

# **MAN0521 Series**

Intel<sup>®</sup> Socket 1151 Core<sup>™</sup> i7/ i5/ i3 Processors Mini ITX Motherboard

**User's Manual** 



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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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# Chapter 1 Introduction



The MANO521 Mini-ITX motherboard supports the new 14nm 8<sup>th</sup> Generation Intel<sup>®</sup> Core<sup>™</sup> i7/ i5/ i3 and Pentium<sup>®</sup> processors in LGA1151 package. Featuring the new Intel<sup>®</sup> H310 Express chipset with two DDR4 2666MHz memory support, this motherboard is built to perform best stability and reliability for industrial applications.

It comes with two SATA 3.0, four USB 3.0, four USB 2.0 and two serial ports (one RS-232/422/485, one RS-232) providing robust storage and I/O options. Users also can increase board functionality with PCI-Express x4 and mSATA slot. The high quality MANO521 allows four display interfaces via HDMI, DisplayPort, VGA 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 8<sup>th</sup> Generation Intel<sup>®</sup> Core<sup>™</sup> i7/ i5/ i3 and Pentium<sup>®</sup> processors (Coffee Lake)
- 2 DDR4 2400/2666MHz memory with maximum capacity up to 32 GB
- 1 PCI-Express x4
- 1 PCI-Express Mini Card and 1 SIM card slots (support SATA, USB 2.0 signal, PCIE x1)
- 1 M.2 Key E, size: 22x30 for WiFi (support PCIE x1, USB 2.0 signal)
- 1 M.2 Key M (support SATA, PCIE x2 signal)
- 2 SATA-600
- 4 USB 3.0 and 4 USB 2.0

# 1.2 Specifications

- CPU
  - LGA1151 Socket for 8<sup>th</sup> Generation Intel<sup>®</sup> Core<sup>™</sup> i7/ i5/ i3 and Pentium<sup>®</sup> processors.
- Chipset
  - Intel<sup>®</sup> H310/Q370 (optional).
- BIOS
  - AMI BIOS via SPI interface.
- System Memory
  - Two 260-pin SO-DIMM sockets.
  - Maximum up to 32GB DDR4 memory.
  - Support 2400/2666MHz.
- Onboard Multi I/O
  - Controller: ITE8625.
  - Two serial ports:
    - COM1 supports RS-232/422/485; COM2 supports RS-232 only.
    - COM1 on the rear I/O; COM2 in wafer connector.

#### • USB Interface

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

#### • Ethernet

- LAN1: 1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE with Intel<sup>®</sup> i211AT.
- LAN2: 1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE with Intel<sup>®</sup> i219V/i219LM (optional).
- Serial ATA
  - Two SATA 3.0 ports (6Gb/s).
  - One mSATA/Mini Card slot.
  - One M.2 Key M slot.
- Audio
  - Realtek ALC662 5.1 channel HDA codec.
  - Support line-out (on the rear I/O).
  - Support MIC-in/line-out/line-in in box header (internal).
- Display
  - One VGA connector in wafer connector. Resolution max. up to 1920x1200.
  - One HDMI with resolution max. up to 3840x2160 @30Hz.
  - One DisplayPort++ with resolution max. up to 4096x2304 @60Hz.
  - One 18/24-bit dual channel LVDS and one 8-pin inverter connector. LVDS resolution is max. up to 1920x1200.
  - One Embedded DisplayPort (eDP) with resolution max. up to 4096x2304 @60Hz; co-layout with LVDS (optional).

#### **Expansion Interface** •

- One PCI-Express x4 slot.
- One PCI-Express Mini Card slot.
- One M.2 key M slot.
- One M.2 Key E slot.
- One SIM card slot.
- **Power Input** •
  - One 12V,19~24V ATX 4-pin power input connector.
  - One 12V,19~24V DC jack power input connector.
- **Operating Temperature** •
  - 0°C ~ 60°C.
- **Storage Temperature** .
  - -20°C ~ 65°C.
- **Form Factor** .
  - Mini ITX (6.7" x 6.7", 17.0cm x 17.0cm).



All specifications and images are subject to change without notice.

Note

#### 1.3 **Utilities Supported**

- Chipset driver
- Graphics driver •
- Intel ME driver •
- Ethernet driver •
- Audio driver •
- Chipset\_serialio driver ٠
- Intel\_Rapid\_Storage\_Technology driver •

# 1.4 Block Diagram



# Chapter 2 Board and Pin Assignments

# 2.1 Board Layout



**Top View** 



**Bottom View** 

# 2.2 Rear I/O



Jumpers/Headers/Connectors				
1	Audio Output Select Jumper (JP2) (Optional)	19	System Fan Connector (CN22)	
2	Front Audio Connector (CN14)	20	USB 3.0 Wafer Connector (CN18)	
3	mSATA/Mini Card Connector (CN16)	21	USB 2.0 Wafer Connector (CN19)	
4	PCI-Express x4 Slot (CN17)	22	ATX Power Input 90 Angle Connector (CN9) (Co-layout with 180 Angle Connector, CN38)	
5	M.2 Key E Connector (CN15)	23	GPIO Header (CN10)	
6	CPU Fan Connector (CN21)	24	CMOS Battery Connector (CN11)	
7	DDR4 SO-DIMM Connectors (CN23, CN24)	25	VGA Wafer Connector (CN12)	
8	Case Open Select Jumper (JP5)	26	DC Jack Power Connector (CN1)	
9	AT/ATX Power Mode Select Jumper (JP6)	27	USB 2.0 Stack Port (CN2)	
10	Clear CMOS Jumper (JP4)	28	USB 3.0 Stack Port (CN3)	
11	Front Panel Connector (CN34)	29	Ethernet Ports (CN4, CN5)	
12	SATA 3.0 Combo Connector (CN32)	30	COM1 D-Sub Connector (CN6)	
13	SATA Power Connectors (CN30, CN31)	31	DisplayPort and HDMI Connector (CN8)	
14	LVDS Signal Header (CN29)	32	Audio Jack (CN7)	
15	LVDS Backlight Control Header (CN28)	33	M.2 Key M Connector (CN35)	
16	COM2 Wafer Connector (CN27)	34	SIM Card Slot (CN36)	
17	LVDS VDD Select Jumper (JP3)	35	eDP Connector (CN37)	
18	COM2 Data/Power Select Jumper (JP1)			



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



# 2.3 Jumper Settings

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 MANO521 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.



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

Jumper	Description		Setting
ID1	COM2 Data/Power Select	CN27 Pin 1: DCD#	3-5 Close
JFI	Default: RS-232 Data	CN27 Pin 8: RI#	4-6 Close
JP2 (Optional)	Audio Output Select Default: Line-out		1-3, 2-4 Close
JP3	LVDS VDD Select Default: +3.3V		1-2 Close
JP4	Clear CMOS Default: Normal Operation		1-2 Close
JP5	Case Open Select Default: Close		1-2 Close
JP6 AT/ATX Power Mode Select Default: ATX Mode		1-2 Close	

#### 2.3.1 COM2 Data/Power Select (JP1)

The COM2 port has +5V level power capability on DCD# and +12V level on RI# by setting JP1.

Function	Setting	2
Power: Set CN27 pin 1 to +5V level	1-3 close	
Data: Set CN27 pin 1 to DCD# (Default)	3-5 close	
Power: Set CN27 pin 8 to +12V level	2-4 close	1
Data: Set CN27 pin 8 to RI# (Default)	4-6 close	•

# 2.3.2 Audio Output Select (JP2) (Optional)

Use this jumper to select line-out or speaker out as source for audio output on audio connector. If speaker out is used, it will deliver 2W/channel continuous at  $8\Omega$  loads.

