

AVS-320

Machine Vision Control

Intel Elkhart Lake Processor

User's Manual

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1 Packing List

Thank you for purchasing an Apex Product!

Open the motherboard package and check for the following items. If the motherboard or accessories are found damaged or missing, please contact your distributor immediately.

- 1 x AVS-320-J6413-XX
- 1 x AVS-320-J6412-XX
- 1 x SATA Cable
- 1 x SATA Power Cable
- 1 x Driver Utility CD

2 Disclaimer

The information in this document is subject to change without further notice. Please refer to your vendor for the latest information. In no event shall Apex Technology Inc. be liable for hidden defects or damages of any kind, whether consequential or incidental, arising from improper use or installation of the product.

3 Trademarks

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4 Safety Notices

- 4.1 Before using the product, please read this manual carefully.
- 4.2 Please handle the motherboard with necessary ESD protection measures. For example, when putting unused motherboard into the antistatic bag, please wear antistatic gloves before touching the motherboard.
- 4.3 Never bend the motherboard.
- 4.4 It is better to hold the motherboard by its edges.
- 4.5 Avoid turning on and off the PC frequently to prevent possible damages to the motherboard.
- 4.6 Be sure to unplug the system before installing or removing onboard devices.

5 Introduction

AVS-320 is a Non-standard motherboard developed on the basis of Intel Elkhart Lake, which provides abundant peripheral interfaces to meet the needs of different customers. Also, it features one GbE port, two PoE Ports, 2-COM ports, 4-Uart and one M.2 M-Key and one M.2 B-Key configuration. To satisfy the special needs of high-end customers, Due to its compact size, Products are used in the field of visual control.

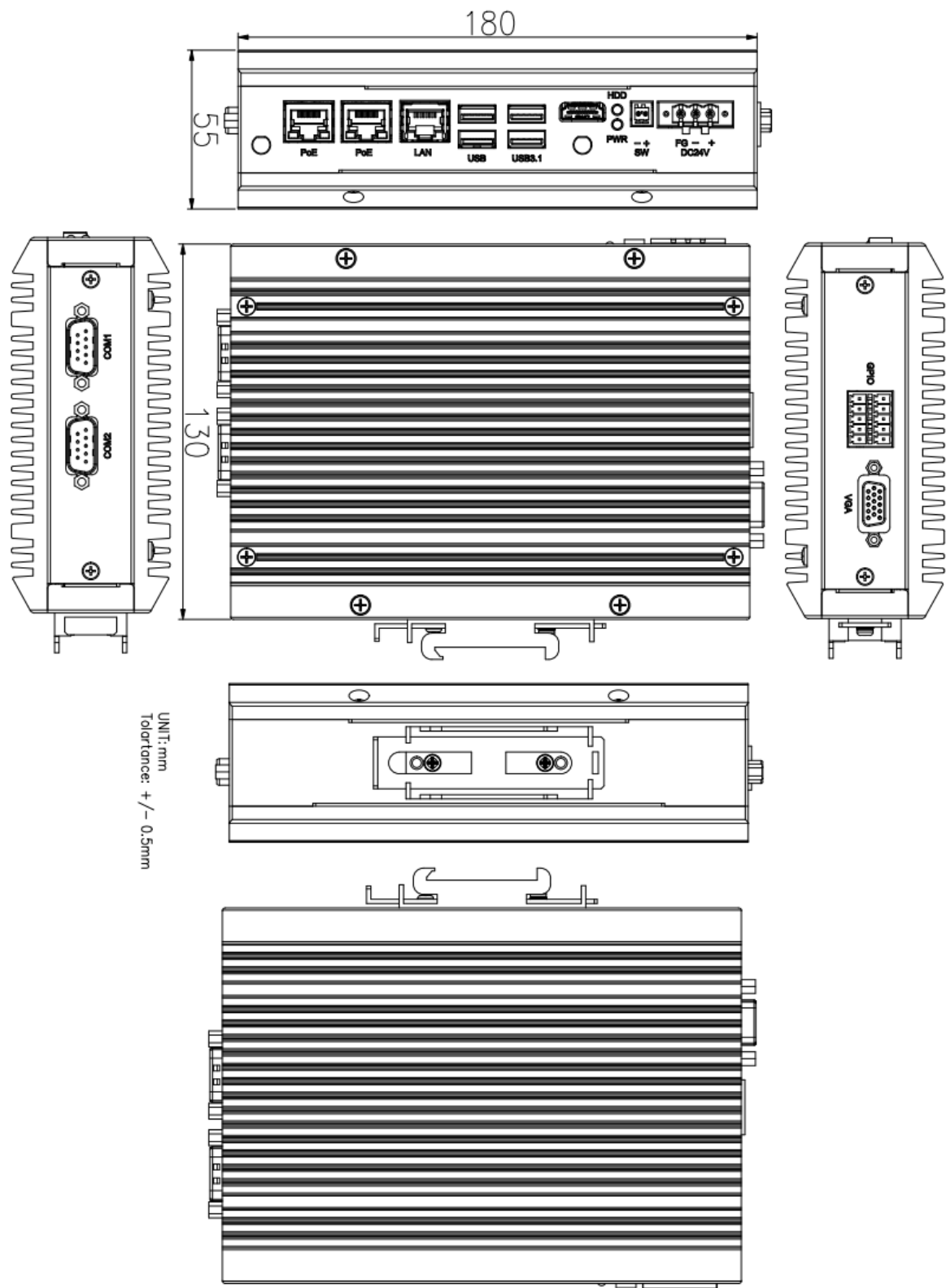
5.1 Specifications

Specifications	
Size	180mm x 130mm x 55mm
CPU Support	Intel Celeron J6413 Processor, 1.8GHz up to 3.00GHz, 10W Intel Celeron J6412 Processor, 2.0GHz up to 2.60GHz, 10W (optional)
Chipset	SOC
Memory Support	1x SO-DIMM (260pins), up to 32GB DDR4 3200MT/s
Graphics	Integrated Intel UHD Graphics 400/800 MHz (J6413/J6412)
Display Mode	1x HDMI 2.0b interface 1x CRT DB15
Support Resolution	Up to 4096 x 2160 @60Hz for HDMI Up to 1920 x 1200 for VGA
Double Display	HDMI + VGA
Super I/O	ITE IT8786E/HX
BIOS	AMI/UEFI BIOS
Storage	1x SATAIII Connector (7Pin)
M.2	1x M.2 M-Key (SATA III/PCIe auto detect), 2242 for Storage 1x M.2 B-Key (USB3.1/USB2.0), 3042/3052 for 4G/5G
Ethernet	1x GbE port by RJ45 with intel I210AT controller
PoE+	2x Gigabit PoE plus ports by RJ45 with intel I210AT Controller ▪ PoE standard IEEE 802.3af/at Power over Ethernet/PSE ▪ PoE power supply type end-span ▪ PoE power output per port max. 25.5 watts
USB	2x USB3.1, Type-A stack ports (USB3_1) 2x USB2.0, Type-A stack ports (USB_37) 1x USB2.0, Type-A stack port (USB_9) 1x USB3.1 for M.2 B-Key
Serial	1x RS232/422/485, DB9, Pin9 with 5V/12V/RI (COM1) 1x RS232, DB9, Pin9 with 5V/12V/RI (COM2)

