MANO520 Series

Intel[®] Socket 1151 Core[™] i7/ i5/ i3 Processors Mini ITX Motherboard

User's Manual

USER'S MANUAL



www.axiomtek.com/

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CAUTION

If you replace wrong batteries, it causes the danger of explosion. It is recommended by the manufacturer that you follow the manufacturer's instructions to only replace the same or equivalent type of battery, and dispose of used ones.

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ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.
- Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components.

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Section 1 Introduction



The MANO520 Mini-ITX motherboard supports the new 14nm 9th and 8th Generation Intel[®] Core[™] i7/ i5/ i3 and Pentium[®] processors in LGA1151 package. Featuring the new Intel[®] H310/Q370(optional) Express chipset with two DDR4 2400/2666MHz memory support, this motherboard is built to perform best stability and reliability for industrial applications.

It comes with three SATA 3.0, four USB 3.0, four USB 2.0 and one RS-232/422/485 port providing robust storage and I/O options. Users also can increase board functionality with PCI-Express x16 and mSATA slot. The high quality MANO520 allows four display interfaces via HDMI, two DisplayPort and LVDS in quadruplicate views, making it an ideal solution for gaming, workstation, digital signage, medical and other IoT&M2M applications.

1.1 Features

- LGA1151 Socket for 9th and 8th Generation Intel[®] Core[™] i7/ i5/ i3 and Pentium[®] processors (Coffee Lake R and Coffee Lake)
- 2 DDR4 2400/2666MHz memory with maximum capacity up to 64 GB
- 1 PCI-Express x16
- 1 mSATA (support SATA, USB 2.0 signal) and 1 SIM card slots
- 1 M.2 Key E, size: 22x30 for WiFi (support PCIE x1, USB 2.0 signal)
- 3 SATA-600
- 4 USB 3.0 and 4 USB 2.0

1.2 Specifications

• CPU

■ LGA1151 Socket for 9th and 8th Generation Intel[®] Core[™] i7/ i5/ i3 and Pentium[®] processors. Max support 65 watts CPU.

Chipset

■ Intel[®] H310/Q370 (optional).

• BIOS

AMI BIOS via SPI interface.

• System Memory

- Two 260-pin SO-DIMM sockets.
- Maximum up to 64GB DDR4 memory.
- Support 2400/2666MHz.

• Onboard Multi I/O

- Controller: ITE8786.
- Four serial ports:
 - COM1 supports RS-232/422/485; COM2~COM4 support RS-232 only.
 - COM1~COM2 on the rear I/O; COM3~COM4 in wafer connectors.

• USB Interface

- Four USB 3.0 ports (on the rear I/O).
- Two USB 2.0 ports (on the rear I/O).
- Two USB 2.0 ports in wafer connector (internal).

• Ethernet

- LAN1: 1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE with Intel[®] i219LM.
- LAN2: 1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE with Intel[®] i211AT.

• Serial ATA

- Three SATA 3.0 port (6Gb/s).
- One mSATA slot.

• Audio

- Realtek ALC662 5.1 channel HDA codec.
- Support MIC-in/line-out (on the rear I/O).
- Support MIC-in/line-out/line-in in box headers (internal).

• Display

- One HDMI with resolution max. up to 3840x2160 @30Hz.
- Two DisplayPort++ with resolution max. up to 4096x2304 @60Hz.
- One 24-bit dual channel LVDS and one 8-pin inverter connector. LVDS resolution is max. up to 1920x1200.

• Expansion Interface

- One PCI-Express x16 slot.
- One SIM card slot.
- One M.2 Key E slot

- **Power Input**
 - One ATX power input connector.
 - One 12V ATX power input connector for CPU power.
- **Operating Temperature** •
 - 0°C ~ 60°C.
- **Storage Temperature** •
 - -10°C ~ 65°C.
- **Form Factor** •
 - Mini ITX (6.7" x 6.7", 17.0cm x 17.0cm).



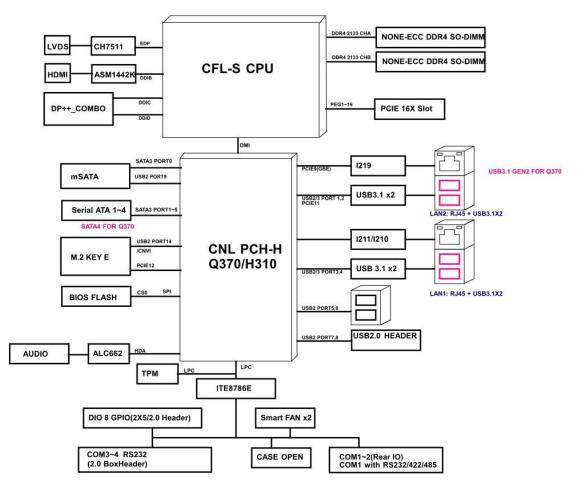
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Note

1.3 **Utilities Supported**

- Chipset driver •
- Graphics driver •
- Intel ME driver •
- Ethernet driver •
- Audio driver
- Chipset_serialio driver •
- Intel_Rapid_Storage_Technology driver •

1.4 Block Diagram

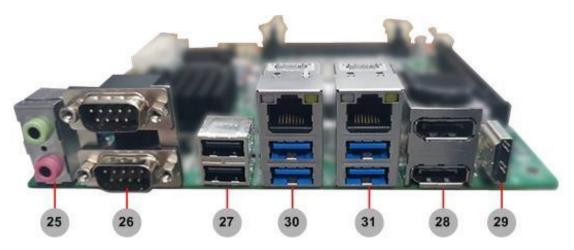


Section 2 Board and Pin Assignments

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2.1 Board Layout

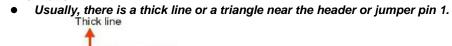
2.2 Rear I/O

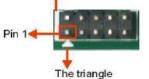


Jumpers/Headers/Connectors				
1	CPU Fan Connector (CN18)	17	Front Audio Connector (CN29)	
2	4-pin ATX Power Input Connector (CN16)	18	COM1 Data/Power Select Jumper (JP5)	
3	PCI-Express x16 Slot (CN15)	19	COM1 RS-232/422/485 Mode Select Jumpers (JP4, JP6, JP7)	
4	mSATA Connector (CN6)	20	Clear CMOS Jumper (JP1)	
5	DDR4 SO-DIMM Connectors (CN1, CN2)	21	Case Open Select Jumper (JP10)	
6	LVDS VDD Select Jumper (JP9)	22	GPIO Header (CN20)	
7	LVDS Signal Header (CN31)	23	M.2 Key E Connector (CN34)	
8	LVDS Backlight Control Header (CN32)	24	System Fan Connector (CN19)	
9	SIM Card Socket (CN5)	25	Audio Jack (CN28)	
10	LVDS Backlight PWM/DC Mode Select Jumper (JP8)	26	COM1 and COM2 D-Sub Connector (CN21)	
11	24-pin ATX Power Input Connector (CN17)	27	USB 2.0 Port (CN13)	
12	Front Panel Header (CN12)	28	DisplayPort Combo Connector (CN3)	
13	AT/ATX Power Mode Select Jumper (JP3)	29	HDMI Connector (CN30)	
14	COM3~COM4 Wafer Connectors (CN22, CN23)	30	LAN1 and USB 3.0 Connector (CN26)	
15	SATA 3.0 Connectors (CN7~CN9)	31	LAN2 and USB 3.0 Connector (CN27)	
16	USB 2.0 Wafer Connector (CN14)			



To identify the first pin of a header or jumper, please refer to the following information:





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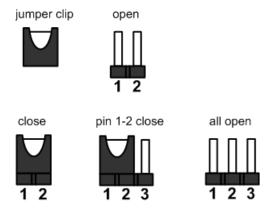
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Square pad, which you can find on the back of the motherboard, is usually used for pin 1.

2.3 Jumper Settings

Pin 14

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. The following illustration shows how to set up jumper.



Before applying power to MANO520 Series, please make sure all of the jumpers are in factory default position. Below you can find a summary table of all jumpers and onboard default settings.

	۱
Note	

Once the default jumper setting needs to be changed, please do it under power-off condition.

Jumper	Description		Setting
JP1	Clear CMOS Default: Normal Operation		1-2 Close
JP3	AT/ATX Power Mode Select Default: ATX Mode		1-2 Close
JP4	COM1 RS-232/422/485 Mode Select Default: RS-232		1-2 Close
JP6			3-5, 4-6 Close
JP7			3-5, 4-6 Close
JP5	COM1 Data/Power Select	CN21 Pin 1: DCD#	3-5 Close
Default: RS-232 Data		CN21 Pin 9: RI#	4-6 Close
JP8	LVDS Backlight PWM/DC Mode Select Default: PWM		1-2 Close
JP9	LVDS VDD Select Default: +3.3V		1-2 Close
JP10	Case Open Select Default: Close		1-2 Close

2.3.1 Clear CMOS (JP1)

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information such as system passwords.

To erase the RTC RAM:

- 1. Turn OFF the computer and unplug the power cord.
- 2. Remove the onboard battery.
- 3. Move the jumper clip from pins 1-2 (default) to pins 2-3. Keep the clip on pins 2-3 for about 5~10 seconds, then move the clip back to pins 1-2.
- 4. Re-install the battery.
- 5. Plug the power cord and turn ON the computer.
- 6. Hold down the key during the boot process and enter BIOS setup to re-enter data.

1	1 🛙
2	2
3	<u>ז</u> ר

2.3.2 AT/ATX Power Mode Select (JP3)

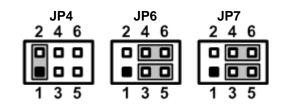
This 3-pin (pitch=2.0mm) jumper allows you to select AT or ATX power mode.

Function	Setting	
ATX mode (Default)	1-2 close	
AT mode	2-3 close	

2.3.3 COM1 RS-232/422/485 Mode Select (JP4, JP6, JP7)

These are 3x2-pin (pitch=2.0mm) jumpers for setting COM1 port to operate in RS-232, RS-422 or RS-485 communication mode.

Function	Setting
RS-232 mode (Default)	JP4 1-2 close JP6 3-5, 4-6 close JP7 3-5, 4-6 close
RS-422 mode	JP4 3-4 close JP6 1-3, 2-4 close JP7 1-3, 2-4 close
RS-485 mode	JP4 5-6 close JP6 1-3, 2-4 close JP7 1-3, 2-4 close



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2.3.4 COM1 Data/Power Select (JP5)

This is a 3x2-pin (pitch=2.0mm) jumper. The COM1 port has +5V power capability on DCD and +12V on RI by setting JP5.