Function	Setting
Line-out (Default)	1-3, 2-4 close
Speaker out	3-5, 4-6 close

_	2	4	6
Γ			
L			
	1	3	5

6

# 2.3.3 LVDS VDD Select (JP3)

The motherboard supports voltage selection for flat panel displays. Use this 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
+5V	3-4 close	5
+12V	5-6 close	Ŭ

#### 2.3.4 Clear CMOS (JP4)

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 <Del> key during the boot process and enter BIOS setup to re-enter data.

Function	Setting
Normal operation (Default)	1-2 close
Clear CMOS	2-3 close

#### 2.3.5 Case Open Select (JP5)

Use this jumper for chassis intrusion detection feature.

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

### 2.3.6 AT/ATX Power Mode Select (JP6)

Use this jumper to select AT or ATX power mode.

Function	Setting	
ATX mode (Default)	1-2 close	
AT mode	2-3 close	123

# 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	DC Jack Power Connector
CN2	USB 2.0 Stack Port
CN3	USB 3.0 Stack Port
CN4	Ethernet LAN1 Port (i211AT)
CN5	Ethernet LAN2 Port (i219V)
CN6	COM1 D-Sub Connector
CN7	Audio Jack
CN8	DisplayPort (Upper) and HDMI (Lower) Connector
CN9/CN38	ATX Power Input 90 Angle Connector. Co-layout with a 180 Angle Connector, CN38 (Optional)
CN10	GPIO Header
CN11	CMOS Battery Connector
CN12	VGA Wafer Connector
CN14	Front Audio Connector
CN15	M.2 Key E Connector
CN16	mSATA/Mini Card Connector
CN17	PCI-Express x4 Slot
CN18	USB 3.0 Wafer Connector
CN19	USB 2.0 Wafer Connector
CN21~CN22	Fan Connectors
CN23~CN24	DIMM1~DIMM2 DDR4 SO-DIMM Connectors
CN27	COM2 Wafer Connector
CN28	LVDS Backlight Control Header
CN29	LVDS Signal Header
CN30~CN31	SATA Power Connectors
CN32	SATA 3.0 Combo Connector
CN34	Front Panel Connector
CN35	M.2 Key M Connector
CN36	SIM Card Slot
CN37 (Optional)	eDP Connector

#### 2.4.1 DC Jack Power Connector (CN1)

The CN1 is a DC jack with screw supporting 12V, 19~24VDC power input connector. Firmly insert at least 90W adapter into this connector. Loose connection may cause system instability and make sure all components/devices are properly installed before connecting.





Screw metric thread size: M8.0x0.75.

#### 2.4.2 USB 2.0 Stack Port (CN2)

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

Pin	Signal	Pin	Signal
1	USB_PWR	2	USB_PWR
3	USB#5_D-	4	USB#6_D-
5	USB#5_D+	6	USB#6_D+
7	GND	8	GND

7	5	3	1	
8	6	4	2	]

### 2.4.3 USB 3.0 Stack Port (CN3)

The motherboard comes with one stacked Universal Serial Bus (compliant with USB 3.0) connector on the rear I/O for installing USB peripherals such as keyboard, mouse, scanner, etc.

Pin	Signal	Pin	Signal
1	USB_PWR	10	USB_PWR
2	USB#1_D-	11	USB#2_D-
3	USB#1_D+	12	USB#2_D+
4	GND	13	GND
5	SSRX1-	14	SSRX2-
6	SSRX1+	15	SSRX2+
7	GND	16	GND
8	SSTX1-	17	SSTX2-
9	SSTX1+	18	SSTX2+



#### 2.4.4 Ethernet Ports (CN4 and CN5)

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.

Pin	1000 Base-T	100/10 Base-T	Description
L1	BI_DA+	TX+	Bidirectional or Transmit Data+
L2	BI_DA-	TX-	Bidirectional or Transmit Data-
L3	BI_DB+	RX+	Bidirectional or Receive Data+
L4	BI_DC+	N.C.	Bidirectional or Not Connected
L5	BI_DC-	N.C.	Bidirectional or Not Connected
L6	BI_DB-	RX-	Bidirectional or Receive Data-
L7	BI_DD+	N.C.	Bidirectional or Not Connected
L8	BI_DD-	N.C.	Bidirectional or Not Connected
А	Active Link LED (Yellow) Off: No link Blinking: Data activity detected		
в	Speed LED 1000: Orange 100/10: Green/OFF		



CN4: LAN1 with  $Intel^{\$}$  i211AT

CN5: LAN2 with Intel<sup>®</sup> i219V

- Speed LED turns orange for 1000Mbps or green for 100Mbps.
- Both CN4 and CN5 support Wake-on-LAN. When the motherboard chipset is Intel<sup>®</sup> Q370, CN5 (LAN2) is changed to i219LM and with AMT supported.

### 2.4.5 COM1 D-Sub Connector (CN6)

This connector is a standard D-Sub connector for COM1 serial port interface which is selectable for RS-232/422/485 mode by BIOS setting (see section 4.4). 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



Note

#### 2.4.6 Audio Jack (CN7)

The motherboard provides HD audio jack for line-out on the rear I/O. Install audio driver, and then attach audio devices to CN7.

Pin Color	Signal
Green	Line-out



# 2.4.7 DisplayPort and HDMI Connector (CN8)

The CN8 is a stacked connector comprising an upper connector for DisplayPort++ interface and a lower connector for HDMI interface.

Pin	Signal	Pin	Signal
1	DP_TX0_P	21	HDMI OUT_DATA2+
2	GND	22	GND
3	DP_TX0_N	23	HDMI OUT_DATA2-
4	DP_TX1_P	24	HDMI OUT_DATA1+
5	GND	25	GND
6	DP_TX1_N	26	HDMI OUT_DATA1-
7	DP_TX2_P	27	HDMI OUT_DATA0+
8	GND	28	GND
9	DP_TX2_N	29	HDMI OUT_DATA0-
10	DP_TX3_P	30	HDMI OUT_Clock+
11	GND	31	GND
12	DP_TX3_N	32	HDMI OUT_Clock-
13	GND	33	NC
14	GND	34	NC
15	DP_AUXP	35	HDMI OUT_SCL
16	GND	36	HDMI OUT_SDA
17	DP_AUXN	37	GND
18	DP_HPD	38	+5V
19	GND	39	HDMI_HTPLG
20	+3.3V		



#### 2.4.8 ATX Power Input Connector (CN9)

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.

By default, the motherboard comes with a 4-pin ATX 90 angle connector (CN9) for DC +12V, +19~24V power input. Co-layout with a 180 angle connector, CN38 (optional).

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



#### 2.4.9 GPIO Header (CN10)

The motherboard comes with a 2x5-pin (pitch=2.00mm) header for GPIO interface.

Pin	Signal	Pin	Signal
1	SIO_GPI70	2	SIO_GPI71
	(0xA06, Bit0, H) <sup>[*]</sup>	2	(0xA06, Bit1, H) <sup>[*]</sup>
2	SIO_GPI72	4	SIO_GPI73
3	(0xA06, Bit2, H) <sup>[*]</sup>	4	(0xA06, Bit3, H) <sup>[*]</sup>
5	SIO_GPI74	6	SIO_GPI75
5	(0xA06, Bit4, H) <sup>[*]</sup>	0	(0xA06, Bit5, H) <sup>[*]</sup>
7	SIO_GPI76	0	SIO_GPI77
'	(0xA06, Bit6, H) <sup>[*]</sup>	0	(0xA06, Bit7, H) <sup>[*]</sup>
9	+5V	10	GND

10	8	6	4	2
Ο	0	0	0	0
0	0	0	0	
9	7	5	3	1



<sup>[1]</sup>: "H" or "L" means the default voltage is High or Low level, and GPIO output is 5V.