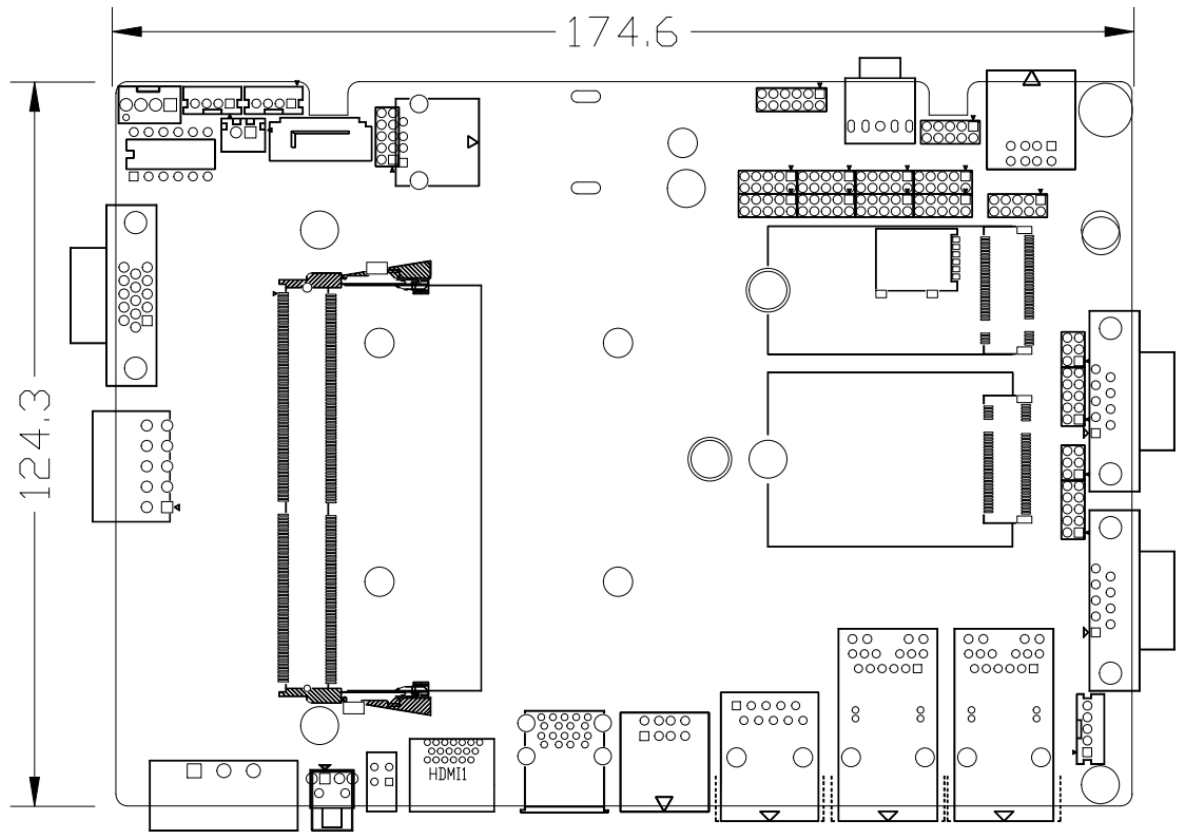
GPIO	PH3.50mm,2x5 Pin Phoenix connector 4x DI 4x DO
Battery	Support CR2477 Li battery by 2-pin header (1000mAh)
SIM	1x SIM Card Holder by SIM1
Watchdog Timer	Software programmable 1–255 levels
TPM	Support Intel® PTT
Power Management	1x 3-pin power input connector (DC24V)
Switches and LED Indicators	Power on/off switch by BT1 1x Power LED status by LED5 1x M.2 M-Key LED status by LED5
Audio	N/A
FAN	N/A
Expansion	N/A
Temperature	Operating: -20°C to 70°C Storage: -40°C to 85°C
Humidity	10% - 90%, non-condensing, operating
Power Consumption	DC24V/1.20A (Intel J6413 Processor with 8GB DDR4/HDD)
EMI/EMS	Meet CE/FCC class A

5.2 Dimensions

Mechanism Dimension:



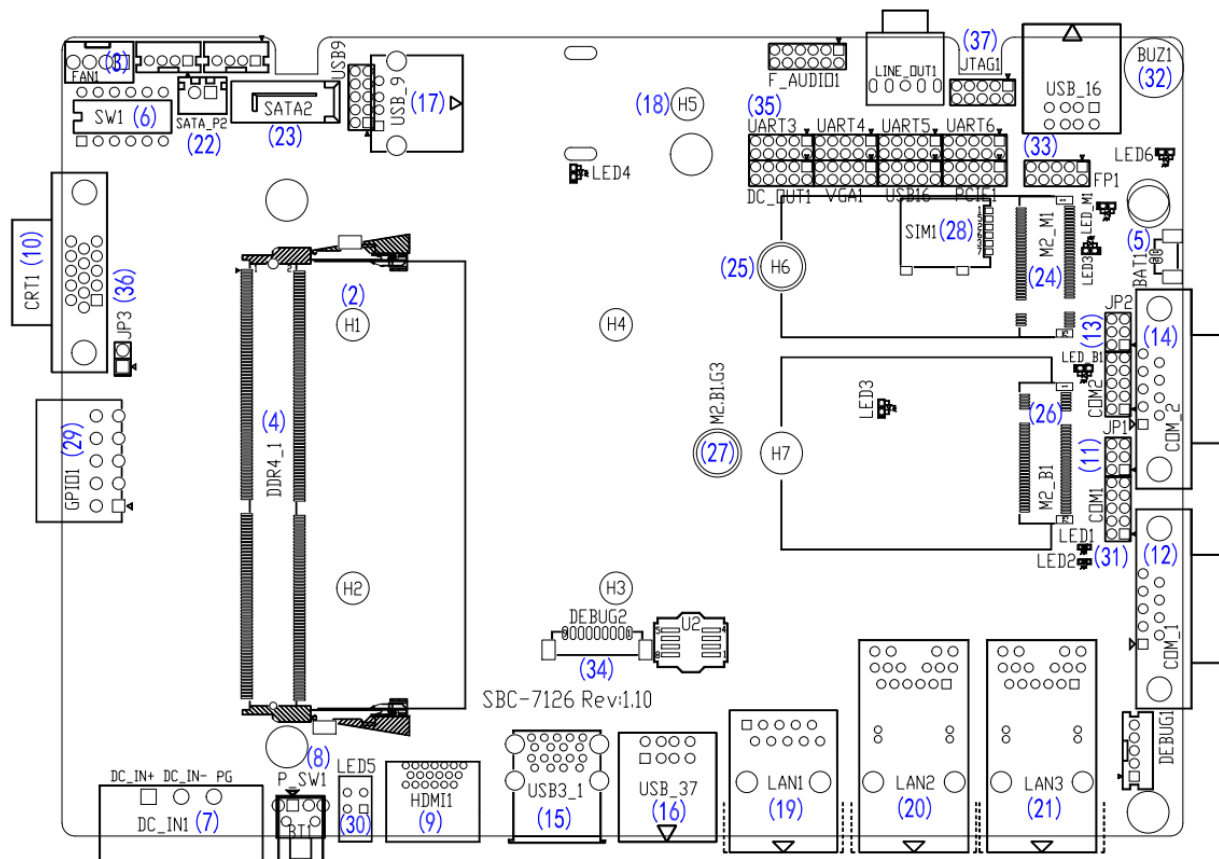
Main board Dimension:



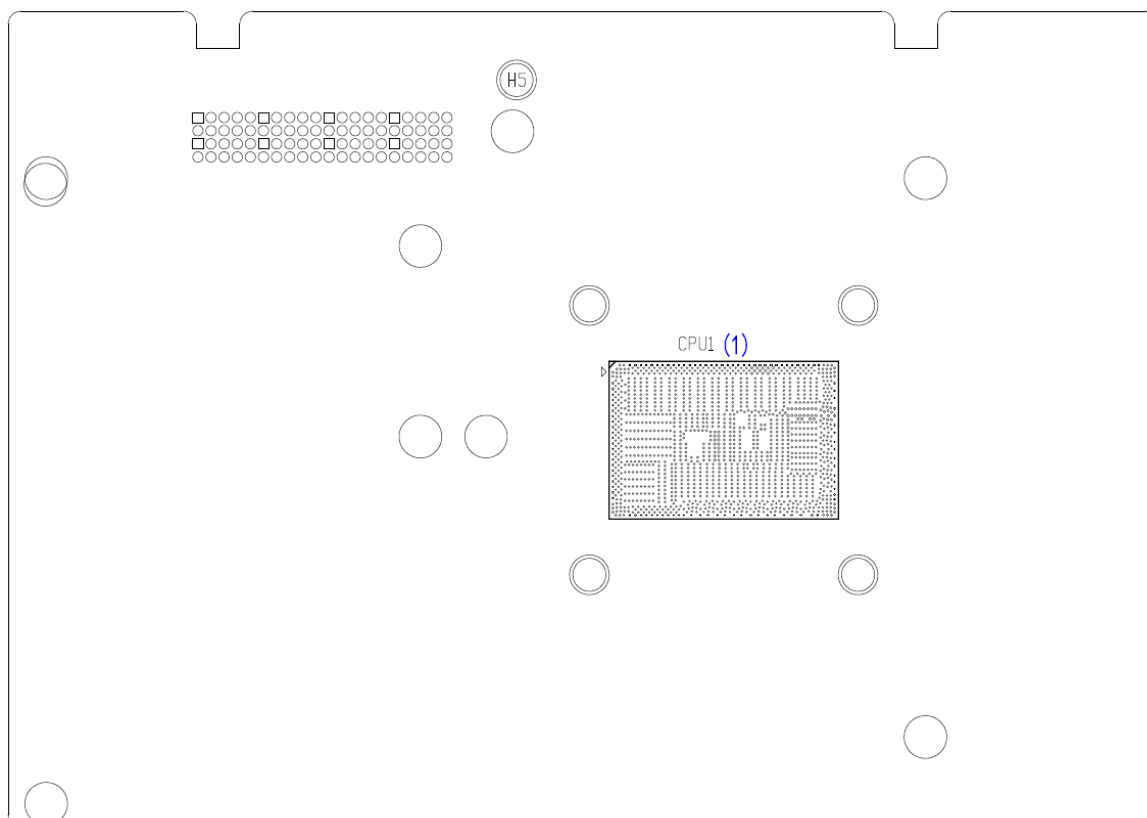
(units :mm)

5.3 Jumpers and Connectors Location

Board Top



Board Bottom



5.4 Jumpers Setting and Connectors

1. CPU1:

(FCBGA1493), onboard Intel Elkhart Lake Processors.