Function	Setting	
Power: Set COM1 pin 1 to +5V	1-3 close	
Data: Set COM1 pin 1 to DCD (Default)	3-5 close	
Power: Set COM1 pin 9 to +12V	2-4 close	
Data: Set COM1 pin 9 to RI (Default)	4-6 close	

2.3.5 LVDS Backlight PWM/DC Mode Select (JP8)

This 3-pin (pitch=2.0mm) jumper enables you to select PWM or voltage control mode for LVDS backlight control header (CN32). These two control modes are for adjusting the brightness of LVDS panel.

Setting	1
1-2 close	2
2-3 close	3
	1-2 close

2.3.6 LVDS VDD Select (JP9)

The motherboard supports voltage selection for flat panel displays. Use this 3x2-pin (pitch=2.54mm) jumper to set up VDD power of the LVDS connector. To prevent hardware damage, before connecting please make sure that the input voltage of LVDS panel is correct.

Function	Setting	1 🗖 🗖
+3.3V (Default)	1-2 close	3 0 0
+5V	3-4 close	5 0 0
+12V	5-6 close	° 8 8

2.3.7 Case Open Select (JP10)

The motherboard has one 2-pin (pitch=2.54mm) jumper for chassis intrusion detection feature.

Function	Setting	1 🔳
Close (Default)	1-2 close	2 0
Active case open	1-2 open	

2.4 Connectors

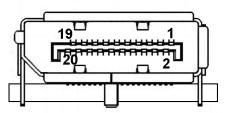
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table showing connectors on the hardware.

Connector	Description
CN1	DIMM1: DDR4 SO-DIMM Connector
CN2	DIMM2: DDR4 SO-DIMM Connector
CN3	DisplayPort Combo Connector
CN5	SIM Card Socket
CN6	mSATA Connector
CN7~CN9	SATA 3.0 Connectors
CN12	Front Panel Header
CN13	USB 2.0 port
CN14	USB 2.0 Wafer Connector
CN15	PCI-Express x16 Slot
CN16~CN17	ATX Power Input Connectors
CN18~CN19	Fan Connectors
CN20	GPIO Header
CN21	COM1 and COM2 D-Sub Connector
CN22~CN23	COM3 and COM4 Wafer Connectors
CN26~CN27	LAN and USB 3.0 Connectors
CN28	Audio Jack
CN29	Front Audio Connector
CN30	HDMI Connector
CN31	LVDS Signal Header
CN32	LVDS Backlight Control Header
CN34	M.2 Key E Connector

2.4.1 DisplayPort Combo Connector (CN3)

The motherboard comes with DisplayPort Combo interface on the rear I/O.

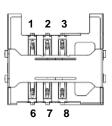
Pin	Signal
1	DP_TX0_P
2	GND
3	DP_TX0_N
4	DP_TX1_P
5	GND
6	DP_TX1_N
7	DP_TX2_P
8	GND
9	DP_TX2_N
10	DP_TX3_P
11	GND
12	DP_TX3_N
13	GND
14	GND
15	DP_AUXP
16	GND
17	DP_AUXN
18	DP_HPD
19	GND
20	+3.3V



2.4.2 SIM Card Socket (CN5)

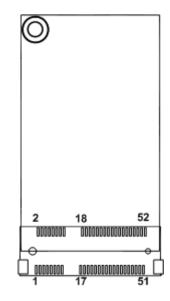
The CN5 is for inserting SIM Card which is mainly used in 3G/4G wireless network application. In order to work properly, the SIM Card must be used together with 3G/4G module which is inserted to CN6.

Pin	Signal	Pin	Signal
1	PWR_UIM	6	DAT_UIM
2	REST_UIM	7	VPP_UIM
3	CLK_UIM	8	GND



Pin	Signal	Pin	Signal
1	N/C	2	+3.3VAUX
3	N/C	4	GND
5	N/C	6	+1.5V
7	N/C	8	UIM_PWR
9	GND	10	UIM_DAT
11	N/C	12	UIM_CLK
13	N/C	14	UIM_REST
15	GND	16	UIM_VPP
17	N/C	18	GND
19	N/C	20	N/C
21	GND	22	PERST#
23	SATA0_RX_DP	24	+3.3VAUX
25	SATA0_RX_DN	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	SATA0_TX_DN	32	SMB_DATA
33	SATA0_TX_DP	34	GND
35	GND	36	USB#6_D-
37	GND	38	USB#6_D+
39	+3.3VAUX	40	GND
41	+3.3VAUX	42	N/C
43	GND	44	N/C
45	N/C	46	N/C
47	N/C	48	+1.5V
49	N/C	50	GND
51	N/C	52	+3.3VAUX

2.4.3 mSATA Connector (CN6)



2.4.4 SATA 3.0 Connectors (CN7~CN9)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for SATA 3.0 interfaces allowing up to 6.0Gb/s data transfer rate. They are computer bus interfaces for connecting to devices such as hard disk drives.

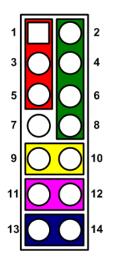
Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND

7	<u>اا</u>	
1		

2.4.5 Front Panel Header (CN12)

The CN12 is a 7x2-pin (pitch=2.54mm) header for front panel interface.

Pin	Signal
1	Power LED+
2	SPK-
3	GND
4	BUZZER-
5	Power LED-
6	N/C
7	N/C
8	SPK+
9	PWR-
10	PWR+
11	RESET-
12	RESET+
13	HD LED-
14	HD LED+



Power LED

Pin 1 connects anode(+) of LED and pin 5 connects cathode(-) of LED. The power LED lights up when the system is powered on.

External Speaker and Internal Buzzer

Pin 2, 4, 6 and 8 connect the case-mounted speaker unit or internal buzzer. While connecting the board to an internal buzzer, please set pin 2 and 4 closed; while connecting to an external speaker, you need to set pins 2 and 4 opened and connect the speaker cable to pin 8(+) and pin 2(-).

Power On/Off Button

Pin 9 and 10 connect the power button on front panel to the board, which allows users to turn on or off power supply.

System Reset Switch

Pin 11 and 12 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system power supply.

HDD Activity LED

This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 13 and 14 connect the hard disk drive to the front panel HDD LED, pin 13 is assigned as cathode(-) and pin 14 is assigned as anode(+).

2.4.6 USB 2.0 Port (CN13)

The motherboard comes with one double-deck Universal Serial Bus (compliant with USB 2.0 (480Mbps)) connector on the rear I/O for installing USB peripherals such as keyboard, mouse, scanner, etc.

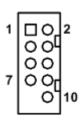
Pin	Signal	Pin	Signal
1	USB VCC (+5V level)	5	USB VCC (+5V level)
2	USB #1_D-	6	USB #8_D-
3	USB #1_D+	7	USB #8_D+
4	GND	8	GND



2.4.7 USB 2.0 Wafer Connector (CN14)

This is a 5x2-pin (pitch=2.00mm) connector for USB 2.0 interface.

Pin	Signal	Pin	Signal
1	+5V	2	+5V
3	USB#7_D-	4	USB#9_D-
5	USB#7_D +	6	USB#9_D +
7	GND	8	GND
		10	N/C



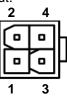
2.4.8 ATX Power Input Connectors (CN16 and CN17)

Steady and sufficient power can be supplied to all components on the board by connecting power connector. Please make sure all components and devices are properly installed before connecting the power connector.

External power supply plug fits into the connector in only one orientation. Properly press down power supply plug until it completely and firmly fits into this connector. Loose connection may cause system instability.

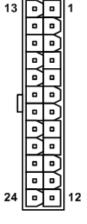
CN16 is a 4-pin connector for DC +12V power input.

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



CN17 is a 24-pin connector for DC power input.

Pin	Signal	Pin	Signal
1	3.3V	13	3.3V
2	3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWR OK	20	-5V
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	3.3V	24	GND



2.4.9 Fan Connectors (CN18 and CN19)

The motherboard has two fan connectors. You can find fan speed option within BIOS Setup Utility if fan is installed. For further information, see BIOS Setup Utility: Advanced\Hardware Monitor\PC Health Status in section 4.4.

CN18: 4-pin (pitch=2.54mm)

Pin	Signal	
1	GND	00
2	+12V	
3	FAN Speed Detection	1
4	FAN Speed Control	

CN19: 3-pin (pitch=2.54mm)

Pin	Signal	
1	GND	1
2	+12V	3
3	FAN Speed Detection	

2.4.10 GPIO Header (CN20)

The CN20 is a 5x2-pin (pitch=2.00mm) header for GPIO interface.

Pin	Signal	Pin	Signal
1	+5V	2	SIO_GPI70 (0xA06 Bit0, H)
3	SIO_GPO74 (0xA06 Bit4, H)	4	SIO_GPI71 (0xA06 Bit1, H)
5	SIO_GPO75 (0xA06 Bit5, H)	6	SIO_GPI72 (0xA06 Bit2, H)
7	SIO_GPO76 (0xA06 Bit6, H)	8	SIO_GPI73 (0xA06 Bit3, H)
9	SIO_GPO77 (0xA06 Bit7, H)	10	GND

1	00	2
3	00	4
5	00	6
7	00	8
9	00	10

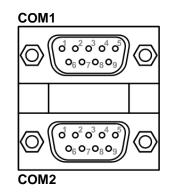
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2.4.11 COM D-Sub Connector (CN21)

The CN21 is a double-deck D-Sub connector for COM1 and COM2 serial port interfaces where only COM1 is selectable for RS-232/422/485 mode by jumper settings (see section 2.3.3). The pin assignments of RS-232/422/485 are listed in table below.



Pin	RS-232	RS-422	RS-485
1	DCD# ^[*]	TX-	Data-
2	RXD	TX+	Data+
3	TXD	RX+	N/C
4	DTR#	RX-	N/C
5	GND	GND	GND
6	DSR#	N/C	N/C
7	RTS#	N/C	N/C
8	CTS#	N/C	N/C
9	RI# ^[*]	N/C	N/C





^[']: Pin 1 of COM1 can be DCD/+5V and pin 9 of COM1 can be Rl/+12V by selecting JP5 (see section 2.3.4).