### 2.4.10 CMOS Battery Connector (CN11)

This is a 2-pin connector for CMOS battery interface.

Pin	Signal
1	+3V
2	GND

#### 2.4.11 VGA Wafer Connector (CN12)

This is a 2x5-pin (pitch=2.00mm) wafer connector for VGA interface.

Pin	Signal	Pin	Signal
1	G_VGA_R	2	VGA_VCC
3	G_VGA_G	4	GND
5	G_VGA_B	6	GND
7	G_HSYNC	8	G_VSYNC
9	VGA_SCL	10	VGA_SDA



#### 2.4.12 Front Audio Connector (CN14)

This is a 2x5-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

#### M.2 Key E Connector (CN15) 2.4.13

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 <sup>[*]</sup>	34	CNV_RGI_RSP[*]	59	CNV_WT_1_DN <sup>[*]</sup>
10	PCM_CRF_RST <sup>[1]</sup>	35	PCIE12_TX_DP[*]	60	N/C
11	CNV_WR_1_DP[*]	36	CNV_BRI_DT <sup>[*]</sup>	61	CNV_WT_1_DP[*]
12	N/C	37	PCIE12_TX_DN	62	N/C
13	GND	38	CL_RST <sup>[*]</sup>	63	GND
14	PCMOUT_CLKREQ0[1]	39	GND	64	M2_REFCLK
15	CNV_WR_0_DN <sup>[*]</sup>	40	CL_DATA <sup>[*]</sup>	65	CNV_WT_0_DN <sup>[*]</sup>
16	N/C	41	PCIE12_RX_DP	66	N/C
17	CNV_WR_0_DP[*]	42	CL_CLK <sup>[*]</sup>	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 <sup>[*]</sup>	46	CNV_MFUART2_TXD[*]	71	CNV_WT_CLK_DN <sup>[*]</sup>
22	CNV_BRI_RSP[*]	47	CLKOUT_PCIE_P3	72	+3.3V
23	CNV_WR_CLK_DP[*]	48	CNV_MFUART2_RXD[1]	73	CNV_WT_CLK_DP[*]
24	N/C	49	CLKOUT_PCIE_N3	74	+3.3V
25	N/C	50	PCH_SUSCLK	75	GND





Support CNVI module. <sup>[']</sup>: These pins are for CNVI module.

# 2.4.14 mSATA/Mini Card Connector (CN16)

The mSATA interface is available through connector CN16.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VAUX
3	N/C	4	GND
5	N/C	6	+1.5V
7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DAT
11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_REST
15	GND	16	UIM_VPP
17	N/C	18	GND
19	N/C	20	+3.3VAUX
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#9_D-
37	GND	38	USB#9_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	+3.3VAUX	52	+3.3VAUX



# 2.4.15 PCI-Express x4 Slot (CN17)

This motherboard comes with one PCI-Express x4 slot.

Pin	Signal	Pin	Signal
B1	+12V	A1	PRSNT1#
B2	+12V	A2	+12V
B3	RSVD	A3	+12V
B4	GND	A4	GND
B5	SMCLK	A5	NC
B6	SMDAT	A6	NC
B7	GND	A7	NC
B8	+3.3V	A8	NC
B9	NC	A9	+3.3V
B10	3.3Vaux	A10	+3.3V
B11	WAKE#	A11	PERST#
B12	NC	A12	GND
B13	GND	A13	REFCLK+
B14	HSOP0	A14	REFCLK-
B15	HSON0	A15	GND
B16	GND	A16	HSIP0
B17	PRSNT2	A17	HSIN0
B18	GND	A18	GND
B19	HSOP1	A19	N/C
B20	HSON1	A20	GND
B21	GND	A21	HSIP1
B22	GND	A22	HSIN1
B23	HSOP2	A23	GND
B24	HSON2	A24	GND
B25	GND	A25	HSIP2
B26	GND	A26	HSIN2
B27	HSOP3	A27	GND
B28	HSON3	A28	GND
B29	GND	A29	HSIP3
B30	N/C	A30	HSIN3
B31	PRSNT2	A31	GND
B32	GND	A32	N/C

#### 2.4.16 USB 3.0 Wafer Connector (CN18)

The CN12 is a 10x2-pin (pitch=2.00mm) internal connector for installing versatile USB 3.0 compliant peripherals.

Pin	Signal	Pin	Signal	10 00 11
1	+5V	20		00
2	P3_SSRX1-	19	+5V	00
3	P3_SSRX+	18	P4_SSRX-	nõõ
4	GND	17	P4_SSRX+	00
5	P3_SSTX-	16	GND	<b>1</b> 00
6	P3_SSTX+	15	P4_SSTX-	00 19
7	GND	14	P4_SSTX+	1 0
8	USB#3_D-	13	GND	
9	USB#3_D+	12	USB#4_D-	
10	N/C	11	USB#4_D+	

#### 2.4.17 USB 2.0 Wafer Connector (CN19)

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

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

10	00	7
2	000	1

#### 2.4.18 Fan Connectors (CN21 and CN22)

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.

CN21: 4-pin (pitch	=2.54mm)
--------------------	----------

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

#### CN22: 3-pin (pitch=2.54mm)

Pin	Signal	
1	GND	113
2	+12V	3 6
3	FAN Speed Detection	

0|9

#### 2.4.19 COM2 Wafer Connector (CN27)

The motherboard comes with one 5x2-pin (pitch=2.00mm) wafer connector for COM2 serial port interface. It has power capability on DCD# and RI# pins by setting jumper JP1.

Pin	Signal	Pin	Signal		
1	DCD#	2	DSR#	8	
3	RXD	4	RTS#	0	
5	TXD	6	CTS#		lõõ
7	DTR#	8	RI#	2	ЮĔ
9	GND				

# 2.4.20 LVDS Backlight Control Header (CN28)

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	г
1	+12V	
2	+12V	* 🗆
3	+5V	
4	LVDS_BKL_EN	
5	GND	
6	GND	'적
7	GND	L
8	LVDS_BKL_CTL	

### 2.4.21 LVDS Signal Header (CN29)

The motherboard comes with 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 <sup>[*]</sup>	2	VDD <sup>[*]</sup>	2
3	VDD <sup>[*]</sup>	4	VDD <sup>[*]</sup>	
5	VDD <sup>[*]</sup>	6	VDD <sup>[*]</sup>	
7	N/C	8	N/C	
9	GND(Detect) <sup>[**]</sup>	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+	4
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) <sup>[**]</sup>	40	GND	





<sup>[\*]</sup>: Panel power VDD is 3.3V by default, 5V or 12V is selectable by jumper JP3, see section 2.3.3. <sup>[\*\*]</sup>: Grounding of this pin is required to ensure normal LVDS output.

## 2.4.22 SATA Power Connectors (CN30 and CN31)

This is a 4-pin (pitch=2.54mm) connector for DC +12V and +5V power output.

Pin	Signal
1	+5V
2	GND
3	GND
4	+12V

Q Q Q	0
+12v	+5v

#### 2.4.23 SATA 3.0 Combo Connector (CN32)

This Serial Advanced Technology Attachment (Serial ATA or SATA) connector is for SATA 3.0 interface allowing up to 6.0Gb/s data transfer rate. It is a computer bus interface for connecting to device such as hard disk drive.

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



#### 2.4.24 Front Panel Connector (CN34)

The CN34 is a 2x7-pin (pitch=2.54mm) header for front panel interface.

Pin	Signal
1	Power LED+
2	SPK-
3	N/C
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(+).