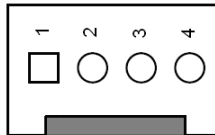
Model	Processor				
	Number	PBF	Cores/ Threads	TDP	Remarks
AVS-320-J6413-XX	J6413	1.8~3.0GHz	4 / 4	10W	
AVS-320-J6412-XX	J6412	2.0~2.6GHz	4 / 4	10W	

2. H1/H2/H3/H4(CPU SCREW HOLES):

CPU FAN SCREW HOLES, Four screw holes for fixed CPU Cooler assemble.

3. FAN1(N/A):

(2.54mm Pitch 1x4 Pin Header), Fan connector, cooling fans can be connected directly for use. You may set the rotation condition of cooling fan in menu of BIOS CMOS Setup.



Pin#	Signal Name
1	Ground
2	VCC(12V_S0)
3	CPU_FANTACH
4	CPU_FANPWM



Note:

Output power of cooling fan must be limited under 5W.

4. DDR4_1:

(SO-DIMM 260Pin slot), DDR4 memory socket, the socket is located at the top of the board and supports 260Pin 1.2V DDR4 SO-DIMM memory module up to 32GB.

Max Memory Size (dependent on memory type).

5. BAT1:

(1.25mm Pitch 1x2 wafer Pin Header) 3.0V Li battery is embedded to provide power for CMOS.

Pin#	Signal Name
Pin1	Ground
Pin2	VCC_RTC

6. SW1:

(Switch), Auto Power on and PSE jumper setting.

SW1	Mode
Pin1 on	Auto Power on (Default)
Pin1 off	Power button on (option)
Pin4 on	Disable PSE (option)
Pin4 off	Enable PSE (Default)
Pin5 on	-
Pin5 off	Default
Pin6 on	-
Pin6 off	Default

CMOS clear switch, CMOS clear operation will permanently reset old BIOS settings to factory defaults.

SW1	CMOS
Pin2 off	Normal (Default)
Pin2 on	Clear CMOS (option)
Pin3 off	Normal (Default)
Pin3 on	Clear CMOS CSE (option)

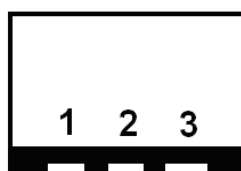


Procedures of CMOS clear:

- Turn off the system and unplug the power cord from the power outlet.
- To clear the CMOS settings, use the switch to Pin2 on for about 1 seconds then move the switch Pin2 off.
- Power on the system again.
- When entering the POST screen, press the key to enter CMOS Setup Utility to load optimal defaults.
- After the above operations, save changes and exit BIOS Setup.

7. DC24V(DC_IN1):

(5.08mm Pitch 1x3 Pin Connector),DC24V System power input connector。



Pin#	Power Input (DC_IN1)
Pin1	DC+24V
Pin2	Ground

Pin3	FG
------	----

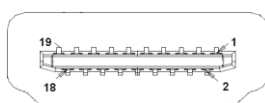
8. BT1/P_SW1(option):

Power on/off button, They are used to connect power switch button. The two pins are disconnected under normal condition. You may short them temporarily to realize system startup & shutdown or awaken the system from sleep state.

Model	BT1	P_SW1
AVS-320-XX	●	-

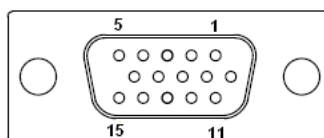
9. HDMI(HDMI1):

(HDMI 19P Connector), High Definition Multimedia Interface connector.



10. VGA(CRT1):

(CRT Connector DB15), Video Graphic Array Port, provide high-quality video output.



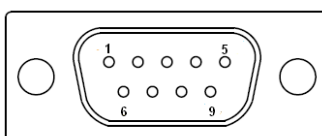
11. JP1(option):

(2.0mm Pitch 2x3 Pin Header), COM1 jumper setting, pin 1~6 are used to select signal out of pin 9 of COM1 port.

JP1 Pin#	Function
Close 1-2	COM1 Pin9 RI (Ring Indicator) (Default)
Close 3-4	COM1 Pin9 = +5V/1A (option)
Close 5-6	COM1 Pin9 = +12V/1A (option)

12. COM1(COM_1,option):

(Type DB9M), Serial port, standard DB9 Male serial port is provided to make a direct connection to serial devices. COM1 port is controlled by pins No.1~6 of JP1, select output Signal RI or 5V or 12V, For details, please refer to description of JP1 setting.



RS232 (Default):

Pin#	Signal Name
1	DCD# (Data Carrier Detect)
2	RXD (Received Data)
3	TXD (Transmit Data)
4	DTR (Data Terminal Ready)
5	Ground
6	DSR (Data Set Ready)
7	RTS (Request To Send)
8	CTS (Clear To Send)
9	JP1 select Setting (RI/5V/12V)
BIOS Setup: Serial Port 1 Configuration 【RS-232】	

RS422 (option):	
Pin#	Signal Name
1	422_TX-
2	422_TX+
3	422_RX+
4	422_RX-
5	Ground
6	NC
7	NC
8	NC
9	NC
BIOS Setup: Serial Port 1 Configuration 【RS-422】	

RS485 (option):	
Pin#	Signal Name
1	485-
2	485+
3	NC
4	NC
5	Ground
6	NC
7	NC
8	NC
9	NC
BIOS Setup: Serial Port 1 Configuration 【RS-485】	

13. JP2(option):

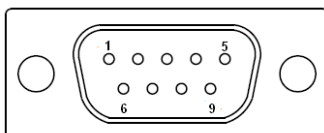
(2.0mm Pitch 2x3 Pin Header), COM2 jumper setting, pin 1~6 are used to select signal out of pin 9 of COM2 port.

JP2 Pin#	Function
Close 1-2	COM2 Pin9 RI (Ring Indicator) (Default)

Close 3-4	COM2 Pin9 = +5V/1A (option)
Close 5-6	COM2 Pin9 = +12V/1A (option)

14. COM2(COM_2,option):

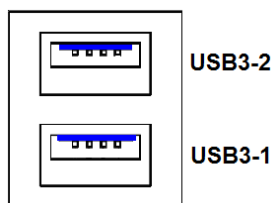
(Type DB9M),Serial port,standard DB9 Male serial port is provided to make a direct connection to serial devices. COM2 port is controlled by pins No.1~6 of JP2,select output Signal RI or 5V or 12V,For details, please refer to description of JP2 setting.



RS232 (option):	
Pin#	Signal Name
1	DCD# (Data Carrier Detect)
2	RXD (Received Data)
3	TXD (Transmit Data)
4	DTR (Data Terminal Ready)
5	Ground
6	DSR (Data Set Ready)
7	RTS (Request To Send)
8	CTS (Clear To Send)
9	JP2 select Setting (RI/5V/12V)
BIOS Setup: Serial Port 2 Configuration 【RS-232】	

15. USB3.1(USB3_1):

USB3-1/USB3-2: (Double stack USB typeA),Rear USB3.1 connector, it provides up to 2 USB3.1 ports,USB3.1 allows data transfers up to 10Gb/s,support USB2.0 and full-speed and low-speed signaling.



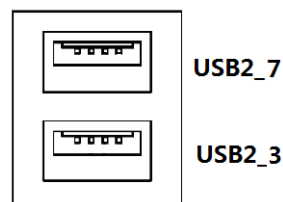
Each USB Type A Receptacle (2 Ports) Current limited value is **2.0A**.

If the external USB device current exceeds 2.0A, please separate connectors into different Receptacle.

16. USB(USB_37):

USB2_3/USB2_7: (Double stack USB typeA),Rear USB2.0 connector, it provides up to 2 USB2.0 ports,USB2.0 allows data transfers up to 480 Mb/s,support USB2.0 and

full-speed and low-speed signaling.

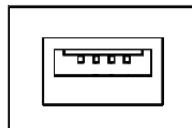


Each USB Type A Receptacle (2 Ports) Current limited value is **2.0A**.

If the external USB device current exceeds 2.0A, please separate connectors into different Receptacle.

17. USB_9 (option):

USB2_9: (Single USB typeA), I/O USB 2.0 connector, it provides up to 1 USB2.0 port, USB 2.0 allows data transfers up to 480Mb/s, support USB2.0 and full-speed and low-speed signaling.



Each USB Type A Receptacle (1 Port) Current limited value is **2.0A**.