COM2:

Pin	Signal	Pin	Signal
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

2.4.12 COM Wafer Connectors (CN22 and CN23)

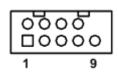
The motherboard comes with two 5x2-pin (pitch=2.00mm) wafer connectors for COM3 and COM4 serial port interfaces.

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Cable is optional.

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Pin	Signal	Pin	Signal
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	N/C

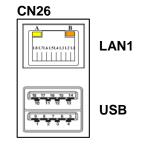


2.4.13 LAN and USB 3.0 Connectors (CN26 and CN27)

The motherboard comes with two high performance plug and play Ethernet interfaces (RJ-45) which are fully compliant with the IEEE 802.3 standard. Connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end to a 1000/100/10 Base-T hub.

The Universal Serial Bus (compliant with USB 3.0) connectors on the rear I/O are for installing USB peripherals such as keyboard, mouse, scanner, etc.

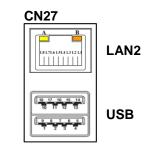
Pin	LAN Signal	Pin	LAN Signal
L1	Tx+ (Data transmission positive)	L2	Tx- (Data transmission negative)
L3	Rx+ (Data reception positive)	L4	RJ-1 (For 1000 Base-T only)
L5	RJ-1 (For 1000 Base-T only)	L6	Rx- (Data reception negative)
L7	RJ-1 (For 1000 Base-T only)	L8	RJ-1 (For 1000 Base-T only)
А	Speed LED	В	Active LED



• Speed LED turns orange for 1000Mbps or green for 100Mbps.

• CN26/CN27 supports Wake-on-LAN. Only CN26 supports AMT when chipset is customized into Intel[®] Q370.

Pin	USB Signal	Pin	USB Signal
1	USB3_POWER	2	USB -
3	USB +	4	GND
5	USB3_SSRX	6	USB3_SSRX+
7	GND	8	USB3_SSTX
9	USB3_SSTX+		



2.4.14 Audio Jack (CN28)

Note

The motherboard provides HD audio jack on the rear I/O. Install audio driver, and then attach audio devices to CN28.

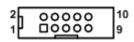
Pin Color	Signal
Green	Line-out
Pink	MIC-in

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2.4.15 Front Audio Connector (CN29)

This is a 5x2-pin (pitch=2.00mm) connector for convenient connection and control of audio devices.

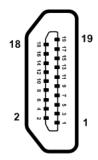
Pin	Signal	Pin	Signal
1	MIC_IN	2	GND
3	LINE_IN_L	4	GND
5	LINE_IN_R	6	GND
7	AUD_OUT_L	8	GND
9	AUD_OUT_R	10	GND



2.4.16 HDMI Connector (CN30)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

Pin	Signal	Pin	Signal
1	HDMI OUT_DATA2+	2	GND
3	HDMI OUT_DATA2-	4	HDMI OUT_DATA1+
5	GND	6	HDMI OUT_DATA1-
7	HDMI OUT_DATA0+	8	GND
9	HDMI OUT_DATA0-	10	HDMI OUT_Clock+
11	GND	12	HDMI OUT_Clock-
13	N/C	14	GND
15	HDMI OUT_SCL	16	HDMI OUT_SDA
17	GND	18	+5V
19	HDMI_HTPLG		



LVDS Signal Header (CN31) 2.4.17

This is a 2x20-pin (pitch=1.0mm) connector which is compliant with JST SM40B-SRDS-G-TF for LVDS LCD interface. It is strongly recommended to connect it with matching connector, SHDR-40VS-B.

Pin	Signal	Pin	Signal
1	VDD ^[*]	2	VDD ^[*]
3	VDD ^[*]	4	VDD ^[*]
5	VDD ^[*]	6	VDD ^[*]
7	N/C	8	N/C
9	GND(Detect) ^[**]	10	GND
11	LVDS_B_DATA3-	12	LVDS_B_DATA0-
13	LVDS_B_DATA3+	14	LVDS_B_DATA0+
15	GND	16	GND
17	LVDS_B_CLK-	18	LVDS_B_DATA1-
19	LVDS_B_CLK +	20	LVDS_B_DATA1+
21	GND	22	GND
23	LVDS_A_DATA0-	24	LVDS_B_DATA2-
25	LVDS_A_DATA0+	26	LVDS_B_DATA2+
27	GND	28	GND
29	LVDS_A_DATA1-	30	LVDS_A_DATA3-
31	LVDS_A_DATA1+	32	LVDS_A_DATA3+
33	LVDS_PRSNT#	34	GND
35	LVDS_A_DATA2-	36	LVDS_A_CLK-
37	LVDS_A_DATA2+	38	LVDS_A_ CLK +
39	GND(Detect) ^[**]	40	GND

)



^[']: Panel power VDD is 3.3V by default, 5V or 12V is selectable by jumper JP9, see section 2.3.6. ^[*']: Grounding of this pin is required to ensure normal LVDS output.

2.4.18 LVDS Backlight Control Header (CN32)

This is an 8-pin (pitch=1.25mm) connector which is compliant with Hirose DF13-8P-1.25V for inverter. We strongly recommend you to use the matching connector, DF13-8S-1.25C, to avoid malfunction.

Pin	Signal	
1	+12V	
2	+12V	
3	+5V	
4	LVDS_BKL_EN	
5	GND	
6	GND	ਂ ਖੋ 🗗
7	GND	
8	LVDS_BKL_CTL ^[*]	

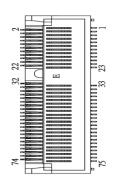


 ${}^{{\scriptscriptstyle [1]}}\!:$ This signal is selectable by jumper JP8, see section 2.3.5.

2.4.19 M.2 Key E Connector (CN34)

The motherboard comes with one M.2 Key E connector (Wi-Fi & Bluetooth).

Pin	Signal	Pin	Signal	Pin	Signal
1	GND	26	N/C	51	GND
2	+3.3V	27	N/C	52	BUF_PLT_RST
3	USB#14_D+	28	N/C	53	NGFF_CLKREQ3
4	+3.3V	29	N/C	54	BT_KILL1
5	USB#14_D-	30	N/C	55	PCH_WAKE
6	N/C	31	N/C	56	WLAN_KILL1
7	GND	32	CNV_RGI_DT ^[*]	57	GND
8	N/C	33	GND	58	N/C
9	CNV_WR_1_DN ^[*]	34	CNV_RGI_RSP[*]	59	CNV_WT_1_DN ^[*]
10	PCM_CRF_RST ^[*]	35	PCIE12_TX_DP[*]	60	N/C
11	CNV_WR_1_DP[*]	36	CNV_BRI_DT ^[*]	61	CNV_WT_1_DP[*]
12	N/C	37	PCIE12_TX_DN	62	N/C
13	GND	38	CL_RST ^[*]	63	GND
14	PCMOUT_CLKREQ0["]	39	GND	64	M2_REFCLK
15	CNV_WR_0_DN ^[*]	40	CL_DATA ^[*]	65	CNV_WT_0_DN ^[*]
16	N/C	41	PCIE12_RX_DP	66	N/C
17	CNV_WR_0_DP[*]	42	CL_CLK ^[*]	67	CNV_WT_0_DP[*]
18	GND	43	PCIE12_RX_DN	68	N/C
19	GND	44	CNV_PA_BLANKING[*]	69	GND
20	UART_BT_WAKE	45	GND	70	N/C
21	CNV_WR_CLK_DN ^[*]	46	CNV_MFUART2_TXD[*]	71	CNV_WT_CLK_DN ^[*]
22	CNV_BRI_RSP[*]	47	CLKOUT_PCIE_P3	72	+3.3V
23	CNV_WR_CLK_DP[*]	48	CNV_MFUART2_RXD[*]	73	CNV_WT_CLK_DP[*]
24	N/C	49	CLKOUT_PCIE_N3	74	+3.3V
25	N/C	50	PCH_SUSCLK	75	GND





^[*]: These pins are for CNVI module.

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Section 3 Hardware Description

3.1 **Microprocessors**

The MANO520 Series supports $Intel^{\mbox{\tiny B}}$ Core $^{\mbox{\tiny M}}$ i7/ i5/ i3, Pentium and Celeron processors, which enable your system to operate under Windows 10 and Linux environments. The system performance depends on the microprocessor. Make sure all correct settings are arranged for your installed microprocessor to prevent the CPU from damages.

3.2 BIOS

The MANO520 Series uses AMI Plug and Play BIOS with a single SPI Flash.

3.3 System Memory

The MANO520 supports two 260-pin DDR4 SO-DIMM sockets for maximum memory capacity up to 32GB DDR4 SDRAMs. The memory module comes in sizes of 2GB, 4GB, 8GB and 16GB.



- For single memory channel configuration, install memory module in channel 0 (CN1) DDR4 SO-DIMM socket.
- For dual memory channel configuration, install memory modules of the same size, chip width, density and rank in both channel 0 (CN1) and channel 1 (CN2) DDR4 SO-DIMM sockets.

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Section 4 AMI BIOS Setup Utility

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:

- 1. Turn on the computer and press during the Power On Self Test (POST) to enter BIOS setup, otherwise, POST will continue with its test routines.
- 2. Once you enter the BIOS, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

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If your computer cannot boot after making and saving system changes with BIOS setup, you can restore BIOS optimal defaults by setting JP1 (see section 2.3.1).

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

4.2 Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.



Some of the navigation keys differ from one screen to another.

Hot Keys	Description
→ ← Left/Right The Left and Right < Arrow> keys allow you to select a setup scree	
↑↓ Up/Down The Up and Down <arrow> keys allow you to select a setup sc screen.</arrow>	
Enter	The <enter> key allows you to display or change the setup option listed for a particular setup item. The <enter> key can also allow you to display the setup sub screens.</enter></enter>
+– Plus/Minus	The Plus and Minus <arrow> keys allow you to change the field value of a particular setup item.</arrow>
F1	The <f1> key allows you to display the General Help screen.</f1>
F2	The <f2> key allows you to Load Previous Values.</f2>
F3	The <f3> key allows you to Load Optimized Defaults.</f3>
F4	The <f4> key allows you to save any changes you have made and exit Setup. Press the <f4> key to save your changes.</f4></f4>
Esc	The <esc> key allows you to discard any changes you have made and exit the Setup. Press the <esc> key to exit the setup without saving your changes.</esc></esc>

4.3 Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.