#### 2.4.25 M.2 Key M Connector (CN35)

The motherboard comes with one M.2 Key M connector suitable for mounting SATA/PCIE storage card.

Pin	Signal	Pin	Signal	Pin	Signal
1	GND	26	N/C	51	GND
2	+3.3V	27	GND	52	CLKREQ
3	GND	28	N/C	53	REFCLKN
4	+3.3V	29	PCIE#11_RXN	54	N/C
5	PCIE#9_RXN <sup>[*]</sup>	30	N/C	55	REFCLKP
6	N/C	31	PCIE#11_RXP	56	N/C
7	PCIE#9_RXP[*]	32	N/C	57	GND
8	N/C	33	GND	58	N/C
9	GND	34	N/C	59	N/C
10	M2_LED	35	PCIE#11_ TXN	60	N/C
11	PCIE#9_TXN <sup>[*]</sup>	36	N/C	61	N/C
12	+3.3V	37	PCIE#11_ TXP	62	N/C
13	PCIE#9_ TXP[*]	38	N/C	63	N/C
14	+3.3V	39	GND	64	N/C
15	GND	40	N/C	65	N/C
16	N/C	41	PERN0/SATA_B+	66	N/C
17	PCIE#10_RXN <sup>[*]</sup>	42	N/C	67	N/C
18	+3.3V	43	PERP0/SATA_B-	68	N/C
19	PCIE#10_RXP[*]	44	N/C	69	PEDET
20	N/C	45	GND	70	+3.3V
21	GND	46	N/C	71	GND
22	N/C	47	PETN0/SATA_A-	72	+3.3V
23	PCIE#10_ TXN <sup>[*]</sup>	48	N/C	73	GND
24	N/C	49	PETP0/SATA_A+	74	+3.3V
25	PCIE#10_ TXP[*]	50	PERST	75	M_DETECT

1	11	21	75
000	000	000000000000000000000000000000000000000	0000
00	000	000000000000000000000000000000000000000	000
1	10	20	74



CN35 supports GEN2 x2 NVMe-based SSD. <sup>[']</sup>: When the motherboard chipset is changed to Intel<sup>®</sup> Q370, these pins support GEN3 x4 NVMe-based SSD.

#### 2.4.26 SIM Card Slot (CN36)

The CN36 is for inserting SIM Card and mainly used in 3G/4G wireless network application. In order to work properly, the SIM Card must be used together with 3G/4G module inserted to CN16.

Pin	Signal
1	PWR
2	RST
3	CLK
4	NC
5	GND
6	VPP
7	I/O
8	NC



#### 2.4.27 eDP Connector (CN37) (Optional)

The embedded DisplayPort (eDP) interface is available through 40-pin connector (CN37), which is compliant with I-PEX-CABLINE II HT1 20143. The eDP is a design to replace internal digital LVDS links in computer monitor panels and TV panels.

Pin	Signal	Pin	Signal
1	VDD <sup>[*]</sup>	2	VDD <sup>[*]</sup>
3	VDD <sup>[*]</sup>	4	VDD <sup>[*]</sup>
5	N/C	6	GND
7	GND	8	GND
9	GND	10	EMB_HPD
11	GND	12	EDP_TXN3C
13	EDP_TXP3_C	14	GND
15	EDP_TXN2_C	16	EDP_TXP2_C
17	GND	18	EDP_TXN1_C
19	EDP_TXP1_C	20	GND
21	EDP_TXN0_C	22	EDP_TXP0_C
23	GND	24	EMB_AUXP
25	EMB_AUXN	26	GND
27	VSS_EDP_AMOLED	28	VSS_EDP_AMOLED
29	VSS_EDP_AMOLED	30	VSS_EDP_AMOLED
31	N/C	32	EDP_BKLTCTL
33	EDP_BKLTEN	34	N/C
35	N/C	36	VCC_EDP_BKLT
37	VCC_EDP_BKLT	38	VCC_EDP_BKLT
39	VCC_EDP_BKLT	40	N/C





- CN37 is co-layout with LVDS signal header (CN29); they can't be accessed simultaneously.
- eDP connector P/N: Aces Electronics 50203-40

<sup>[7]</sup>: Panel power VDD is +3.3V by default, +5V or 12V is selectable by jumper JP3, see section 2.3.3.

# Chapter 3 Hardware Description

# 3.1 Microprocessors

The MANO521 Series supports Intel<sup>®</sup> Core<sup>TM</sup> i7/ i5/ i3, Pentium<sup>®</sup> and Celeron<sup>®</sup> processors, which enable your system to operate under Windows<sup>®</sup> 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 MANO521 Series uses AMI Plug and Play BIOS with a single SPI Flash.

# 3.3 System Memory

The MANO521 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 (CN23) DDR4 SO-DIMM socket.
- Note
- For dual memory channel configuration, install memory modules of the same size, chip width, density and rank in both channel 0 (CN23) and channel 1 (CN24) DDR4 SO-DIMM sockets.

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# Chapter 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 <Del> 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.

1	-	
L		1
U		
	lot	~

*If your computer cannot boot after making and saving system changes with BIOS setup, you can restore BIOS optimal defaults by setting JP4 (see section 2.3.4).* 

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 screen.</arrow>
∕∱↓ Up/Down	The Up and Down <arrow> keys allow you to select a setup screen or sub 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 Adv	Aptio Setup Ut vanced Chipset	ility - Copyright (C) 2019 American Security Boot Save & Exit	Megatrends, Inc.
BIOS Inform Build Date Project Ver System Date System Time Access Leve	ation and Time sion	01/22/2019 10:07:26 MANO521 X107 H310 [Sat 02/09/2019] [21:51:28] Administrator	Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 2005-2099 Months: 1-12 Days: dependent on month
Board Infor Processor PCH	mation Name Type Stepping Name SKU Stapping	CoffeeLake DT Genuine Intel(R) CPU 0000 @ 1.60GHz U0 CNL PCH-H H310 P0	<pre>→+: Select Screen  ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help</pre>
Memory	Size Frequency	4096 мв 2400 мнz	F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
	Version 2.20.	.1271. Copyright (C) 2019 American M	Megatrends, 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:

- ► IT8625 Super IO Configuration
- Hardware Monitor
- 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 Utility - Copyright (C) 2019 American Megatrends, Inc. Main <mark>Advanced</mark> Chipset Security Boot Save & Exit				
<ul> <li>IT8625 Super</li> <li>Hardware Mon</li> <li>Trusted Comp</li> <li>ACPI Setting</li> <li>CPU Configur</li> <li>SATA And RST</li> <li>PCH-FW Confi</li> <li>USB Configur</li> </ul>	IO Configuratio itor uting s ation Configuration guration ation	n		System Super IO Chip Parameters.
				<pre>→+: Select Screen  ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
	Version 2.20	1271. Copyright	(C) 2019 American Me	gatrends, 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 Utility - Copyright (C) 2019 American Megatrends, Inc. Advanced		
IT8625 Super IO Configuration		Set Parameters of Serial Port
Super IO Chip ≻ Serial Port 1 Configuration ≻ Serial Port 2 Configuration	178625	
		<pre> ++: Select Screen  \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$</pre>
Version 2.20.127	1. Copyright (C) 2019	American Megatrends, Inc.

#### Serial Port 1~2 Configuration

Use these items to set parameters related to serial port 1~2.

#### • Serial Port 1 Configuration

Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc. Advanced				
Serial Port 1 Configuration	n	Enable or Disable Serial Port		
Serial Port Device settings	[Enabled] IO=3F8H; IRQ=4;			
COM Port Type	[RS232]			
		<pre>→+: Select Screen tl: Select Item</pre>		
		Enter: Select		
		+/-: Change Opt. F1: General Help		
		F2: Previous Values		
		F3: Optimized Defaults F4: Save & Exit		
		ESC: Exit		
Version 2.2	0.1271. Copyright (C) 2019 American	Megatrends, Inc.		