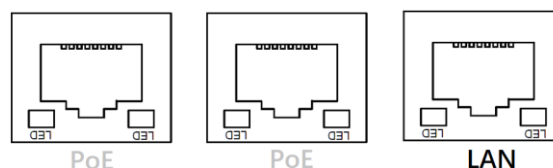
If the external USB device current exceeds 2.0A, please separate connectors into different Receptacle.

18. H5 (option):

USB_9 SCREW HOLES, H5 for USB_9 card assemble.

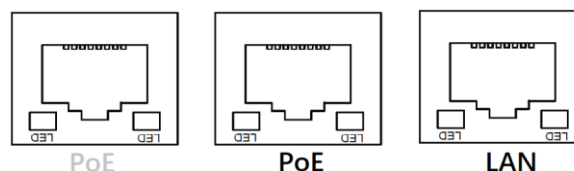
19. LAN(LAN1):

(RJ45 Connector), Rear LAN port, one standard 10/100/1000Mbps RJ45 Ethernet port are provided. Used Intel I210AT chipset.



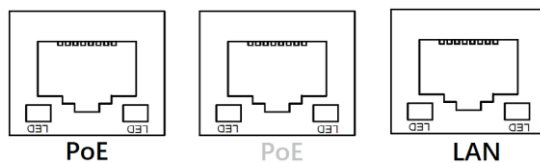
20. PoE(LAN2):

(RJ45 Connector), Gigabit PoE plus port by RJ45 with intel I210AT Controller, PoE standard IEEE 802.3af/at Power over Ethernet/PSE, PoE power supply type end-span, PoE power output per port max. 25.5 watts.



21. PoE(LAN3):

(RJ45 Connector),Gigabit PoE plus port by RJ45 with intel I210AT Controller, PoE standard IEEE 802.3af/at Power over Ethernet/PSE, PoE power supply type end-span, PoE power output per port max. 25.5 watts.



22. SATA_P2(option):

(2.5mm Pitch 1x2 Wafer Pin Header), One onboard 5V output connectors are reserved to provide power for SATA devices.

Pin#	Signal Name
1	+DC5V_S0
2	Ground



Note:

Output current of the connector must not be above 1A.

23. SATA2(option):

(SATA 7Pin),SATA Connectors,one SATA connectors are provided,SATA2 transfer speed up to 6.0Gb/s.

24. M2_M1:

(M.2 Socket),M.2 M-Key,it is located at the top,it supports M.2 M-Key devices with one PCIe or SATAIII signal. support 2242 size SSD card.

Function	Support
PCIe or SATAIII signal	● (auto detect)
USB2.0 (USB2_4)	○ (co-lay, NC)

25. H6:

M2_M1 SCREW HOLES, H6 for M2_M1 card assemble.

26. M2_B1:

(M.2 Socket),M.2 B-Key,it is located at the top, it supports M.2 B-Key devices with USB3.1 Gen2 and SIM and USB2.0 signal. support 3042/3052 size 5G card.

Function	Support
USB3.1	●
PCIe 1x signal	○ (Change BIOS rom)

27. H7, M2.B1.G3:

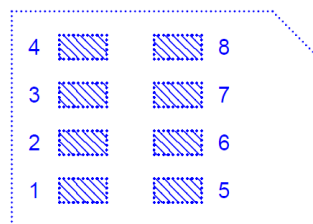
M2_B1 SCREW HOLES, H7 or M2.B1.G3 for M2_B1 card assemble.

The height can be adjusted according to the equipment.

M2_B1 Card size	H7/ M2.B1.G3 (high)	Remarks
3042	H7=6.45mm M2.B1.G3=2.45mm	
3052	M2.B1.G3=6.45mm H7=2.45mm	

28. SIM1:

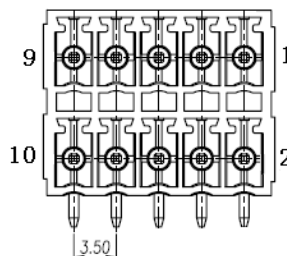
(NANO-SIM Socket), Support nano SIM Card devices.



Pin#	Signal Name
1	M2B_UIM_VDD
2	M2B_UIM_RST
3	M2B_UIM_CLK
5	Ground
6	M2B_UIM_VDD
7	M2B_UIM_DATA

29. GPIO1:

(3.50mm, 2x5 pin connector), general I/ O port, 8 port GPIO, user can program interface by themselves. GPIO programming routines are required, please contact your sales window staff or agent.



Pin#	Signal	GPIO	function
1	VCC_GPIO	5V_GPIO	5VDC_OUT
2	Ground	Ground	GND
3	GPIO_IN1	F75111_GPIO_27	IN

4	GPIO_IN2	F75111_GPIO_26	IN
5	GPIO_IN3	F75111_GPIO_25	IN
6	GPIO_IN4	F75111_GPIO_24	IN
7	GPIO_OUT1	F75111_GPIO_23	OUT
8	GPIO_OUT2	F75111_GPIO_22	OUT
9	GPIO_OUT3	F75111_GPIO_21	OUT
10	GPIO_OUT4	F75111_GPIO_20	OUT

30. **PWR/HDD LED(LED5):**

PWR LED: Green LED for Motherboard Standby Power Good status.

HDD LED: Yellow LED for M.2 M-Key status.

31. **LED1,LED2,LED3,LED4,LED6,LED7,LED_M1,LED_B1:**

LED1 STATUS. Green LED for Motherboard PSE Power status.

LED2 STATUS. Green LED for Motherboard PSE Power status.

LED3 STATUS. Green LED for Motherboard Power Supply 3P3V_S5 status.

LED4 STATUS. Green LED for Motherboard CPU status.

LED6 STATUS. Green LED for Motherboard Standby Power Good status.

LED7 STATUS. Green LED for MCU status.

LED_M1 STATUS. Green LED for M2_M1 status.

LED_B1 STATUS. Green LED for M2_B1 status.

32. **BUZZER1:**

Onboard buzzer.

33. **FP1(option):**

(2.0mm Pitch 2x5 Pin Header), Front panel connector.

Signal Name	Pin#	Pin#	Signal Name
HDD_LED+	1	2	POWER LED+
HDD_LED-	3	4	Ground
Ground	5	6	SW+
RESET+	7	8	Ground
BUZZER+	9	10	BUZZER-

Pin1-3: **HDD LED**, They are used to connect hard disk activity LED. The LED blinks when the hard disk is reading or writing data.

Pin2-4: **POWER LED**, They are used to connect power LED. When the system is powered on or under S0/S1 state, the LED is normally on; when the system is under S4/S5 state, the LED is off.

Pin5-6: **POWER on/off Button**, They are used to connect power switch button. The two pins are disconnected under normal condition. You may short them temporarily to realize system startup & shutdown or awaken the system from sleep state.

Pin7-8: **RESET Button**, They are used to connect reset button. The two pins are disconnected under normal condition. You may short them temporarily to realize

system reset.

Pin9-10: **BUZZER**, They are used to connect buzzer.



Note:

When connecting LEDs and buzzer, pay special attention to the signal polarity. Make sure that the connector pins have a one-to-one correspondence with chassis wiring, or it may cause boot up failure.

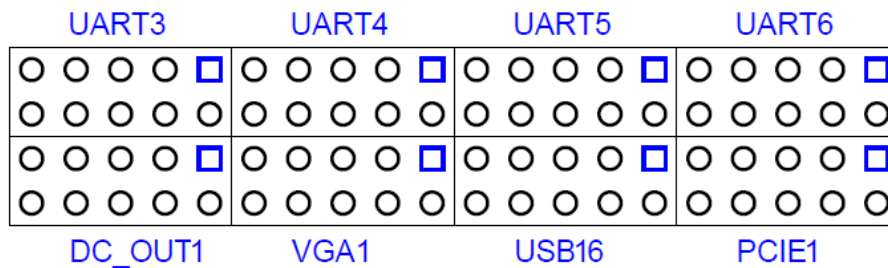
34. **DEBUG2(option):**

(1.25mm Pitch 1x9 Pin Header), it supports ESPI signal.

Pin#	Signal Name
1	3P3V_S5
2	ESPI_IO3
3	ESPI_IO2
4	ESPI_IO1
5	ESPI_IO0
6	ESPI_CLK
7	ESPI_CS0-
8	RLTRST_3P3V-
9	Ground

35. **80PIN CONN(N/A):**

(2.0mm Pitch 4x20 Pin),Riser Card expansion connector.Can expand support one PCIe x1 Signal and four Uart Signal and one VGA Signal and two USB2.0 Signal.80Pin connect to TB-579xx 80Pin connector.