Main A	Aptio Setup Ut dvanced Chipset	ility - Copyright (C) 2018 American Security Boot Save & Exit	Megatrends, Inc.
BIOS Information Build Date and Time Project Version System Date System Time Access Level		01/08/2019 14:05:41 MANO520 V2.00 H310 [Tue 01/08/2019] [18:09:01] Administrator	Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 2005-2099 Months: 1-12 Days: dependent on month
Board Info Processor PCH Memory		CoffeeLake DT Intel(R) Core(TM) i3-8100T CPU @ 3.10GHz B0 CNL PCH-H H310 B0 16384 MB 2400 MHz	<pre>++: Select Screen 1↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
	Version 2.20	.1271. Copyright (C) 2018 American M	egatrends, Inc.

BIOS Information

Display the BIOS information.

System Date/Time

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

Access Level

Display the access level of current user.

Board Information

Display the board information.

4.4 Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► IT8786 Super IO Configuration
- ► Hardware Monitor
- Smart Fan Function
- Trusted Computing
- ACPI Settings
- CPU Configuration
- SATA And RST Configuration
- PCH-FW Configuration
- ► USB Configuration

For items marked with "▶", please press <Enter> for more options.

Aptio Setup Ut Main <mark>Advanced</mark> Chipset	ıt (C) 2018 American Megatrends, Inc. t Save & Exit				
MainAdvancedChipsetSecurityBootSave & Exit> IT8786Super IO Configuration>System Super IO Chip> Hardware Monitor>>Parameters.> Smart Fan Function>>Parameters.> Trusted Computing>>>> ACPI Settings>>>> CPU Configuration>>>> SATA And RST Configuration>>>> PCH-FW Configuration>>>> USB Configuration>>>					
	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>				
Version 2.20	(C) 2018 American Megatrends, Inc.				

• IT8786 Super IO Configuration

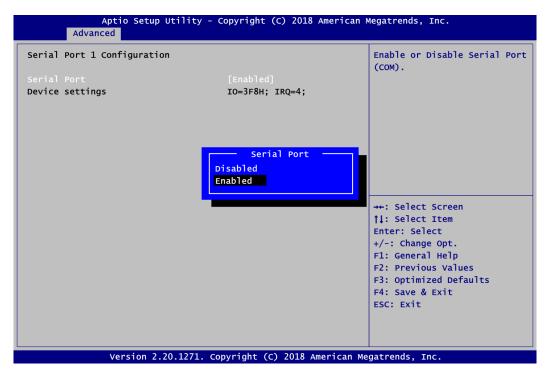
You can use this screen to select options for the Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "▶", please press <Enter> for more options.

Aptio Setup Util ⁻ Advanced	ity - Copyright (C) 201	18 American Megatrends, Inc.
IT8786 Super IO Configuration		Set Parameters of Serial Port 1 (COMA).
<pre>Super IO Chip > Serial Port 1 Configuration > Serial Port 2 Configuration > Serial Port 3 Configuration > Serial Port 4 Configuration</pre>	IT8786	
		<pre>++: Select Screen \$\$\phi: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.20.12	71. Copyright (C) 2018	American Megatrends, Inc.

Serial Port 1~4 Configuration

Use these items to set parameters related to serial port 1~4.

• Serial Port 1~4 Configuration



Serial Port

Enable or disable serial port 1~4. The optimal settings for base I/O address and for interrupt request address are:

- Serial port 1: 3F8h, IRQ4
- Serial port 2: 2F8h, IRQ3
- Serial port 3: 3E8h, IRQ7
- Serial port 4: 2E8h, IRQ6

• Hardware Monitor

This screen monitors hardware health status.

Aptio Setup U Advanced	tility - Copyright (C) 2018 Am	erican Megatrends, Inc.
Pc Health Status		
CPU temperature System temperature CPU Fan Speed System Fan Speed VCC_CPU VCC_DDR +12V +5V +3.3V_SBY	: +48 °C : +35 °C : 1137 RPM : N/A : +0.756 V : +1.200 V : +12.312 V : +5.070 V : +3.400 V	<pre>→+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.20	0.1271. Copyright (C) 2018 Amer	rican Megatrends, Inc.

This screen displays the temperature of system and CPU, cooling fans speed in RPM and system voltages (VCC_CPU, VCC_DDR, +12V, +5V and +3.3V standby).

• Smart Fan Function

This screen allows you to select CPU fan and system fan mode.

Aptio Setup (Advanced	Utility - Copyright (C) 2018 Ameri	ican Megatrends, Inc.
Pc Health Status		CPU FAN Mode Select
CPU FAN System FAN	[Full On] [Full On]	
	CPU FAN Full On Manual Mode Automatic Mode	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.2	0.1271. Copyright (C) 2018 America	an Megatrends, Inc.

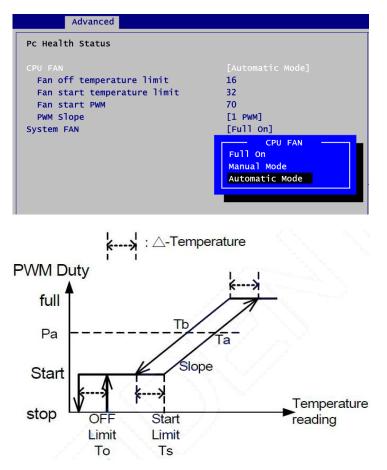
CPU FAN\System FAN

This item allows you to select the fan speed option(s) of CPU fan and system fan (see section 2.4.9) which can be set to Full on, Manual and Automatic Mode.

- Full On: The fan always runs at full speed.
- Manual Mode: Use the start PWM value to set fan speed manually. The range is from 0 to 255.

Advanced	
Pc Health Status	
CPU FAN Fan start PWM System FAN	[Manual Mode] 70 [Full On]
	CPU FAN Full On Manual Mode Automatic Mode

- Automatic Mode: Follow super I/O IT8786 integrated automatic mode described below to adjust the fan speed.



• Trusted Computing

This screen provides function for specifying the TPM settings.

Aptio Setup Ut Advanced	ility - Copyright (C) 2018 /	American Megatrends, Inc.
TPM20 Device Found Firmware Version: Vendor: Security Device Support TPM Device Selection Active PCR banks Available PCR banks	402.1 INTC [Enable] [PTT] SHA-1, SHA256 SHA-1, SHA256	Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.
Pending operation		<pre>→+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2 20	.1271. Copyright (C) 2018 Am	perican Megatrends Inc

Security Device Support

Enable or disable BIOS support for security device, see image below. OS will not show security device. TCG EFI protocol and INT1A interface will not be available.

Advanced	
TPM20 Device Found	402.4
Firmware Version:	402.1
Vendor:	INTC
Security Device Support TPM Device Selection Active PCR banks Available PCR banks	[Enable] [PTT] SHA-1, SHA256 SHA-1, SHA256
Pending operation	Security Device Support — Disable Enable

TPM Device Selection

Select TPM device:

- PTT: Intel[®] built-in TPM.

Advanced	
TPM20 Device Found Firmware Version: Vendor:	402.1 INTC
Security Device Support TPM Device Selection Active PCR banks Available PCR banks	[Enable] [PTT] SHA-1, SHA256 SHA-1, SHA256
Pending operation	TPM Device Selection

- dTPM: External extended Infineon's TPM (optional).

Advanced	
TPM20 Device Found Firmware Version: Vendor:	5.62 IPX
Security Device Support TPM Device Selection Active PCR banks Available PCR banks	[Enable] [dTPM] SHA-1, SHA256 SHA-1, SHA256
Pending operation	None

Pending operation

Schedule an operation for the security device, see image below.

- None
- TPM Clear: Clear all data secured by TPM.

Advanced	
TPM20 Device Found	
Firmware Version:	402.1
Vendor:	INTC
Security Device Support	[Enable]
TPM Device Selection	[РТТ]
Active PCR banks	SHA-1, SHA256
Available PCR banks	SHA-1, SHA256
	Pending operation

• ACPI Settings

Aptio Setu Advanced	ıp Utility - Copyright (C) 2018 American	Megatrends, Inc.
ACPI Settings		
ACPI Sleep State	[S3 (Suspend to RAM)]	
		↔: Select Screen
		<pre> \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$</pre>
		+/-: Change Opt. F1: General Help
		F2: Previous Values
		F3: Optimized Defaults F4: Save & Exit
		ESC: Exit
Version 2	2.20.1271. Copyright (C) 2018 American Mo	egatrends, Inc.

ACPI Sleep State When the suspend button is pressed, the ACPI (Advanced Configuration and Power Interface) sleep state is S3 (Suspend to RAM).

• CPU Configuration

This screen shows CPU information, and you can change the value of the selected option.

Aptio Setup Advanced	Utility - Copyright (C) 2018 Ameri	can Megatrends, Inc.
CPU Configuration		When enabled, a VMM can
Type ID Speed L1 Data Cache L1 Instruction Cache L2 Cache	Genuine Intel(R) CPU 0000 @ 1.60GHz 0x906EA 1600 MHz 32 KB x 6 32 KB x 6 256 KB x 6	hardware capabilities provided by Vanderpool Technology.
L3 Cache L4 Cache VMX Intel (VMX) Virtualization Technology Intel(R) SpeedStep(tm)	Intel (VMX) Virtualization T Disabled Enabled	echnology
Turbo Mode	[Disabled]	<pre>[]: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.	20.1271. Copyright (C) 2018 America	an Megatrends, Inc.

Intel (VMX) Virtualization Technology

Enable or disable Intel Virtualization Technology. When enabled, a VMM (Virtual Machine Mode) can utilize the additional hardware capabilities. It allows a platform to run multiple operating systems and applications independently, hence enabling a single computer system to work as several virtual systems.

Advanced	
CPU Configuration	
Туре	Genuine Intel(R) CPU 0000 @ 1.60GHz
ID	0x906EA
Speed	1600 MHz
L1 Data Cache	32 КВ х б
L1 Instruction Cache	32 КВ х б
L2 Cache	256 КВ х 6
L3 Cache	Intel(R) SpeedStep(tm)
L4 Cache	Disabled
VMX	Enabled
Intel (VMX) Virtualization	Enabreu
Technology	
<pre>Intel(R) SpeedStep(tm)</pre>	
Turbo Mode	[Disabled]

Intel(R) SpeedStep(tm) Enable or disable Intel[®] SpeedStep. It allows more than two frequency ranges to be supported.