#### Serial Port

Enable or disable serial port 1. The optimal setting for base I/O address is 3F8h and for interrupt request address is IRQ4.

#### COM Port Type

Use this item to set RS-232/422/485 communication mode.

#### • Serial Port 2 Configuration



#### Serial Port

Enable or disable serial port 2. The optimal setting for base I/O address is 2F8h and for interrupt request address is IRQ3.

#### • Hardware Monitor

This screen monitors hardware health status.

Pc Health StatusSwitch On/Off case openSystem temperature: +24 °CPCH temperature: +31 °CCPU temperature: +43 °CCPU Fan Speed: N/ASystem Fan Speed: N/AVCC_CPU: +1.465 V+3.3V: +3.394 V+12V: +12.408 V+5V: +5.087 V+3.3V_SBY: +3.448 VVBAT: +3.036 VCase Open[Enabled]> Smart Fan Function:	Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc. Advanced			
+3.3V_SBY : +3.448 V VBAT : +3.036 V Case Open [Enabled] →+: Select Screen > Smart Fan Function [Enabled] +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Select Item	Pc Health Status System temperature PCH temperature CPU temperature CPU Fan Speed System Fan Speed VCC_CPU +3.3V +12V +5V +5V_SBY	: +24 °C : +31 °C : +43 °C : N/A : N/A : +1.465 V : +3.394 V : +12.408 V : +5.087 V : +5.087 V	Switch On/Off case open	
ESC: Exit	+3.3V_SBY VBAT Case Open ► Smart Fan Function	: +3.448 V : +3.036 V [Enabled]	<pre>→+: Select Screen  ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>	

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

#### Case Open

Switch on or off case open.

#### • Smart Fan Function

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

Pc Health Status       Smart Fan 1 Mode Se         CPU FAN       [Full on]         Smart Fan 1 Mode       [Full on]         Smart Fan 2 Mode       [Full on]         Full on       Manual Mode         Automatic Mode       ++: Select Screen         11: Select Item       Enter: Select         F1: General Help       F2: Previous Values         F3: Optimized Defau       F4: Soue & Evit	Aptio Setup Utility - Co Advanced	right (C) 2019 American	Megatrends, Inc.
CPU FAN Smart Fan 1 Mode [Full On] SYSTEM FAN Smart Fan 2 Mode [Full On]	c Health Status		Smart Fan 1 Mode Select
Smart Fan 1 Mode [Full on] SYSTEM FAN Smart Fan 2 Mode [Full on] Full on Manual Mode Automatic Mode ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F4: Source & Evit	PU FAN		
Smart Fan 2 Mode [Full On] Smart Fan 1 Mode Full On Manual Mode Automatic Mode ++: Select Screen 1↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defau E4: Scree & Evit	mart Fan 1 Mode YSTEM FAN		
Smart Fan 1 Mode Full on Manual Mode Automatic Mode ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defau F4: Save & Evit	mart Fan 2 Mode	11 On]	
Version 2.20.1271. Copyright (C) 2019 American Megatrends. Inc.	Version 2.20.1271, Cop	Smart Fan 1 Mode	<pre>→+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>

#### Smart Fan 1 Mode\Smart Fan 2 Mode

This item allows you to select Smart Fan Mode:

- Full On: The fan always runs at full speed.
- Manual Mode: Use the Manual PWM Setting to determine fan speed manually. The range is from 0 (minimum speed) to 255 (maximum speed).



- Automatic Mode: The following option selections appear only in Automatic Mode. The initial spinning speed of fan is determined according to start PWM value. The PWM Slope is used to control how fast the fan speeds up or slows down; larger value means faster. When temperature gets higher, the fan increases its speed according to PWM Slope.



#### • Trusted Computing

This screen provides function for specifying the TPM settings.

TPM20 Device Found		Enables or Disables BIOS
Firmware Version:	402.1	support for security device.
Vendor: Security Device Support PM Device Selection Active PCR banks Available PCR banks	INTC [Enable] [PTT] SHA-1, SHA256 SHA-1, SHA256	O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Pending operation	Security Device Suppo Disable Enable	prt -
		tl: Select Item
		Enter: Select
		+/-: Change Opt.
		F1: General Help
		F2: Previous Values
		F3: Optimized Defaults
		F4: Save & Exit
		ESC: Exit

#### Security Device Support

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

#### **TPM Device Selection**

Select TPM device:

- dTPM: External extended Infineon's TPM .



- PTT: Intel<sup>®</sup> built-in TPM.



#### **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	[PTT]
Active PCR banks	SHA-1, SHA256
Available PCR banks	SHA-1, SHA256
Pending operation	Pending operation

#### • ACPI Settings

Aptio Se Advanced	tup Utility - Copyright (C) 2019 American (	Megatrends, Inc.
ACPI Settings		
ACPI Sleep State	[S3 (Suspend to RAM)]	
		++: Select Screen
		<pre> till Select Item Enter: Select </pre>
		+/-: Change Opt. F1: General Help
		F2: Previous Values F3: Optimized Defaults
		F4: Save & Exit ESC: Exit
Version 2.20.1271. Copyright (C) 2019 American Megatrends, 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) 2019 Amer	ican Megatrends, Inc.
CPU Configuration Type ID Sneed	Genuine Intel(R) CPU 0000 @ 1.60GHz 0x906EA 1600 MHz	when enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
L1 Data Cache L1 Instruction Cache L2 Cache	32 KB x 6 32 KB x 6 256 KB x 6	
L3 Cache L4 Cache VMX Intel (VMX) Virtualization Technology	Intel (VMX) virtualization Disabled Enabled	Technology
Intel(R) SpeedStep(tm) Turbo Mode	[Disabled]	File 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) 2019 Americ	can 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 KB x 6
L1 Instruction Cache	32 KB x 6
L2 Cache	256 КВ х 6
L3 Cache	Intel(R) SpeedStep(tm)
L4 Cache	Disabled
VMX	Enabled
Intel (VMX) Virtualization	Enabled
Technology	
<pre>Intel(R) SpeedStep(tm)</pre>	
Turbo Mode	[Disabled]

#### Intel(R) SpeedStep(tm)

Enable or disable Intel<sup>®</sup> 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 KB x 6
L2 Cache	256 КВ х 6
L3 Cache	Turbo Mode —
L4 Cache	Disabled
VMX	Enabled
Intel (VMX) Virtualization	Lindbred
Technology	
Inter(R) Speedstep(tm)	[pi-sh] ad]
Turbo Mode	[DISabled]

#### Turbo Mode

Enable or disable Intel<sup>®</sup> 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 currently installed hardware in the SATA ports.



#### SATA Controller(s)

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

Advanced		
SATA And RST Configuration		Dete
SATA Controller(s)	[Enabled]	This
SATA Mode Selection	[AHCI]	RST
Serial ATA Port 0	Empty	
Serial ATA Port 1	Empty	
Serial ATA Port 2	Empty	
Serial ATA Port 3	Empty	
	SATA Mode Selection —	
		†↓: Ente

#### SATA Mode Selection

Determine how SATA controller(s) operate.

#### • PCH-FW Configuration

This screen displays ME Firmware information.

Ap Advance	tio Setup Utility - Copyright (C) 20 1	19 American Megatrends, Inc.
ME Firmware Vers ME Firmware Mode ME Firmware SKU	ion 12.0.5.1117 Normal Mode Consumer SKU	++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
	/ersion 2.20.1271. Copyright (C) 2019	American Megatrends, 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.