DC_OUT1(Power output):			
Signal Name	Pin#	Pin#	Signal Name
3P3V_S5	1	2	3P3V_S5
12V_S5	3	4	12V_S5
Ground	5	6	Ground
DC_IN1 Voltage	7	8	DC_IN1 Voltage
DC_IN1 Voltage	9	10	DC_IN1 Voltage

VGA1 (Video Graphic Array Signal):			
Signal Name	Pin#	Pin#	Signal Name

CRT_RED(NC)	1	2	Ground
CRT_GREEN(NC)	3	4	Ground
CRT_BLUE(NC)	5	6	Ground
CRT_H_SYNC	7	8	CRT_DDCDATA
CRT_V_SYNC	9	10	CRT_DDCCLK

USB16 (USB2.0 Signal):			
Signal Name	Pin#	Pin#	Signal Name
5V_S5	1	2	5V_S5
USB1_N	3	4	USB6_N
USB1_P	5	6	USB6_N
Ground	7	8	Ground
PM_PCIE_WAKE-	9	10	FP_RESET-

PCIe1(PCIe X1 Signal):			
Signal Name	Pin#	Pin#	Signal Name
PE5_TX_P0	1	2	PE5_TX_N0
Ground	3	4	PE5_RX_P0
PLT_RST_BUF2-	5	6	PE5_RX_N0
SMB_CLK_S5	7	8	CLK_100M_PE5_P
SMB_DATA_S5	9	10	CLK_100M_PE5_N

UART3(UART Signal):			
Signal Name	Pin#	Pin#	Signal Name
GP63_DCD3-	1	2	GP90_RXD3
GPA2_TXD3	3	4	GPA0_DTR3-
Ground	5	6	GP34_DSR3-
GPA1_RTS3-	7	8	GP13_CTS3-
GP14_RI3-	9	10	5V_S0

UART4(UART Signal):			
Signal Name	Pin#	Pin#	Signal Name
GP66_DCD4-	1	2	GP97_RXD4
GP96_TXD4	3	4	GP93_DTR4-
Ground	5	6	GP95_DSR4-
GP94_RTS4-	7	8	GP92_CTS4-
GP91_RI4-	9	10	5V_S0

UART5(UART Signal):			
Signal Name	Pin#	Pin#	Signal Name
GP41_DCD5-	1	2	GP35_RXD5
GP37_FAN3_TAC	3	4	GP11_DTR5-
Ground	5	6	GP46_DSR5-
GP26_RTS5-	7	8	GP64_CTS5-
GP65_RI5-	9	10	5V_S0

UART6(UART Signal):			
Signal Name	Pin#	Pin#	Signal Name
GP67_DCD6-	1	2	GP27_RXD6
GP32_TXD6	3	4	GP16_DTR6-
Ground	5	6	GP47_DSR6-
GP50_RTS6-	7	8	GP33_CTS6-
GP15_RI6-	9	10	5V_S0

36. JP3(NC):

(2.54mm Pitch 1x2 Pin Header),DC24V power input setting.

JP3	Power Adapter input (DC_IN1)
Open	DC24V input, Default
Short	-

37. JTAG1(option):

(2.0mm Pitch 2x5 Pin Header),Joint Test Action Group port.

Signal Name	Pin#	Pin#	Signal Name
VCC_MCU	1	2	NC
TICE_DAT	3	4	NC
TICE_CLK	5	6	M2940A_SCL
RST_MCU-	7	8	Ground
Ground	9	10	M2940A_SDA

6 BIOS Setup Description

6.1 Operations after POST Screen

After CMOS discharge or BIOS flashing operation,.Press [Delete] key to enter CMOS Setup.



After optimizing and exiting CMOS Setup

6.2 BIOS SETUP UTILITY

Press [Delete] key to enter BIOS Setup utility during POST, and then a main menu containing system summary information will appear.

6.3 Main Settings

Aptio Setup - AMI					
Main	Advanced	Chipset	Security	Boot	Save & Exit
BIOS Information Project Version: 7126A005 Build Date and Time: 11/18/2022 09:05:50					Choose the system default language →←: Select Screen ↑↓ : Select Item Enter : Select +/- : Change Opt. F1 : General Help F2 : Previous Values F3 : Optimized Defaults F4 : Save and Exit ESC : Exit
Compute Die Information Name: ElkhartLake ULX Type: Intel Atom(R) Celeron(R) Processor @ 1.80GHz					
Speed: 1800MHz Number of Processors: 4Core(s) / 4 Thread(s) Total Memory: 8192 MB Memory Date Rate: 3200 MTPS					
System Language: [English]					
System Date: [Thu 01/05/2023]					
System Time: [13:21:38]					

Version 2.22.1282. Copyright (C) 2022 AMI

System Time:

Set the system time, the time format is:

Hour : 0 to 23

Minute : 0 to 59

Second : 0 to 59

System Date:

Set the system date, the date format is:

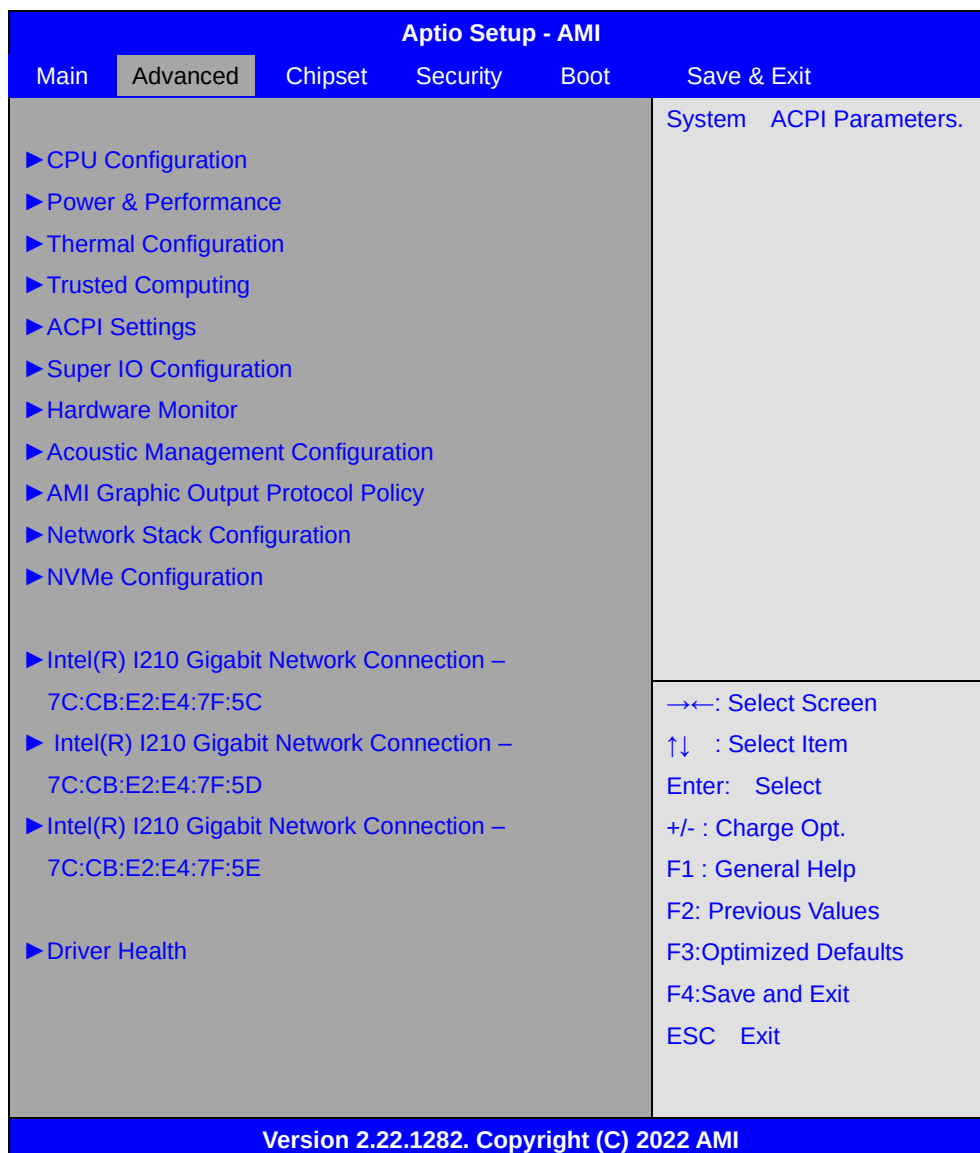
Day: Note that the 'Day' automatically changes when you set the date.