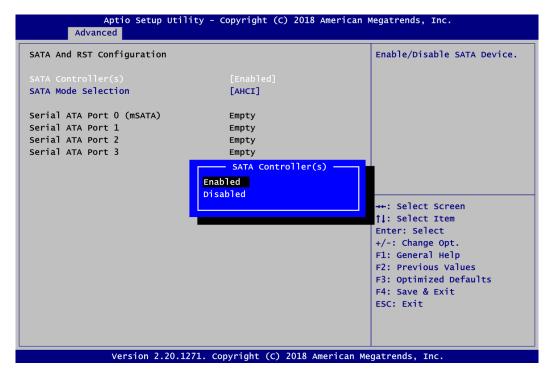
Advanced	
CPU Configuration	
Туре	Genuine Intel(R) CPU 0000 @ 1.60GHz
ID	0x906EA
Speed	1600 MHz
L1 Data Cache	32 КВ х б
L1 Instruction Cache	32 КВ х б
L2 Cache	256 КВ х 6
L3 Cache	Turbo Mode
L4 Cache	Disabled
VMX	Enabled
Intel (VMX) Virtualization	
Technology	
Intel(R) SpeedStep(tm) Turbo Mode	[Disabled]

Turbo Mode

Enable or disable Intel[®] turbo boost mode allowing processor cores to run faster but not exceed CPU defined frequency limits.

• SATA and RST Configuration

During system boot up, BIOS automatically detects the presence of SATA devices. In the SATA Configuration menu, you can see the hardware currently installed in SATA ports.



SATA Controller(s)

Enable or disable the SATA Controller feature. The default is Enabled.

SATA Mode Selection

Determine how SATA controller(s) operate. Operation mode options are:

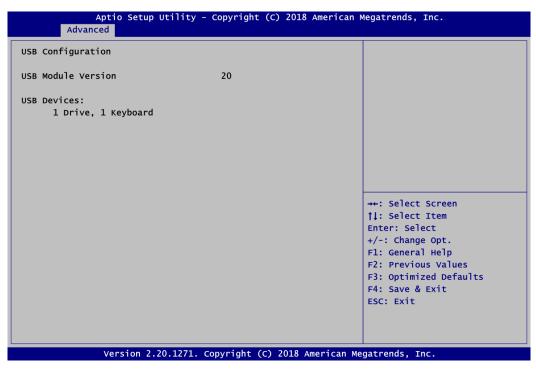
- AHCI (Advanced Host Controller Interface)
- Intel RST Premium With Intel Optane System Acceleration

• PCH-FW Configuration

This screen displays ME Firmware information.

Aptic Advanced	9 Setup Utility - Copyright (C) 2018 American	Megatrends, Inc.
ME Firmware Version ME Firmware Mode ME Firmware SKU	Normal Mode Corporate SKU	<pre>→+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Ver	sion 2.20.1271. Copyright (C) 2018 American Me	gatrends, Inc.

• USB Configuration



USB Devices

Display all detected USB devices.

4.5 Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- System Agent (SA) Configuration
- PCH-IO Configuration

For items marked with "▶", please press <Enter> for more options.

 System Agent (SA) Configuration PCH-IO Configuration 	System Agent (SA) Parameters
	<pre> ++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>

• System Agent (SA) Configuration

This screen allows users to configure System Agent (SA) parameters. For items marked with "▶", please press <Enter> for more options.

Aptio Setup (Chipset	utility - Copyright (C) 2018 Am	nerican Megatrends, Inc.
SA PCIe Code Version VT-d ≻ Graphics Configuration ▶ Memory Configuration	7.0.46.80 Supported	Graphics Configuration
		<pre>→+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.2	0.1271. Copyright (C) 2018 Ame	rican Megatrends, Inc.

Graphics Configuration

Open sub menu for parameters related to graphics configuration.

Memory Configuration

Open sub menu for information related to system memory.

• Graphics Configuration

Graphics Configuration Primary IGFX Boot Display			Select the Video Device whic will be activated during POS
LVDS Panel Type	[1280x768	18Bit]	This has no effect if extern graphics present. Secondary boot display selection will appear based your selection. VGA modes will be supported only on primary display.
	AUTO HDMI	oor Display -	
	DP1(Up)		↔+: Select Screen
	DP2 (Down) LVDS		<pre> \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$</pre>
			+/-: Change Opt.
			F1: General Help F2: Previous Values
			F3: Optimized Defaults
			F4: Save & Exit
			ESC: Exit

Primary IGFX Boot Display

Select the video device which will be activated during POST (Power-On Self Test). The default is Auto.

Aptio Setup Utili Chipset	ty - Copyright (C)	2018 Americar	Megatrends, Inc.
Graphics Configuration Primary IGFX Boot Display Secondary IGFX Boot Display LVDS Panel Type	[HDMI] [DP1(Up)] [1280x768	18Bit]	Select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display.
	Primary IGFX B AUTO HDMI DP1(Up) DP2(Down) LVDS	oot Display —	<pre>++: Select Screen \$\$\\$\\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$</pre>
Version 2.20.12	71. Copyright (C)	2018 American	Megatrends, Inc.

Secondary IGFX Boot Display

After selecting other than "AUTO" on "Primary IGFX Boot Display", the Secondary IGFX Boot Display will show up and the options are Disabled, HDMI and VGA.

MANO520 Mini ITX Motherboard

Graphics Configuration		Select LCD panel used by DP
Primary IGFX Boot Display	[HDMI]	Device by selecting the
Secondary IGFX Boot Display	[DP1(Up)]	appropriate setup item.
LVDS Panel Type	LVDS Panel Type ——	
	800x600 18Bit	
	1024x768 18Bit	
	1024x768 24Bit	
	1280x768 18Bit	
	1280x800 18Bit	
	1280x960 18Bit	
	1280x1024 48Bit	
	1366x768 18Bit	
	1366x768 24Bit	→+: Select Screen
	1440x900 48Bit	↑↓: Select Item
	1440x1050 48Bit	Enter: Select
	1600x900 48Bit	+/-: Change Opt.
	1680x1050 48Bit	F1: General Help
	1600x1200 48Bit	F2: Previous Values
	1920x1080 48Bit	F3: Optimized Defaults
	1920x1200 48Bit	F4: Save & Exit
		ESC: Exit

LVDS Panel Type

Select the appropriate LVDS panel resolution; see the selection options in image above.

• Memory Configuration

This screen shows the system memory information.

Aptio Setup Uti Chipset	lity - Copyright (C) 2018 American	Megatrends, Inc.
Memory Configuration		
Memory RC Version Memory Size	0.7.1.65 4096 MB	
Channel 0 Slot 0 Size Number of Ranks Manufacturer Channel 1 Slot 0	Populated & Enabled 4096 MB (DDR4) 1 Kingston Not Populated / Disabled	<pre>→+: Select Screen 1↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.20.1	L271. Copyright (C) 2018 American M	legatrends, Inc.

• PCH-IO Configuration

This screen allows you to set PCH parameters.

Aptio Setup Chips	0 Utility - Copyright (C) 2018 Amer et	ican Megatrends, Inc.
PCH LAN Controller	[Disabled] PCH LAN Controller – Enabled Disabled	Enable/Disable onboard NIC. →+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2	.20.1271. Copyright (C) 2018 Americ	an Megatrends. Inc.

PCH LAN Controller

Enable or disable onboard PCH LAN controller.

Chipset	
PCH LAN Controller Wake on LAN Enable	[Enabled] [Enabled]
	PCH LAN Controller Enabled Disabled

Wake on LAN

After enabling PCH LAN Controller, enabling or disabling integrated LAN to wake the system.

4.6 Security Menu

The Security menu allows users to change the security settings for the system.

Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.		
Main Advanced Chipset	Security Boot	Save & Exit
Password Description		Set Setup Administrator Password
If ONLY the Administrator's then this only limits acces only asked for when enterin If ONLY the User's password is a power on password and boot or enter Setup. In Set have Administrator rights. The password length must be in the following range: Minimum length	s to Setup and is g Setup. is set, then this must be entered to	
Maximum length Setup Administrator Passwor User Password	20 d	<pre> ++: Select Screen \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$</pre>
Version 2.20).1271. Copyright (C) 2018 American Megatrends, Inc.

- Setup Administrator Password Set setup administrator password.
- User Password Set user password.

4.7 Boot Menu

Boot Configuration		Number of seconds to wait for
Setup Prompt Timeout	3	<pre>setup activation key. 65535(0xFFFF) means indefinit</pre>
Bootup Numlock State	[On]	waiting.
Quiet Boot	[Disabled]	
Launch UEFI PXE OpROM policy	[Disabled]	
Boot Option Priorities		
Boot Option #1	[UEFI: JetFlashTranscend 16GB 1100, Partition 1]	
Boot Mode	[UEFI Mode]	<pre>→+: Select Screen †↓: Select Item Enter: Select</pre>
		+/-: Change Opt.
		F1: General Help
		F2: Previous Values
		F3: Optimized Defaults F4: Save & Exit
		ESC: Exit
		ESC: Exit

The Boot menu allows users to change boot options of the system.

- Setup Prompt Timeout Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
- **Bootup NumLock State** Use this item to select the power-on state for the keyboard NumLock.
- Quiet Boot

Select to display either POST output messages or a splash screen during boot-up.

Main Advanced Chipset	Security Boot Save & Exit
Boot Configuration	
Setup Prompt Timeout	3
Bootup Numlock State	[On]
Quiet Boot Launch UEFI PXE OpROM policy PXE LAN Select	[Disabled] [Enabled] [LAN1]
Boot Option Priorities	
Boot Option #1	Launch UEFI PXE OpROM policy - Disabled Enabled
Boot Mode	

• Launch UEFI PXE OpROM policy

Control the execution of UEFI PXE OpROM. When enabled, you may select LAN1 or LAN2 as PXE LAN port.

• Boot Option Priorities

These are settings for boot priority. Specify the boot device priority sequence from the available devices.

Boot Mode

Use this option for boot mode settings.

- UEFI Boot: Select support to boot any UEFI-capable OS.
- Legacy Boot: Select support to boot non UEFI-capable OS that expects a legacy BIOS interface.

4.8 Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.