<ul> <li>&gt; System Agent (SA) Configuration</li> <li>&gt; PCH-IO Configuration</li> </ul>	System Agent (SA) Parameters
	++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

• 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) 2019 Ame t	erican Megatrends, Inc.
SA PCIE Code Version VT-d ▶ Graphics Configuration ▶ Memory Configuration	7.0.56.48 Supported	Graphics Configuration
		<pre>++: Select Screen  ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
Version 2.2	20.1271. Copyright (C) 2019 Amer	ican Megatrends, Inc.

#### **Graphics Configuration**

Select to open sub menu for parameters related to graphics configuration.

#### Memory Configuration

Select to open sub menu for information related to system memory.

#### • Graphics Configuration

Aptio Setup Util Chipset	ity - Copyright (C)	2019 America	n Megatrends, Inc.
Graphics Configuration Primary IGFX Boot Display LVDS Control LVDS Panel Type	[AUTO] [Enabled] [1280x768 AUTO VGA DP HDMI LVDS	18Bit] oot Display —	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.
Version 2.20.12	271. Copyright (C)	2019 American	Megatrends, Inc.

#### Primary IGFX Boot Display

Select the video device which will be activated during POST (Power-On Self Test). The secondary boot display selection will appear based on your selection.

Chipset	
Graphics Configuration Primary IGFX Boot Display Secondary IGFX Boot Display LVDS Control LVDS Panel Type	[VGA] [DP] [Enabled] [1280x768 18Bit]
	Secondary IGFX Boot Display DP HDMI

#### Secondary IGFX Boot Display

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



#### LVDS Control

Enable or disable LVDS Control. When installing Linux OS and if DP, HDMI or VGA display is connected to your system, make sure to set this option to Disabled.

Graphics Configuration Primary IGFX Boot Display [VGA] Secondary IGFX Boot Display [DP] LVDS Control LVDS Panel Type 1024x768 2 1280x768 1 1280x800 1 1280x800 1 1280x960 1 1280x960 1 1280x1024 4 1366x768 1 1366x768 1 1366x768 1 1366x768 2 1440x900 4 1600x900 4 1600x1200 4 1920x1080 4 1920x1200 4	nel Type &Bit &Bit &Bit &Bit &Bit &Bit &Bit &Bit &Bit &Bit &Bit &Bit &Bit &Bit &Bit &Bit

#### **LVDS Panel Type**

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

Chipset		
Graphics Configuration Primary IGFX Boot Display LVDS Control LVDS Panel Type Brightness Setting	[AUTO] [Enabled] [1280x768 <mark>255</mark>	18Bit]

#### **Brightness Setting**

This option appears only when LVDS panel is connected. It allows user to adjust the brightness level of the LVDS panel.

- Range: 0~255
- Default: 255

#### • Memory Configuration

This screen shows the system memory information.



#### • PCH-IO Configuration

This screen allows you to set PCH parameters.

Aptio Setup Chipse	Utility - Copyright (C) 2019 Ame t	erican Megatrends, Inc.
PCH LAN Controller Wake on LAN Enable	[Enabled] [Enabled] PCH LAN Controller Enabled Disabled	Enable/Disable onboard NIC. ++: Select Screen 11: 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) 2019 Amer	ican Megatrends, Inc.

#### **PCH LAN Controller**

Enable or disable onboard PCH LAN controller.

#### Wake on LAN Enable

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) 2019 American Megatrends, Inc.		
Main Advanced Chipset Security Boot Save & Exit		
Password Description	Set Administrator Password	
If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup. If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights. The password length must be in the following range: Minimum length		
Maximum length Administrator Password User Password	<pre>++: Select Screen  †↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>	

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

## 4.7 Boot Menu

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

Aptio Setup Util Main Advanced Chipset	ity - Copyright (C) 2019 American Security Boot Save & Exit	Megatrends, Inc.
Boot Configuration Setup Prompt Timeout Bootup Numlock State	<mark>3</mark> [0n]	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Quiet Boot Launch UEFI PXE OpROM policy	[Disabled] [Disabled]	
Boot Option Priorities		
Boot Option #1	[Windows Boot Manager (P0: TS128GSSD370)]	
Boot Option #2	[Windows Boot Manager (P1. TS128GSSD370)]	
Boot Option #3	JetFlashTranscend 16GB 1100, Partition 1]	<pre>++: Select Screen  \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$</pre>
Boot Mode	[UEFI Mode]	+/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.1	271. Copyright (C) 2019 American Me	egatrends. Inc.

- 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 Bootup Numlock State	3 [on]
Quiet Boot Launch UEFI PXE OpROM policy On Board PXE LAN Select	[Disabled] / [Enabled] [Disabled]
Boot Option Priorities Boot Option #1	- On Board PXE LAN Select -
Boot Option #2	1219 1211
Boot Option #3	Disabled
Boot Mode	[UEFI Mode]

Launch UEFI PXE OpROM policy

Control the execution of UEFI PXE OpROM. When enabled, you may select I219, I211 or Disabled as PXE LAN port.

#### • Boot Option Priorities

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

Main	Advanced	Chipset	Security	Boot	Save & Exit	
Boot Con	figuration					
Setup Pr Bootup N	ompt Timeou umlock Sta	ut te	3 [0	On]		
Quiet Bo Launch U	ot EFI PXE Opi	ROM policy	0 0	Disable Disable	d] d]	
Boot Opt Boot Opt	ion Priorit	ties	Ľ	windows	Boot Manager	
Boot Opt	ion #2			UEFI M	ode Mode	
Boot Opt	ion #3			juoj		

#### 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.

Apti	io Setup Utility - Co	pyright ( <u>C) 2019 Ameri</u> can Megatrends, Inc.
Main Advanced	Chipset Security	Boot Save & Exit
Save Options Save Changes and E Discard Changes ar Save Changes and F Discard Changes ar Save Changes Discard Changes Default Options	axit nd Exit Reset nd Reset	Exit system setup after saving the changes.
Restore Defaults Save as User Defau Restore User Defau Boot Override UEFI: Built-in EFJ UEFI: Ut163 TS1GJF Ut163 TS1GJFV10 0.	ults ults shell v10 0.00, Partition 00	++: Select Screen †1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

#### • 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 <Del> 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 Utility Advanced	- Copyright (C) 2019 American	Megatrends, Inc.
SATA And RST Configuration		Determines how SATA
SATA Controller(s)	[Enabled]	
SATA Mode Selection		
Serial ATA Port 0 (mSATA)	HAGIWARA LFDMS (120.0GB)	
Serial ATA Port 2	E = 1000  M	
Serial ATA Port 3	Empty	
		<pre>++: Select Screen  \$ 1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
Version 2.20.1271.	Copyright (C) 2019 American M	egatrends, Inc.

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

Aptio Setup Utility Advanced	- Copyright (C) 2019 American	Megatrends, Inc.
SATA And RST Configuration		Determines how SATA
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	ST500DM002-1SB (500.1GB)	
Serial ATA Port 3	Empty	
Intel RST Pre	emium With Intel Optane System ,	Acceleration en
		+/-: Change Opt. F1: General Help F2: Previous Values
		F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.1271. Copyright (C) 2019 American Megatrends, Inc.		