Month: 01 to 12

Date: 01 to 31

Year: 1998 to 2099

6.4 Advanced Settings



6.4.1 CPU Configuration

CPU Configuration

Type	Intel (R) Celeron (R) J6413 @ 1.80GHz
ID	0x90661
Speed	1800 MHz
L1 Data Cache	32 KB x 4
L1 Instruction Cache	32 KB x 4
L2 Cache	1536 KB x 4
L3 Cache	4 MB
L4 Cache	N/A
VMX	Supported
SMX/TXT	Not Supported

CPU Flex Ratio Override:	[Disabled] [Enabled]
CPU Flex Ratio Settings	18
Hardware Prefetcher:	[Disabled] [Enabled]
Intel (VNX) Virtualization Technology:	[Disabled] [Enabled]
PECI:	[Disabled] [Enabled]
Active Processor Cores:	[ALL] [1] [2] [3]
BIST:	[Disabled] [Enabled]
AP threads Idle Manner:	[HALT Loop] [MWAIT Loop] [RUN Loop]
AES:	[Disabled] [Enabled]
MachineCheck:	[Disabled] [Enabled]
MonitorMWait:	[Disabled] [Enabled]
CPU SMM Enhancement	
CPU SMM Enhancement	
SMM Use Delay Indication:	[Disabled] [Enabled]
SMM Use Block Indication:	[Disabled] [Enabled]
SMM Use SMM en-US Indication:	[Disabled]

[Enabled]

#AC Split Lock:

[Enabled]

[Disabled]

6.4.2 Power & Performance

Power & Performance

CPU – Power Management Control

CPU – Power Management Control

P0 Fused Max Core Ratio N/A

P1 Fused Max Core Ratio N/A

P2 Fused Max Core Ratio N/A

P3 Fused Max Core Ratio N/A

Boot performance mode:

[Max Battery]

[Max Non-Turbo Performance]

[Turbo Performance]

Intel (R) SpeedStep(tm):

[Disabled]

[Enabled]

Race To Halt (RTH):

[Disabled]

[Enabled]

Intel (R) Speed Shift Technology:

[Disabled]

[Enabled]

HwP Autonomous EPP Grouping:

[Disabled]

[Enabled]

EPB override over PECI:

[Disabled]

[Enabled]

HwP Fast MSR Support:

[Disabled]

[Enabled]

HDC Control:

[Disabled]

[Enabled]

Turbo Mode:

[Disabled]

[Enabled]

View/Configure Turbo Options

Current Turbo Settings

Max Turbo Power Limit	4095.875
Min Turbo Power Limit	0.0
Package TDP Limit	10.0
Power Limit 1	10.0
Power Limit 2	20.0
1-core Turbo Ratio	30
2- core Turbo Ratio	30
3- core Turbo Ratio	27
4- core Turbo Ratio	27
Energy Efficient P-state:	[Disabled] [Enabled]
Package Power Limit MSR Lock:	[Disabled] [Enabled]
Power Limit 1 Override:	[Disabled] [Enabled]
Power Limit 2 Override:	[Disabled] [Enabled]
Power Limit 2	0
1-Core Ratio Limit Override	30
2-Core Ratio Limit Override	30
3-Core Ratio Limit Override	27
4-Core Ratio Limit Override	27
Energy Efficient Turbo:	[Disabled] [Enabled]
CPU VR Settings	
CPU VR Ssttings	
PSYS Slope	0
PSYS Offset	0
PSYS Prefix:	[+] [-]
PSYS PMax Power	0
Acoustic Noise Settings	
Acoustic Noise Settings	
Acoustic Noise Mitigation:	[Disabled] [Enabled]

VccIn VR Domain	
Disable Fast PKG C State Ramp for VccIn Domain:	[FALSE] [TRUE]
Slow Slew Rate for VccIn Domain:	[Fast/2] [Fast/4] [Fast/8] [Fast/16]
VccIn VR Settings	
VccIn VR Domain	
VR Config Enable:	[Disabled] [Enabled]
AC Loadline	880
DC Loadline	860
PS Current Threshold1	0
PS Current Threshold2	0
PS Current Threshold3	0
PS3 Enable:	[Disabled] [Enabled]
PS4 Enable:	[Disabled] [Enabled]
IMON Slope	100
IMON Offset	1
IMON Prefix	[+]
VR Current Limit	90
TDC Enable:	[Disabled] [Enabled]
TDC Current Limit	112
TDC Time Window:	[1 ms] [2 ms] [3 ms] [4 ms] [5 ms] [6 ms] [7 ms] [8 ms] [9 ms] [10 ms]
TDC Lock:	[Disabled]

	[Enabled]
RFI Settings	
RFI Domain	
RFI Current Frequency	140.400MHz
RFI Frequency	0
RFI Spread Spectrum	15
Platform PL1 Enable:	
	[Disabled]
	[Enabled]
Platform PL1 Power	128
Platform PL1 Time window	128
Platform PL2 Enable:	
	[Disabled]
	[Enabled]
Power Limit 4 Override:	
	[Disabled]
	[Enabled]
C states:	
	[Disabled]
	[Enabled]
Enhanced C-states:	
	[Disabled]
	[Enabled]
C-state Auto Demotion	[C1]
C-state Un-demotion	[C1]
Package C-State Demotion:	
	[Disabled]
	[Enabled]
Package C-State Un-demotion:	
	[Disabled]
	[Enabled]
CState Pre-Wake:	
	[Disabled]
	[Enabled]
IO MWAIT Redirection:	
	[Disabled]
	[Enabled]
Package C State Limit	[Auto]
C6/C7 Short Latency Control(MSR 0x60B)	
Time Unit	[1024 ns]
Latency	0
C6/C7 Short Latency Control(MSR 0x60C)	
Time Unit	[1024 ns]
Latency	0

C8 Latency Control(MSR 0x633)	
Time Unit	[1024 ns]
Latency	0
C9 Latency Control(MSR 0x634)	
Time Unit	[1024 ns]
Latency	0
C10 Latency Control(MSR 0x635)	
Time Unit	[1024 ns]
Latency	0
Thermal Monitor:	
	[Disabled]
	[Enabled]
Interrupt Redirection Mode Selection:	
	[Fixed Priority]
	[Round robin]
	[Hash Vector]
	[No Change]
Timed MWAIT:	
	[Disabled]
	[Enabled]
Custom P-state Table	
Custom P-state Table	
Number of P states	0
EC Turbo Control Mode:	
	[Disabled]
	[Enabled]
Energy Performance Gain:	
	[Disabled]
	[Enabled]
EPG DIMM Idd3N	26
EFG DIMM Idd3P	11
Power Limit 3 Settings	
CPU Lock Configuration	
CFG Lock:	
	[Disabled]
	[Enabled]
Overclocking Lock:	
	[Disabled]
	[Enabled]
GT – Power Management Control	
GT – Power Management Control	
Maximum GT frequency:	
	[Default Max Frequency]
	[100Mhz]
	[150Mhz]

[200Mhz]
 [250Mhz]
 [300Mhz]
 [350Mhz]
 [400Mhz]
 [450Mhz]
 [500Mhz]
 [550Mhz]
 [600Mhz]
 [650Mhz]
 [700Mhz]
 [750Mhz]
 [800Mhz]
 [850Mhz]
 [900Mhz]
 [950Mhz]
 [1000Mhz]
 [1050Mhz]
 [1100Mhz]
 [1150Mhz]
 [1200Mhz]

Disable Turbo GT frequency:

[Enabled]
 [Disabled]

6.4.3 Thermal Configuration

Thermal Configuration

Enable All Thermal Funcations:

[Disabled]
 [Enabled]

CPU Thermal Configuration

Cpu Thermal Configuration

DTS SMM:

[Disabled]
 [Enabled]
 [Critical Temp Reporting(Out of spec)]

Tcc Activation Offset

25

Tcc Offset Time Window:

[Disabled]
 [5ms]
 [10 ms]
 [55 ms]
 [156 ms]
 [375 ms]
 [500 ms]

[750 ms]
 [1 sec]
 [2 sec]
 [3 sec]
 [4 sec]
 [5 sec]
 [6 sec]
 [7 sec]
 [8 sec]
 [10 sec]
 [12 sec]
 [14 sec]
 [16 sec]
 [20 sec]
 [24 sec]
 [28 sec]
 [32 sec]
 [40 sec]
 [48 sec]
 [56 sec]
 [64 sec]
 [80 sec]
 [96 sec]
 [112 sec]
 [128 sec]
 [160 sec]
 [192 sec]
 [224 sec]
 [256 sec]
 [320 sec]

Tcc Offset Clamp Enable:

[Disabled]
 [Enabled]

Tcc Offset Lock Enable:

[Disabled]
 [Enabled]

Bi-directional PROCHOT#:

[Disabled]
 [Enabled]

Disable PROCHOT# Output:

[Disabled]
 [Enabled]

Disable VR Thermal Alert:

[Disabled]
 [Enabled]

PROCHOT Response:	[Disabled] [Enabled]
PROCHOT Lock:	[Disabled] [Enabled]
ACPI T-States:	[Disabled] [Enabled]
Platform Thermal Configuration	
Platform Thermal Configuration	
Critical Trip Point:	[15 C] [23 C] [31 C] [39 C] [47 C] [55 C] [63 C] [71 C] [79 C] [87 C] [95 C] [100 C] [103 C] [111 C] [119 C (POR)] [127 C] [130 C]
Active Trip Point 0:	[Disabled] [15 C] [23 C] [31 C] [39 C] [47 C] [55 C] [63 C] [71 C] [79 C] [87 C] [95 C] [103 C] [111C] [119 C (POR)]