Aptio Setup Utility - Copyright (C) 2018 American Main Advanced Chipset Security Boot <mark>Save & Exit</mark>	Megatrends, Inc.
Save Options Save Changes and Exit Discard Changes and Exit Save Changes and Reset Discard Changes and Reset Save Changes Discard Changes Default Options Restore Defaults	Exit system setup after saving the changes.
Save as User Defaults Restore User Defaults Boot Override UEFI: Built-in EFI Shell UEFI: Ut163 TS1GJFV10 0.00, Partition 1 Ut163 TS1GJFV10 0.00 Version 2.20.1271. Copyright (C) 2018 American M	<pre>→+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>

• Save Changes and Exit

When you have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

• Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

• Save Changes and Reset

When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

• Discard Changes and Reset

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

• Save Changes

When you have completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

• Discard Changes

Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

• Restore Defaults

It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

• Save as User Defaults

Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

• Restore User Defaults

It automatically sets all Setup options to a complete set of User Defaults when you select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

• Boot Override

Select a drive to immediately boot that device regardless of the current boot order.

Appendix A Watchdog Timer

A.1 About Watchdog Timer

Software stability is major issue in most application. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solution.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

A.2 Sample Program

- 1. Enter ADU, and press <F4> to select the superior ITE
- 2. **PORT** setting **002E**, **002F**
- 3. Address 07h setting 07 GPIO
- 4. Address 72h to set the countdown, for example Sec: C0, Min: 40
- 5. Address 73h set the countdown time, for example 10sec: 0A

This page is intentionally left blank.

Appendix B Configuring SATA for RAID

B.1 Configuring SATA Hard Drive(s) for RAID Function

Before you begin the SATA configuration, please prepare:

• Two SATA hard drives (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). If you do not want to create RAID with the SATA controller, you may prepare only one hard drive.

Please follow up the steps below to configure SATA hard drive(s):

- 1. Install SATA hard drive(s) in your system.
- 2. Enter the BIOS Setup to configure SATA controller mode and boot sequence.
- 3. Configure RAID by the RAID BIOS.

1. Installing SATA hard drive(s) in your system.

Connect one end of the SATA signal cable to the rear of the SATA hard drive, and the other end to available SATA port(s) on the board. Then, connect the power connector of power supply to the hard drive.

2. Configuring SATA controller mode and boot sequence by the BIOS Setup.

You have to make sure whether the SATA controller is configured correctly by system BIOS Setup and set up BIOS boot sequence for the SATA hard drive(s).

2.1. Turn on your system, and then press the button to enter BIOS Setup during running POST (Power-On Self Test). If you want to create RAID, just go to the Advanced Settings menu/SATA and RST Configuration, select the "SATA Mode Selection", and press <Enter> for more options.

Aptio Setup Utilit Advanced	y - Copyright (C) 2019 American	Megatrends, Inc.
SATA And RST Configuration		Determines how SATA controller(s) operate.
SATA Controller(s)	[Enab]ed]	
SATA Mode Selection	[AHCI]	
Serial ATA Port 0 (mSATA)	HAGIWARA LFDMS (120.0GB)	
Serial ATA Port 1	Empty	
Serial ATA Port 2 Serial ATA Port 3	ST500DM002-1SB (500.1GB) Empty	
		<pre>++: Select Screen \$ 1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.20.127	1. Copyright (C) 2019 American M	legatrends, Inc.

A list of options appears, please select "Intel RST Premium With Intel Optane System Acceleration".

GATA And RST Configuration		Determines how SATA controller(s) operate.
SATA Controller(s)	[Enabled]	concrotter (s) operate.
ATA Mode Selection	[AHCI]	
erial ATA Port 0 (mSATA)	HAGIWARA LFDMS (120.0GB)	
Serial ATA Port 1	Empty	
Serial ATA Port 2	ST500DM002-1SB (500.1GB)	
Serial ATA Port 3	Empty	
AHCI Intel RST	SATA Mode Selection —— Premium With Intel Optane System	Acceleration
		en
		en Enter: Select
		Enter: Select +/-: Change Opt.
		Enter: Select +/-: Change Opt. F1: General Help
		Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values
		Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults
		Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values

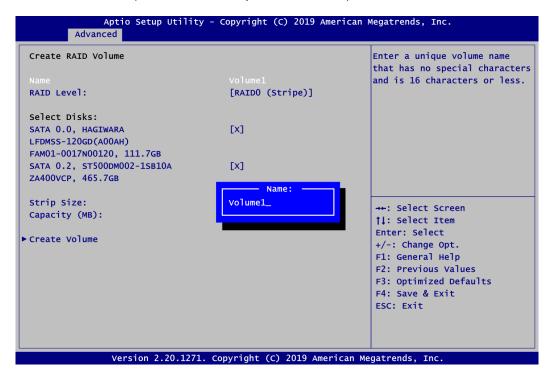
2.2. Set DVD-ROM for First Boot Option under the Boot Settings menu to boot DVD-ROM after system restarts.

3. Configuring RAID.

3.1. Configure a RAID array. If you want to create a RAID array, select the Intel(R) Rapid Storage Technology option and press <Enter>.

Aptio Setup Utility - C Advanced	Copyright (C) 2019 American	Megatrends, Inc.
SATA And RST Configuration		This formset allows the user to manage RAID volumes on the
SATA Controller(s) SATA Mode Selection > Intel(R) Rapid Storage Technology > Intel(R) Ethernet Connection (7) 1219	[Enabled] [Intel RST Premium With Intel Optane System Acceleration] D-LM - 88:88:88:88:87:88	Intel(R) RAID Controller
Serial ATA Port 0 (mSATA) Serial ATA Port 1 Serial ATA Port 2 Serial ATA Port 3	HAGIWARA LFDMS (120.0GB) Empty sT500DM002-1SB (500.1GB) Empty	<pre>→+: Select Screen †↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.20.1271. Co	pyright (C) 2019 American Me	gatrends, Inc.

3.2. After entering the Create RAID Volume screen, you can type the disk array name with 1~16 letters or less (letters cannot be special characters) in the item "Name".



3.3. Then select a RAID level. There are three RAID levels: RAID0 (Stripe), RAID1 (Mirror) and Recovery. The RAID level option list varies according to the number of connected storage devices. For example, it can support RAID0, RAID1, RAID5 or RAID10 if 4 storages devices are connected to the system.

Aptio Setup Utility - Advanced	Copyright (C) 2019 American	Megatrends, Inc.
Create RAID Volume		Select RAID Level
Name RAID Level:	Volume1 [RAIDO (Stripe)]	
Select Disks: SATA 0.0, HAGIWARA LFDMSS-120GD(A00AH) FAM01-0017N00120, 111.7GB	[X]	
SATA 0.2, ST500DM002-1SB10A ZA400VCP, 465.7GB Strip Size: Capacity (MB):	[X] RAID Level: RAIDO (Stripe) RAIDI (Mirror)	↔: Select Screen
► Create Volume	Recovery	<pre> †1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit</pre>
Version 2.20.1271. C	opyright (C) 2019 American Me	ESC: Exit

Aptio Setup Ut Advanced	ility - Copyright (C) 2019 Amer	ican Megatrends, Inc.
Create RAID Volume		X - to Select Disk
Name RAID Level:	Volume1 [RAIDO (Stripe)]	
Select Disks: SATA 0.0, HAGIWARA LFDMSS-120GD(A00AH) FAM01-0017N00120, 111.7GB		
SATA 0 ZA400V(x Strip 1	\ LFDMSS-120GD(A00AH) FAM01-0017	7N00120, 111.7GB
Capacity (MB): Create Volume		<pre> fl: Select Item Enter: Select +/-: Change Opt.</pre>
Select at least two disks		F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.	1271. Copyright (C) 2019 Americ	can Megatrends, Inc.

Don't forget to Select Disks by typing "X" as indicated in image below.

3.4. Set the stripe block size. The KB is the standard unit of stripe block size. The stripe block size can be 4KB to 128KB.

Aptio Setup Utilit Advanced	ty - Copyright (C) 2019 Amer	ican Megatrends, Inc.
Create RAID Volume		Strip size help
Name RAID Level:	Volume1 [RAIDO (Stripe)]	
Select Disks: SATA 0.0, HAGIWARA LFDMSS-120GD(A00AH) FAM01-0017N00120, 111.7GB	[X]	
SATA 0.2, ST500DM002-1SB10A ZA400VCP, 465.7GB	[×]	
Strip Size: Capacity (MB): ▶ Create Volume	[64кв] 228942	<pre>→+: Select Screen ↑↓: Select Item Enter: Select</pre>
		+/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.127	1. Copyright (C) 2019 Americ	an Megatrends, Inc.

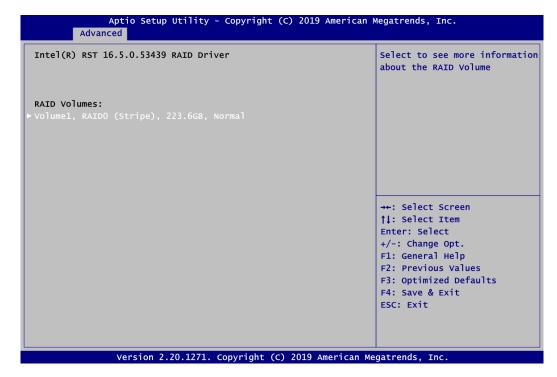
3.5. After the setting, proceed to next step for the array capacity setting.

Aptio Setup Utilit Advanced	y - Copyright (C) 2019 Amer	ican Megatrends, Inc.
Create RAID Volume		Capacity in MB
Name RAID Level:	Volume1 [RAIDO (Stripe)]	
Select Disks: SATA 0.0, HAGIWARA LFDMSS-120GD(A00AH) FAM01-0017N00120, 111.7GB	[x]	
SATA 0.2, ST500DM002-1SB10A ZA400VCP, 465.7GB	[×]	
Strip Size: Capacity (MB):	[64КВ] <mark>228942</mark>	<pre>→+: Select Screen ↑↓: Select Item Enter: Select</pre>
► Create Volume		+/-: Change Opt. Fl: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.127	1. Copyright (C) 2019 Americ	can Megatrends, Inc.