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 - 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	[Enabled] [Intel RST Premium With Intel Optane System Acceleration]	Intel(R) RAID Controller
<pre>Intel(R) Ethernet Connection (7) I21 Serial ATA Port 0 (mSATA)</pre>	9-LM - 88:88:88:88:87:88 HAGIWARA LFDMS (120.0GB)	
Serial ATA Port 1 Serial ATA Port 2	Empty ST500DM002-1SB (500.1GB)	
Serial ATA Port 3	Empty	<pre>++: Select Screen  \$\$\\$\\$ Select Item Enter: Select +/-: Change Opt.  \$\$\\$ General Help \$\$\\$ Previous Values \$\$\$: Optimized Defaults \$</pre>
Version 2.20.1271. Co	opyright (C) 2019 American Me	egatrends, 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:	<b>Volume1</b> [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 Leve]: RAID0 (Stripe) RAID1 (Mirror) Recovery	↔ Select Screen
►Create Volume		Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.1271.	Copyright (C) 2019 American M	egatrends, 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 Utili 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	[X]	
Strip Size: Capacity (MB):	[64КВ] 228942	<pre>++: Select Screen  †↓: Select Item Enter: Select</pre>
Create volume		+/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.12	71. 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	[X]	
<b>Strip Size:</b> Capacity (MB):	[64КВ] <mark>228942</mark>	<pre>++: Select Screen  ↑↓: Select Item Enter: Select</pre>
► Create Volume		+/-: 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	can Megatrends, Inc.

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

Aptio Setup Utili Advanced	ty - Copyright (C) 2019 Ameri	ican Megatrends, Inc.
Create RAID Volume		Create a volume with the
Name RAID Level:	Volume1 [RAIDO (Stripe)]	sectings spectrice above
Select Disks: SATA 0.0, HAGIWARA LFDMSS-120GD(A00AH) FAM01-0017N00120, 111.7GB	[X]	
ZA400VCP, 465.7GB	[64кв]	
Capacity (MB):	228942	<pre>++: Select Screen  ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help</pre>
		F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.20.127	1. 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 Setu Advanced	o Utility - Copyright (C) 2019 Ameria	can Megatrends, Inc.
RAID VOLUME INFO Volume Actions > Delete		
Name: RAID Level: Stripe Size: Size: Status: Bootable: SATA 0.0, HAGIWARA LFDMS: 111.7GB SATA 0.2, ST500DM002-1SB:	Volume1 RAIDO (Stripe) 64KB 223.6GB Normal Yes G-120GD(A00AH) FAM01-0017N00120, LOA ZA400VCP, 465.7GB	<pre>→+: Select Screen  ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; 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<sup>®</sup> Active Management Technology (Intel<sup>®</sup> 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<sup>®</sup> iAMT you must enter the ME BIOS (<Ctrl + P> during system startup), change the ME BIOS password, and then select "Intel<sup>®</sup> 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 &gt; Intel(R) ME General Settings &gt; 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 !  $\sim$  \$ or ;  $\rightarrow$  (  $\sim$  " , 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) ME v9.0.3.1347 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.									
MAIN MENU									
<ul> <li>Intel(R) ME General Settings</li> <li>Intel(R) Standard Manageability Configuration MEBx Exit</li> </ul>									
[↓↑] = Move Highlight [Enter] = Select Entry [Esc] = Exit									

1. Select Network Setup to configure iAMT.

	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.										
	INTEL (R) STANDARD MANAGEABILITY CONFIGURATION										
^ ^ ^ ^ ^	Manageability Feature Selection SOL/IDER User Consent Password Policy Network Setup Activate Network Access Unconfigure Network Access Remote Setup And Configuration Power Control	n	<enabled> <anytime> <full td="" unpro<=""><td>ovision&gt;</td></full></anytime></enabled>	ovision>							
ſ	[↓↑] = Move Highlight [E	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.

copyright(c) zo	03-12 Intel Corporation. All Rights	(R) ME v9.0.3.1347 Reserved.
	INTEL (R) ME NETWORK SETUP	
Intel(R) ME Network Name S > TCP/IP Settings	settings	
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	03-12 Intel Corporation. All Rights	Reserved.
	03-12 Intel Corporation. All Rights WIRED LAN IPV4 CONFIGURATION	Reserved.
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DHCP Mode Enable/Disable IPV4 D	03-12 Intel Corporation. All Rights WIRED LAN IPV4 CONFIGURATION Enabled>	Reserved.

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

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.								
WIRED LAN IPV4 CONFIGURATION								
DHCP Mode IPV4 Address Subnet Mask Address Default Gateway Address Preferred DNS Address Alternate DNS Address Subnet mask (e.g. 255.255.255.0) 255.255.255.0_								
<ent< td=""><td>er&gt; = Complete Entry</td><td>[Esc] = Discard Changes</td></ent<>	er> = Complete Entry	[Esc] = Discard Changes						

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

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INTEL (R) STANDARD MANAGEABILITY CONFIGURATION								
Manageability Feature Selection <enabled> &gt; SOL/IDER</enabled>								
<pre>&gt; User Consent Password Policy <anytime> &gt; Network Setup</anytime></pre>								
Activate Network Access Unconfigure Network Access > Remote Setup And Configurati > Power Control Activates the current network settings and opens the ME network interface Continue: (Y/N)								
$[\downarrow\uparrow]$ = Move Highlight [Enter] = Select Entry [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		- 6 ×
😋 💽 👻 🙋 http://10.1.40.214:16992/logon.htm		Google	P -
🚖 🛠 🎉 Intel® Active Management Technology		🏠 🔹 🗟 🝸 🖶 🗃 嗣有(	(P) • ③ 工具(0) • "
Intel <sup>®</sup> Active Management Technology			(intel)
Los On			
Log on to Intel® Active Management Technology on this compute	ſ.		
Log On			
,		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.

🖉 Intel® Standard Manageabil	lity - Windows Internet Explorer #	昰由下列提供: Yahool奇摩		_ @ ×
📀 🕞 🗢 🙋 http://10.1	1.40.214 16992/index.htm		💌 🔛 😽 🗙 🞯 Yahaol	P -
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🏉 Intel® Standard Manageal	bility		🏠 • 🗔 - 🖃 🚔 • 網頁 🕑 • 安全性図 •	工具()・ 🕢・ »
	Managoability			
Computer:	manageability			(intel)
	-			
System Status	System Status			
Hardware Information System	Power	On		
Processor	IP address	10.1.40.214		
Disk	IPv6 address	Disabled		
Event Log Remote Control	System ID	03000200-0400-0500-0006-0007000	380009	
Power Policies	Date	7/17/2013		
IPv6 Network Settings	Time	9:59 am		
System Name Settings	Refresh			
٠ <b>[</b>	1			× •
			AD171 400.0	() - + 105 a -

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

🖉 Intel® Standard Manageabilit	s - Windows Internet Explorer 是由下列提供: Valuot奇摩		_ 8 ×
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檔案 E 編輯 E 檢視 (V)	我的最爱(A) 工具(D) 說明(A)		
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🏉 Intel® Standard Manageabil	ity	🏠 • 🔂 🔹 🖶 • 網頁 🛛 • 安全性 🕲	• 工具②• 🕢• »
Intel <sup>®</sup> Standard I <sup>Computer:</sup>	Manageability		(intel)
System Status Hardware Information	Remote Control		
System Processor	Power state: On		
Memory Disk	Send a command to this computer:		
Event Log Remote Control	Contension off*     Select a boot option:     Normal boot		
Power Policies Network Settings	C Reset* Boot from local CD/DVD drive Boot from local hard drive		
IPv6 Network Settings System Name Settings	C Graceful Shutdown*		
User Accounts	*Caution: These commands may cause user application data loss.		
	Send Command		
<b>.</b> [	I		
			A + + 105% + /