Active Trip Point 0 Fan Speed:	100
Active Trip Point 1:	[Disabled] [15 C] [23 C] [31 C] [39 C] [47 C] [55 C] [63 C] [71 C] [79 C] [87 C] [95 C] [103 C] [111C] [119 C (POR)]
Active Trip Point 1 Fan Speed:	75
Passive Trip Point :	[Disabled] [15 C] [23 C] [31 C] [39 C] [47 C] [55 C] [63 C] [71 C] [79 C] [87 C] [95 C] [103 C] [111C] [119 C (POR)]
Passive TC1 Value	1
Passive TC2 Value	5
Passive TSP Value	10
Active Trip Points:	[Disabled] [Enabled]
Passive Trip Points:	[Disabled] [Enabled]
CriticalTrip Points:	[Disabled]

		[Enabled]
	PCH Temp Read:	[Disabled]
		[Enabled]
	CPU Energy Read:	[Disabled]
		[Enabled]
	CPU Temp Read:	[Disabled]
		[Enabled]
	Alert Enable Lock:	[Disabled]
		[Enabled]
	CPU Temp	72
	CPU Fan Speed	65
	DPTF Configuration	
	DPTF Configuration	
	Hardware Health Monitor	
	Hardware Health Monitor	
	Thermal Sensor 1 Temp	0.0 C
	Thermal Sensor 2 Temp	0.0 C
	Thermal Sensor 3 Temp	0.0 C
	Thermal Sensor 4 Temp	0.0 C
	CPU Fan Speed	0 rpm
6.4.4	Trusted Computing Configuration	
	Security Device Support:	[Disabled]
		[Enabled]
	NO Security Device Found	
6.4.5	ACPI Settings	
	ACPI Settings	
	Enable Hibernation:	[Disabled]
		[Enabled]
	ACPI Sleep State:	[Suspend]
		[S3 (Suspend to RAM)]

6.4.6 Super IO Configuration

Super IO Configuration

Super IO Chip	IT8786
Serial Port 1 Configuration	
Serial Port 1 Configuration	
Serial Port:	[Disabled] [Enabled]
Device Settings	IO=3F8h; IRQ=4;
Change Settings:	[Auto] [IO=3F8h; IRQ=4] [IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12;] [IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12;] [IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;] [IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;]
COM1 Config:	[RS232 mode] [RS485 mode] [RS422 mode]
Serial Port 2 Configuration	
Serial Port 2 Configuration	
Serial Port:	[Disabled] [Enabled]
Device Settings	IO=2F8h; IRQ=4;
Change Settings:	[Auto] [IO=2F8h; IRQ=4] [IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12;] [IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12;] [IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;] [IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;]

6.4.7 Hardware Monitor

Pc Health Status

System temperature1	: +32 C
Fan1 Speed	: N/A
CPU_CORE_VIN	: +1.653 V
+1.2V	: +1.236 V
+12V	: +11.648 V
+5V	: +5.123 V

	Smart Fan Function	
	Fan 1 Setting	
	Fan 1 Setting	
	Smart Fan 1 Mode:	[Software Mode] [Automatic Mode]
	Fan 1 Type:	[PWM] [RPM]
	Temperature select:	[TMPIN1] [TMPIN2] [TMPIN3]
	Fan off temperature limit:	0
	Fan start temperature limit:	30
	Fan full speed temperature limit:	90
	Fan start PWM:	75
	PWM SLOPE SETTING:	3
	Temperature:	4
6.4.8	Acoustic Management Configuration	
	Acoustic Management Configuration	
	HDD not found	
	HDD not found	
6.4.9	AMI Graphic Output Protocol Policy	
	Intel(R) Graphics Controller	
	Intel(R) GOP Driver [18.0.1034]	
	Output Select:	[DP1[ACTIVE]]
6.4.10	Network Stack Configuration	
	Network Stack:	[Disabled] [Enabled]
6.4.11	NVMe Configuration	
	NVMe Configuration	
	No NVME Device Found	
6.4.12	Intel(R) I210 Gigabit Network Connection –	
	7C:CB:E2:E4:7F:5C	
	NIC Configuration	
	Link Speed:	[Auto Negotiated] [10 Mbps Half] [10 Mbps Full]

	[100 Mbps Half] [100 Mbps Full]
Wake On LAN:	[Disabled] [Enabled]
Blink LEDS	0
UEFI Driver	Intel(R) PRO/1000 9.1.12 PCI-E
Adapter PBA	000300-000
Device Name	Intel(R) I210 Gigabit Network Connection
Chip Type	Intel i210
PCI Device ID	1533
PCI Address	01:00:00
Link Status	[Disconnected]
MAC Address	7C:CB:E2:E4:7F:5C
Virtual MAC Address	00:00:00:00:00:00

6.4.13 Intel(R) I210 Gigabit Network Connection –

7C:CB:E2:E4:7F:5D

NIC Configuration

Link Speed:

	[Auto Negotiated] [10 Mbps Half] [10 Mbps Full] [100 Mbps Half] [100 Mbps Full]
Wake On LAN:	[Disabled] [Enabled]
Blink LEDS	0
UEFI Driver	Intel(R) PRO/1000 9.1.12 PCI-E
Adapter PBA	000300-000
Device Name	Intel(R) I210 Gigabit Network Connection
Chip Type	Intel i210
PCI Device ID	1533
PCI Address	02:00:00
Link Status	[Disconnected]

MAC Address	7C:CB:E2:E4:7F:5D
Virtual MAC Address	00:00:00:00:00:00

6.4.14 Intel(R) I210 Gigabit Network Connection –

7C:CB:E2:E4:7F:5E

NIC Configuration

Link Speed:

[Auto Negotiated]
[10 Mbps Half]
[10 Mbps Full]
[100 Mbps Half]
[100 Mbps Full]

Wake On LAN:

[Disabled]
[Enabled]

Blink LEDS

0

UEFI Driver

Intel(R) PRO/1000
9.1.12 PCI-E

Adapter PBA

000300-000

Device Name

Intel(R) I210 Gigabit
Network Connection

Chip Type

Intel i210

PCI Device ID

1533

PCI Address

03:00:00

Link Status

[Disconnected]

MAC Address

7C:CB:E2:E4:7F:5E

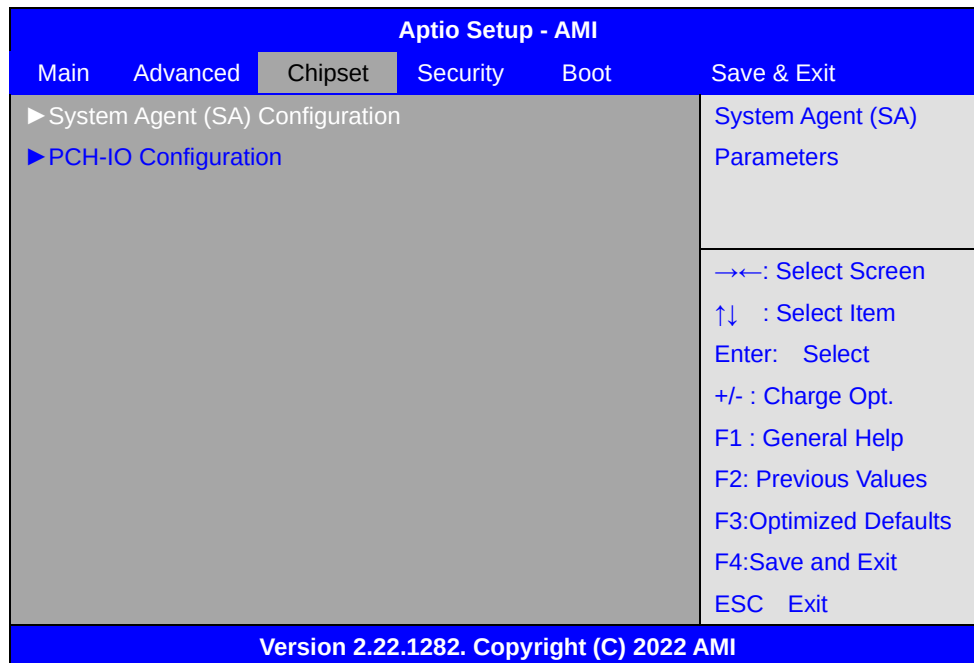
Virtual MAC Address

00:00:00:00:00:00

6.4.15 Driver Health

Intel(R) PRO/1000 9.1.12 PCI-E	Healthy
Controller 72A96B18 Child 0	Healthy
Intel(R) I210 Gigabit Network Connection	Healthy
Intel(R) PRO/1000 9.1.12 PCI-E	Healthy
Controller 72A96898 Child 0	Healthy
Intel(R) I210 Gigabit Network Connection	Healthy
Intel(R) PRO/1000 9.1.12 PCI-E	Healthy
Controller 72A96518 Child 0	Healthy
Intel(R) I210 Gigabit Network Connection	Healthy