3.6. After setting all the items on the screen, select Create Volume to start creating the RAID array.

Aptio Setup Utilit Advanced	y - Copyright (C) 2019 Ameri	ican Megatrends, Inc.
Create RAID Volume		Create a volume with the settings specified above
Name RAID Level:	Volume1 [RAIDO (Stripe)]	sectings spectrice above
Select Disks: SATA 0.0, HAGIWARA LFDMSS-120GD(A00AH) FAM01-0017N00120, 111.7GB	[X]	
SATA 0.2, ST500DM002-1SB10A ZA400VCP, 465.7GB		
Strip Size: Capacity (MB): ≻Create Volume	[64KB] 228942	<pre>++: Select Screen \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$</pre>
Version 2.20.1271	. Copyright (C) 2019 Americ	an Megatrends, Inc.

After the creation is completed, you can see detailed information about the RAID Array in the following screen, including disk name, RAID level, disk block size and disk capacity, etc.



Delete RAID volume

If you want to delete a RAID volume, select the Delete option and follow on-screen instructions.

Aptio Setur Advanced	o Utility - Copyright (C) 2019 Americ	can Megatrends, Inc.
RAID VOLUME INFO Volume Actions ► Delete		
Name: RAID Level: Stripe Size: Size: Status: Bootable: > SATA 0.0, HAGIWARA LFDMSS 111.7GB > SATA 0.2, ST500DM002-1SB1	Volume1 RAIDO (Stripe) 64KB 223.6GB Normal Yes 5-120GD(A00AH) FAM01-0017N00120, 0A ZA400VCP, 465.7GB	<pre>→+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2	.20.1271. Copyright (C) 2019 America	n Megatrends, Inc.

Save and exit the BIOS Setup. Now, you can proceed to install a SATA driver controller and the operating system.

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Appendix C iAMT Settings

Utilizing built-in platform capabilities and popular third-party management and security applications, the Intel[®] Active Management Technology (Intel[®] iAMT) has significantly lowered a major barrier to IT management efficiency, helping IT professionals discover, repair and better protect their networked computing assets.

In order to utilize Intel[®] iAMT you must enter the ME BIOS (<Ctrl + P> during system startup), change the ME BIOS password, and then select "Intel[®] iAMT" as the manageability feature.

C.1 Entering MEBx

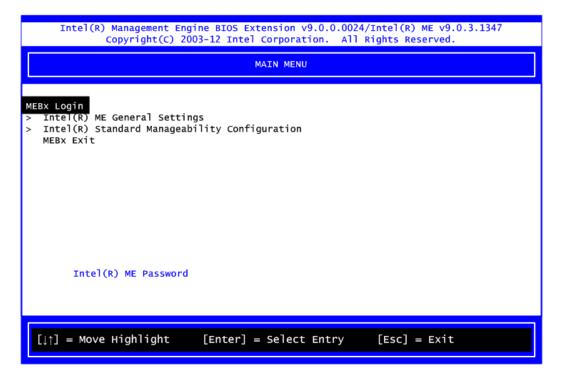
- 1. You must go to BIOS to enable iAMT function.
- 2. Exit from BIOS after starting iAMT, and press <Ctrl + P> to enter MEBx Setting.



It is advised to press <Ctrl + P> before the screen pops out.

C.2 Set and Change Password

1. You will be asked to set a password when first logging in. The default password is "admin".



2. You will be asked to change the password before setting ME.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.	
MAIN MENU	
<pre>MEBx Login > Intel(R) ME General Settings > Intel(R) Standard Manageability Configuration MEBx Exit Intel(R) ME Password</pre>	
Intel(R) ME Password	
$[\downarrow\uparrow]$ = Move Highlight [Enter] = Select Entry [Esc] = Exit	

- 3. You must confirm your new password while revising. The new password must consist of eight characters, including at least:
 - One upper case
 - One lower case
 - One number
 - One special symbol, such as ! < \$ or ; < (< " , excepted)

The default value demonstrates an example of a valid password: **!!11qqQQ** Underline (_) and space are valid characters for password, but they won't make higher complexity.

C.3 iAMT Settings

Select $Intel^{\ensuremath{\mathbb{R}}}$ iAMT configuration and press <Enter>.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) Copyright(C) 2003-12 Intel Corporation. All Rights Re	
MAIN MENU	
> Intel(R) ME General Settings > Intel(R) Standard Manageability Configuration MEBX Exit	
[↓↑] = Move Highlight [Enter] = Select Entry [Esc]	= Exit

1. Select Network Setup to configure iAMT.

Intel(R) Management Engine BIOS E Copyright(C) 2003-12 Inte			
INTEL (R) STANDAR	RD MANAGEABI	LITY CONFIG	URATION
Manageability Feature Selection SOL/IDER User Consent Password Policy Network Setup Activate Network Access Unconfigure Network Access Remote Setup And Configuration Power Control		<enabled> <anytime> <full td="" unpro<=""><td>ovision></td></full></anytime></enabled>	ovision>
[↓↑] = Move Highlight [Enter]	= Select	Entry	[Esc] = Exit

2. Select TCP/IP to get into Network interface and set it to Enabled. Get into DHCP Mode and set it to Disabled.

	ine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347 D3-12 Intel Corporation. All Rights Reserved.
	INTEL (R) ME NETWORK SETUP
Intel(R) ME Network Name S > TCP/IP Settings	ettings
[↓↑] = Move Highlight	[Enter] = Select Entry [Esc] = Exit
Intel(R) Management Eng Copyright(C) 20	ine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347 03-12 Intel Corporation. All Rights Reserved.
	WIRED LAN IPV4 CONFIGURATION
DHCP Mode	
DHCP Mode Enable/Disable IPV4 D	WIRED LAN IPV4 CONFIGURATION <enabled></enabled>

- 3. If DHCP Mode is disabled, set the following settings:
 - IP address
 - Subnet mask

	e BIOS Extension v9.0.0. -12 Intel Corporation.	0024/Intel(R) ME v9.0.3.1347 All Rights Reserved.
Ŵ	IRED LAN IPV4 CONFIGURA	TION
DHCP Mode IPV4 Address Subnet Mask Address Default Gateway Address Preferred DNS Address Alternate DNS Address	10.1	0.0
<ente< td=""><td>r> = Complete Entry</td><td>[Esc] = Discard Changes</td></ente<>	r> = Complete Entry	[Esc] = Discard Changes

4. Go back to Intel[®] iAMT Configuration, then select Activate Network Access and press <Enter>.

Intel(R) Management Engine BIOS Extension v9. Copyright(C) 2003-12 Intel Corporatio	
INTEL (R) STANDARD MANAGEABIL	ITY CONFIGURATION
 > SOL/IDER > User Consent Password Policy > Network Setup Activate Network Access Unconfigure Network Access > Remote Setup And Configurati > Power Control 	Enabled> Anytime> ent network settings network interface ue: (Y/N)
[↓↑] = Move Highlight [Enter] = Select E	ntry [Esc] = Exit

5. Exit from MEBx after completing the iAMT settings.

C.4 iAMT Web Console

1. On a web browser, type http://(IP ADDRESS):16992, which connects to iAMT Web.

Example: <u>http://10.1.40.214:16992</u>

🏉 Intel® Active Management Technology - Windows Internet Explorer		_ # X
C C F http://10.1.40.214:16992/logon.htm	Google	• ٩
😭 🏟 🎉 Intel® Active Management Technology	🟠 🔹 🗟 🝸 🖶 #頁(約	
Intel [®] Active Management Technology		(intel)
Log On Log on to Intel® Active Management Technology on this computer.		
		~
,	(1) 網際網路	🔍 100% 🔻 🚲

2. To log on, you will be required to type in username and password for access to the Web.

USER: admin (default value) PASS: (MEBx password) 3. Enter the iAMT Web.

	0.214:16992/index.htm		💌 😒 🐓 🗙 🞯! Yahool	2
(F) 编辑(E) 檢視(Y)		明田		
💽! • 🔍 Yahoo'āj	摩搜章 #	🛤 - 🗄 - 🖄 😋 🖂 - 🗔 - 🛞 - 🖅	• 🛃 • 👂 • 🏭 • 🚘 • 🞬 🛅 • 🌒 🗠 🕮 • 🔯 •	+
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tel [®] Standard I	Manageability			(intal)
nputer:				unter
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tem Status	System Status			
dware Information System	Power	On		
Processor	IP address	10.1.40.214		
Memory Disk	IPv6 address	Disabled		
nt Log	System ID	03000200-0400-0500-0006-000700080009		
note Control ver Policies	Date	7/17/2013		
vork Settings	Time	9:59 am		
Network Settings em Name Settings	Refresh			

4. Click Remote Control, and select commands on the right side.

-	y - Windows Internet Explorer 是由下列提供: Yahool奇摩		_ 6
\sim .	10.214:16092/remote.htm	💌 🗟 🚧 🗙 🞯 Yahoo!	٩
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tel [®] Standard I	Manageability		(intel)
stem Status dware Information	Remote Control		
System Processor	Power state: On		
Memory Disk	Send a command to this computer.		
nt Log note Control	Turn power off* Select a boot option: Orde power off and on* Normal boot		
er Policies vork Settings	C Reset* Boot from local CD/DVD drive Boot from local hard drive		
Network Settings em Name Settings	C Graceful Shutdown*		
Accounts	*Caution: These commands may cause user application data loss.		
	Send Command		
			0.00
)

5. When you have finished using the iAMT Web console, close the Web browser.

Appendix D TPM Settings

1. Setup BitLocker Drive Encryption main storage. Press <Win + R> and type "Control Panel", then select BitLocker Drive Encryption.