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

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# Appendix D TPM Settings

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

🗐 Run		×	
Type the name resource, and W	of a program, folder, document, or /indows will open it for you.	Internet	
Open: control		~	
	OK Cancel <u>B</u> r	owse	
🖭 All Control Panel Items			×
← → · · ↑ 🔤 → Control Pane	I → All Control Panel Items →	ڻ <sub>~</sub>	Search Control Panel
續 Administrative Tools	AutoPlay	🐌 Backup and Restore (Wind	ows 7)
Real BitLocker Drive Encryption	Color Management	Credential Manager	
Pate and Time	Default Programs	🗄 Device Manager	
Devices and Printers	Sease of Access Center	File Explorer Options	
File History	Flash Player (32-bit)	A Fonts	
• HomeGroup	🛃 Indexing Options	Infrared	
Intel® Graphics Settings	😒 Internet Options	🕌 Java	
Keyboard	S <sup>‡</sup> Language	Mouse	
Network and Sharing Center	Pen and Touch	Phone and Modem	
Power Options	Programs and Features	Recovery	
Kegion	RemoteApp and Desktop Connections	Security and Maintenance	
Sisoftware sandra	Source Control	Speech Recognition	
Tablet DC Settings	Sync Center	Troublesheating	
Ilser Accounts	Windows Defender Firewall	Windows Mobility Center	
Windows To Go	Work Folders	- who ws woonly celler	

e bicocke bive cheryption				~
🛧 🔶 Contro	I Panel > All Control Panel Items > BitLocker Drive Encryption	~ Ö	Search Control Panel	Q
Control Panel Home	BitLocker Drive Encryption			•
	Help protect your files and folders from unauthorized access by pr	otecting your dri	ves with BitLocker.	
	Operating system drive			
	Windows (C:) BitLocker off		$\odot$	
	😴 Turn on BitLoo	cker		
		-		
	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				

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 E	Drive Encryption				-		×				
Recy	← →	Ť	T 🕸 « All Control Panel Items	<ul> <li>BitLocker Drive Encryption</li> </ul>	_	✓ 🖒 Search	Control Par	iel .	2				
	Con	tr _	Ritl ocker Drive Encountion (C	-)	<	🎕 Save BitLocke	r recovery	key as				×	
		Ľ	- one of the office of the cheryphon (c.	-		← → ~ ↑	→ 16	GB (D:) →		<b>v</b> þ	Search 16GB (D:)	Ą	
This			How do you want to back	up your recovery key?		Organize 👻	New fold	er	2		[]==	• 🕜	
Sho			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 In one and keep each in a safe place other	prot than	Pictures HD Tune Music Videos	* ^ Pro 5.5	Name EFI LOCAL	.E IARK BurninTest Pro 4.0	5	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	
Mici Ec			ightarrow Save to your Microso	oft account		- 影像測信		SBC84	620		3/3/2018 5:40 PM	File folder	
			ightarrow Save to a file	1	>	🖌 🧥 OneDrive							
Intel(F		Ľ	ightarrow Print the recovery ke	ey .	>	16GB (D:)	-						
1					>	🕐 Metwork	~	<	3			>	
PCor			How can I find my recovery key la	ater?		File na Save as t	me: BitLo ype: lext h	cker Recovery iles (*.txt)	Key F809F878-040F-4A	1E-A4AC-2F	6D629A3DD7	~	
	See TPN	al: 17				<ul> <li>Hide Folders</li> </ul>					Save	Cancel	
	💡 Disk	Mana	gement		-							11.	
	Priv	acy sta	itement										
-	0	Туре	here to search	0 Hi 🔁 🚍	1		<b>j</b> -	<u>8</u>	🤏 🥳		¶ ^ ۹	(1)) ( <sup>3</sup> 4	2:30 AM

3. Please follow the steps below to encrypt your storage device:

4	×
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 still contain retrievable info.
ſ	Encrypt used disk space only (faster and best for new PCs and drives)
	Encrypt entire drive (slower but best for PCs and drives already in use)
	2 Next Cancel
2	×
4	Real BitLocker 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 1511) or later, you should choose the new encryption mode
4	New encryption mode (best for fixed drives on this device)
6	○ <u>C</u> ompatible mode (best for drives that can be moved from this device)
	2
	<u>N</u> ext Cancel



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

Recycle Bin 3DM	Mark 11 E	BitLocker Drive Encryptio	on entrol Panel	> All Control P	anel Items > 1	Bitl ocker Drive	Encryption	4		Search Co	-		× USB3.0	est USB2tes	ter	
A 6		e <u>E</u> dit ⊻iew <u>T</u> ools													ſ	
BurninTest 3DM	Mark06	Control Panel Home	Ì	BitLocker Dr Help protect you	ive Encrypti ar files and fold	ON ers from unaut	horized access l	by protecting	your drive	s with BitL	ocker.		0		Test	t_result
	<b>S</b>			For your set	curity, some se	ttings are man	aged by your sy	stem admini	istrator.							
hw64_551 CINE	EBENGH Qu R10 Dri			Operating sy	vstem drive									LuxMar	k-v3.1	
-				Windows (	C:) BitLocke	r Encrypting	9				$\odot$					
MonitorTest HD	)D Test				I		😍 Back up y 💱 Turn off B	our recovery litLocker	key						郑团 Cov	望Alina - rer 不曾
				Fixed data di	rives											•
saneng201 J	lperf Inte			Removable o	data drives - r off	BitLocker	To Go				0				Bu Pro	rnInTest fession
saneng2016 Lus	xmark Inte	See also		D. DILOCKE										JDMark	06 Burr	ninTest
CrystalDisk usb3	loopdr Pi	TPM Administration Disk Management Privacy statement	18 TEL							1	-	Encr Encr Encr infor BitLoc	yption in pro yption of C: t yption has st mation. ker Drive Encry	ogress by BitLocker arted. Click	Drive for more on Utility	
Е О Ту	pe here to sea	irch	Q	0 2			🥵 🔚	Ŷ		Ø	8	۶ ا	ዮ ^ 🏘	🛐 də))	7:49 PM 1/8/2018	3



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

💸 EitLackze Drive Encryption		×
← → + ↑ 🏘 > Cod	vel Panel > All Control Panel Items > BtLocker Dave Encryption	v 🁌 Search Control Panel 🔎
Control Panel Home	BitLocker Drive Encryption Help pretect your Mis and felders from unauthorized access by pretecting your drives with BitLocker.	0
	For your security, some settings are managed by your system administrator.	
	Operating system of  C Bit locker on	
	Cline Manage Bitlacker	
1 CONTRACTOR	Fixed data drives	_
	Removable data drives - BitLocker To Go	
	TRANSCEND (E) BitLocker off	0
See also ThM Administration Disk Management Privacy addement		

4. Confirm the completion of encryption.



5. Disable TPM function in BIOS Setup Utility.

Advanced		
TPM20 Device Found	402.1	Enables or Disables BIOS
Firmware Version: Vendor:	402.1 INTC	support for security device O.S. will not show Security
		Device. TCG EFI protocol an INT1A interface will not be available.
		<pre>→+: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help</pre>
		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.

iter the recovery	key for this drive		
I			
or more informati http://windows.mic	on on how to retrieve th rosoft.com/recoverykeyfa	nis key, go to Ng from another PC or mobi	le device.
Use the number key	s or function keys F1-F1	.0(use F10 for 0).	
Recovery key ID: 9	95386D1-889B-4ADA-BA42-C	xCD3929AF074	
Press Enter to Press Esc for m	continue ore recovery options		



System with no TPM function support is as below:

1. TPM information is not found in Device Manager.



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

> -> 🛧 🕀 > Contro	I 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 BitL
	Operating system drive
	C: BitLocker off
	Urrn on BitLocker
	Fixed data drives
	Removable data drives - BitLocker To Go
	TRANSCEND (D:) BitLocker off