🖅 Run		×		
	f a program, folder, document, or ndows will open it for you.	Internet		
Open: control		~		
	DK Cancel <u>B</u> r	owse		
💷 All Control Panel Items				×
← → · · ↑ 🖭 > Control Panel	> All Control Panel Items >	v ق	Search Control Panel	Q
Adjust your computer's setting	gs		View by: Small icons 🔻	
Administrative Tools	AutoPlay	🐌 Backup and Restore (Wind	ows 7)	
RitLocker Drive Encryption	💶 Color Management	Credential Manager		
骨 Date and Time	Default Programs	🛔 Device Manager		
To Devices and Printers	Sase of Access Center	File Explorer Options		
le History	Flash Player (32-bit)	A Fonts		
• HomeGroup	La Indexing Options	Infrared		
Intel® Graphics Settings	🔁 Internet Options	🍰 Java		
Keyboard	📌 Language	Mouse		
👫 Network and Sharing Center	Pen and Touch	Phone and Modem		
Power Options	Programs and Features	Recovery		
🔗 Region	🐻 RemoteApp and Desktop Connections	🌾 Security and Maintenance		
SiSoftware Sandra	📢 Sound	Speech Recognition		
Storage Spaces	🔕 Sync Center	System		
Tablet PC Settings	Taskbar and Navigation	Troubleshooting		
🔏 User Accounts	Windows Defender Firewall	🖳 Windows Mobility Center		
🚣 Windows To Go	Work Folders			

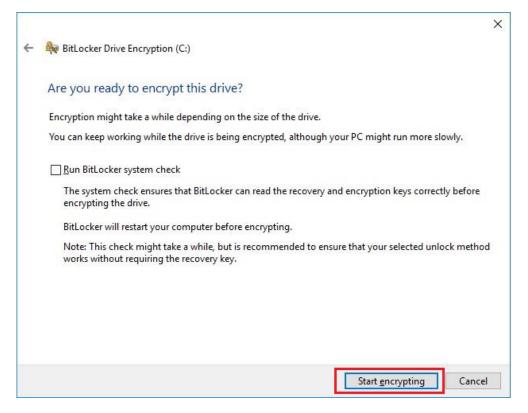
BitLocker Drive Encryption			- 0	×
🗧 🚽 👻 🛧 🎭 > Contro	I Panel > All Control Panel Items > BitLocker Drive Encryption	~ Ö	Search Control Panel	Q
Control Panel Home	BitLocker Drive Encryption			1
	Help protect your files and folders from unauthorized access by pr	otecting your dri	ives with BitLocker.	
	Operating system drive			
	Windows (C:) BitLocker off		\odot	
	🗣 Turn on BitLoo	sker		
	Fixed data drives			
	Removable data drives - BitLocker To Go			
	Insert a removable USB flash drive to use BitLocker To Go.			
See also				
TPM Administration				
Disk Management				
Privacy statement				

2. Insert an external storage device, for example USB Storage. Back up BitLocker recovery key in a new file and save it to the USB Storage.

0	Real BitL	ocker D	Drive Encryption		v Č Sean	-		×				
Recy	¢ -		T 🙀 « All Control Panel Items	> BitLocker Drive Encryption	V C) Sean	n Control Pi	inei ,	ρ				
	Con	ntr 🥧	RitLocker Drive Encryption (C	.)	🍕 Save BitLo	ker recovery	r key as				×	
					$\leftarrow \rightarrow \cdot$	↑ => 1	6GB (D:) →		✓ b 3	earch 16GB (D:)	Ą	
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Sho Sho Mici		L	A recovery key can be used to ac It's a good idea to have more tha	cess your files and folders if you're having pr n one and keep each in a safe place other tha	ot In Music	ne Pro 5.5	EFI	E ARK BurninTest Pro 4.0		Date modified 2/21/2018 4:25 PM 4/29/2019 10:59 AM 7/11/2013 6:42 PM	Type File folder File folder File folder	
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Intel(F		Ľ	ightarrow Print the recovery ke	ey (This PC 16GB (0))						
1		Ŀ			> 🂣 Networ		<	3			>	
PCor	See	alı	How can I find my recovery key la	ater?		name: BitL ; type: Text	· · · ·	Key F809F878-040F-4A1	IE-A4AC-2F6	D629A3DD7	~	
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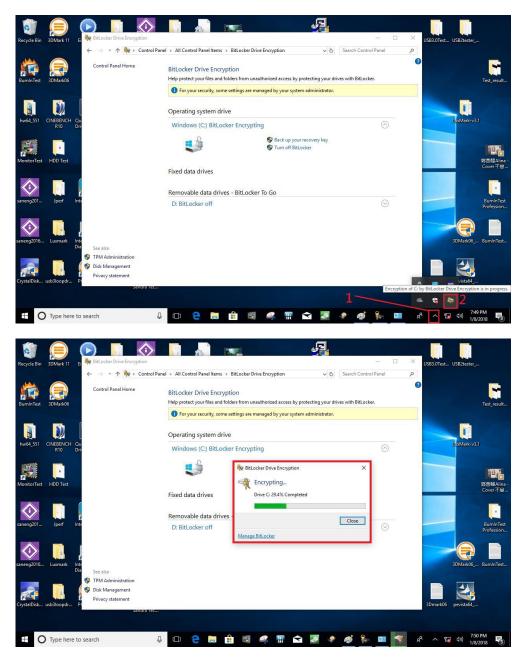
3. Please follow the steps below to encrypt your storage device:

		>
4	RitLocker Drive Encryption (C:)	
	Choose how much of your drive to encrypt	
	If you're setting up BitLocker on a new drive or a new PC, you only need to encrypt the part of the drive that's currently being used. BitLocker encrypts new data automatically as you add it.	
	If you're enabling BitLocker on a PC or drive that's already in use, consider encrypting the entire drive. Encrypting the entire drive ensures that all data is protected–even data that you deleted but that might st contain retrievable info.	11
ſ	Encrypt used disk space only (faster and best for new PCs and drives)	
1	Encrypt entire drive (slower but best for PCs and drives already in use)	
	2 Next Cance	
F		>
+	RitLocker Drive Encryption (C:)	
	Choose which encryption mode to use	
	Windows 10 (Version 1511) introduces a new disk encryption mode (XTS-AES). This mode provides additional integrity support, but it is not compatible with older versions of Windows.	
	If this is a removable drive that you're going to use on older version of Windows, you should choose Compatible mode.	
	If this is a fixed drive or if this drive will only be used on devices running at least Windows 10 (Version 151 or later, you should choose the new encryption mode)
1	New encryption mode (best for fixed drives on this device)	
	Compatible mode (best for drives that can be moved from this device)	
	2	
	<u>N</u> ext Cance	8



Now, the system prompts that the operating system drive encryption is in progress, and the encryption progress is checked.

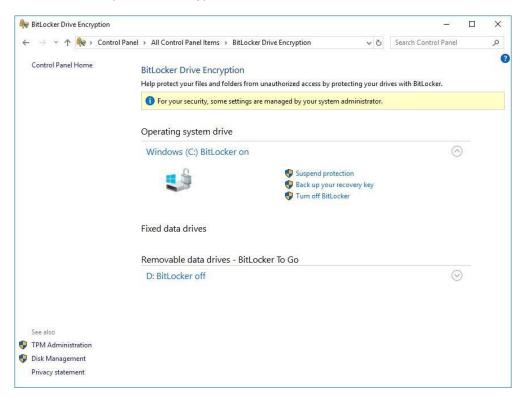
Recycle Bin 3DMark 11	E Relicoker Drive Encryption		<u>.</u>	_	USB3.0Test USB2tester	
	🗧 🔶 👻 🛧 🏘 > Control I	Panel > All Control Panel Items > BitLoc	cer Drive Encryption 🗸 ව	Search Control Panel	م	
	Elle Edit View Tools					
BurninTest 3DMark06	Control Panel Home	BitLocker Drive Encryption Help protect your files and folders fro	m unauthorized access by protecting your dri	ves with BitLocker.	C Test_result.	
	ſ	For your security, some settings	are managed by your system administrator.			
hw64_551 CINEBENCH	H Qu Dri	Operating system drive			LoxMark-v3.1	
	D iff	Windows (C:) BitLocker End	rypting	\odot		
MonitorTest			Sack up your recovery key Turn off BitLocker		数百里Aima Cover 不管。	
		Fixed data drives				
saneng201 Jperf	Into	Removable data drives - BitL	ocker To Go		BurnInTest Profession	
saneng2016	nt. Dia See also	D: BitLocker off		\odot	3DMark06, BurninTest.	
CrystalDisk usb3loopdr.	TPM Administration Disk Management Privacy statement	*		1 🗬	Encryption in progress Encryption of C: by BitLocker Drive Encryption has started. Click for more information. BitLocker Drive Encryption Notification Ubility	
E O Type he	re to search	Q @ @ 🛱 🔒 I	🗐 🧠 🖫 🖻 🛃 👂	ø % 😐	يرو ^R ∧ 🏘 😭 ما% 7:49 PM 1/8/2018 €	



Select and click the icon in the lower right corner to complete the encryption.

RitLacker Drive Encryption		×	
← → → ↑ 🎭 > Cont	el Panel > All Control Panel Items > BitLocker Drive Encryption	✓ δ Search Control Panel ,P	
Control Panel Home	BitLocker Drive Encryption Holp protect your files and Islands from unauthorized access by protecting your drives with BitLocker.	0	
	For your security, some settings are managed by your system administrator.		
	Operating system of the fit date Diver browstom X C. Bit Locker on	0	
	Fixed data drives		
	Removable data drives - Bitl.ocker To Go		
	TRANSCEND (E) BitLocker off	0	
Sezalus S TEM Administration S Dati Management Privacy soletiment			

4. Confirm the completion of encryption.



5. Disable TPM function in BIOS Setup Utility.

TPM20 Device Found		Enables or Disables BIOS
Firmware Version:	402.1 INTC	support for security devic
Vendor:	INIC	0.S. will not show Securit
		Device. TCG EFI protocol a INT1A interface will not b available.
		→+: Select Screen
		↑↓: Select Item
		Enter: Select +/-: Change Opt.
		F1: General Help
		F2: Previous Values
		F3: Optimized Defaults
		F4: Save & Exit
		ESC: Exit

6. When the system is powered on and you see the following screen, it means the TPM module function is working fine. Note that BitLocker cannot be executed if your system does not have TPM function.

nter the recovery key for this driv	ve
I	
For more information on how to retrant http://windows.microsoft.com/recove	ieve this key, go to rykeyfaq from another PC or mobile device.
Jse the number keys or function keys	s F1-F10(use F10 for 0).
Recovery key ID: 995386D1-889B-4ADA	-BA42-DCD3929AF074
Press Enter to continue Press Esc for more recovery op	otions

System with no TPM function support is as below:

1. TPM information is not found in Device Manager.

Note

1. TPM information is not found in Device Manager.

Device Manager

File Action View Help

File Action V



2. When trying to turn on Bitlocker, the following error message shows up.

🗧 🕂 🛧 🔶 🗧	ol Panel > All Control Panel Items > BitLocker Drive Encryption
Control Panel Home	BitLocker Drive Encryption
	Help protect your files and folders from unauthorized access by protecting your drives with Bit
	Operating system drive
	C: BitLocker off
	Turn on BitLocker
	Fixed data drives
	Removable data drives - BitLocker To Go
	TRANSCEND (D:) BitLocker off