6.5 Chipset Settings



6.5.1 System Agent (SA) Configuration System Agent (SA) Configuration

Memory Configuration

Memory Thermal Configuration

Memory Thermal Configuration

Memory Power and Thermal Throttling

Memory Power and Thermal Throttling

DDR PowerDown and idle counter:

[PCODE]

[BIOS]

FOR LPDDR Only: DDR PowerDown and Idle counter

[PCODE]

[BIOS]

REFRESH_2X_MODE:

[Disabled]

[1- Enabled for WARM or HOT]

[2- Enabled HOT only]

LPDDR Thermal Sensor:

[Disabled]

[Enabled]

SelfRefresh Enable:

[Disabled]

	[Enabled]
SelfRefresh IdleTimer:	512
Throttler CKEMin Defeature:	
	[Enabled]
	[Disabled]
Throttler CKKEMin Timer:	48
For LPDDR Only: Throttler CKEMin Defeature:	
	[Enabled]
	[Disabled]
For LPDDR Only: Throttler CKEMin Timer:	64
Dram Power Meter	
Dram Power Meter	
Use user provided power weights,	
Sacle factor, and channel power	
Floor values:	[Disabled]
	[Enabled]
Energy Scale Factor	4
Idle Energy Ch0Dimm0	10
PowerDown Energy Ch0Dimm0	6
Activate Energy Ch0Dimm0	172
Read Energy Ch0Dimm0	212
Write Energy Ch0Dimm0	221
Idle Energy Ch0Dimm1	10
PowerDown Energy Ch0Dimm1	6
Activate Energy Ch0Dimm1	172
Read Energy Ch0Dimm1	212
Write Energy Ch0Dimm1	221
Idle Energy Ch1Dimm0	10
PowerDown Energy Ch1Dimm0	6
Activate Energy Ch1Dimm0	172
Read Energy Ch1Dimm0	212
Write Energy Ch1Dimm0	221
Idle Energy Ch1Dimm1	10
PowerDown Energy Ch1Dimm1	6
Activate Energy Ch1Dimm1	172
Read Energy Ch1Dimm1	212
Write Energy Ch1Dimm1	221
Memory Thermal Reporting	
Lock Thermal Management Registers:	
	[Disabled]
	[Enabled]

Memory Thermal Reporting

Extern Therm Status:

[Disabled]

[Enabled]

Closed Loop Therm Manage:

[Disabled]

[Enabled]

Open Loop Therm Manage:

[Disabled]

[Enabled]

Thermal Threshold Settings

Warm Threshold Ch0 Dimm0 255

Warm Threshold Ch0 Dimm1 255

Hot Threshold Ch0 Dimm0 255

Hot Threshold Ch0 Dimm1 255

Warm Threshold Ch1 Dimm0 255

Warm Threshold Ch1 Dimm1 255

Hot Threshold Ch1 Dimm0 255

Hot Threshold Ch1 Dimm1 255

Thermal Throttle Budget Settings

Warm Budget Ch0 Dimm0 255

Warm Budget Ch0 Dimm1 255

Hot Budget Ch0 Dimm0 255

Hot Budget Ch0 Dimm1 255

Warm Budget Ch1 Dimm0 255

Warm Budget Ch1 Dimm1 255

Hot Budget Ch1 Dimm0 255

Hot Budget Ch1 Dimm1 255

Memory RAPL

Memory RAPL

Rap1 Power Floor Ch0 0

Rap1 Power Floor Ch1 0

RAPL PL Lock:

[Disabled]

[Enabled]

RAPL PL 1 enable:

[Disabled]

[Enabled]

RAPL PL 1 Power	0
RAPL PL 1 WindowX	0
RAPL PL 1 WindowY	0
RAPL PL 2 enable:	[Disabled] [Enabled]
RAPL PL 2 Power	222
RAPL PL 2 WindowX	1
RAPL PL 2 WindowY	10
Memory Thermal Management:	[Disabled] [Enabled]
Memory Training Algorithms:	
Early Command Training:	[Disabled] [Enabled]
SenseAmp Offset Training:	[Disabled] [Enabled]
Early ReadMPR Timing Centering 2D:	[Disabled] [Enabled]
Read MPR Training:	[Disabled] [Enabled]
Receive Enable Training:	[Disabled] [Enabled]
Jedec Write Leveling:	[Disabled] [Enabled]
LPDDR4 Write DQ DQS Retraining:	[Disabled] [Enabled]
Early Write Time Centering 2D:	[Disabled] [Enabled]
Early Read Time Centering 2D:	[Disabled] [Enabled]
Write Timing Centering 1D:	[Disabled] [Enabled]
Write Voltage Centering 1D:	[Disabled]

	[Enabled]
Read Timing Centering 1D:	[Disabled]
	[Enabled]
Dimm ODT Training* :	[Disabled]
	[Enabled]
Max RTT_WR:	[ODT Off]
	[120 Ohms]
DIMM RON Training*:	[Disabled]
	[Enabled]
Write Drive Strength/Equalization 2D*:	[Disabled]
	[Enabled]
Write Slew Rate Training*:	[Disabled]
	[Enabled]
Read ODT Training*:	[Disabled]
	[Enabled]
Read Equalization Training*:	[Disabled]
	[Enabled]
Read Amplifier Training*:	[Disabled]
	[Enabled]
Write Timing Centering 2D:	[Disabled]
	[Enabled]
Read Timing Centering 2D:	[Disabled]
	[Enabled]
Command Voltage Centering:	[Disabled]
	[Enabled]
Write Voltage Centering 2D:	[Disabled]
	[Enabled]
Read Voltage Centering 2D:	[Disabled]
	[Enabled]
Late Command Training:	[Disabled]
	[Enabled]

Round Trip Latency:	[Disabled] [Enabled]
Turn Around Timing Training:	[Disabled] [Enabled]
Rank Margin Tool:	[Disabled] [Enabled]
Rank Margin Tool Per Bit:	[Disabled] [Enabled]
Margin Check Limit:	[Disabled] [L1] [L2] [Both]
Margin Limit Check L2:	100
Memory Test:	[Disabled] [Enabled]
DIMM SPD Alias Test:	[Disabled] [Enabled]
Receive Enable Centering 1D:	[Disabled] [Enabled]
Retrain Margin Check:	[Disabled] [Enabled]
Write Drive Strength Up/ Dnindependently:	[Disabled] [Enabled]
Command Slew Rate Training:	[Disabled] [Enabled]
Command Drive Strength and Equalization:	[Disabled] [Enabled]
Command Normalization:	[Disabled] [Enabled]
Early DQ Write Drive Strength and Equalization Training:	

	[Disabled]
	[Enabled]
Read Voltage Centering 1D:	
	[Disabled]
	[Enabled]
Write TC0 Comp Training:	
	[Disabled]
	[Enabled]
Clock TC0 Comp Training:	
	[Disabled]
	[Enabled]
Dimm ODT CA Training:	
	[Disabled]
	[Enabled]
Write TC0 DqsTraining:	
	[Disabled]
	[Enabled]
Duty Cycle Correction:	
	[Disabled]
	[Enabled]
DQ DFE Training:	
	[Disabled]
	[Enabled]
Sense Amplifier Correction Training:	
	[Disabled]
	[Enabled]
Memory Configuration	
Memory RC Version	0.0.4.104
Memory Data Rate	2400 MTPS
Memory Timings (tCL-tRCD-tRP-tRAS)	17-17-17-39
Channel 0 Slot 0	Populated & Enabled
Size	8192 MB (DDR4)
Number of Ranks	1
Manufacturer	Samsung
Channel 0 Slot 1	Not Populated / Disabled
Channel 1 Slot 0	Not Populated / Disabled
Channel 1 Slot 1	Not Populated / Disabled
Memory ratio/reference clock	
Options moved to	
Overclock->Memory->Custom Profile	
Menu	
MRC ULT Safe Config:	
	[Disabled]

	[Enabled]
Safe Mode Support:	[Disabled]
	[Enabled]
Maximum Memory Frequency:	[Auto]
	[1067]
	[1200]
	[1333]
	[1400]
	[1600]
	[1800]
	[1867]
	[2000]
	[2133]
	[2200]
	[2400]
	[2600]
	[2667]
	[2800]
	[2933]
	[3000]
	[3200]
	[3467]
	[3600]
	[3733]
	[4000]
	[4200]
	[4267]
HOB Buffer Size:	[Auto]
	[1B]
	[1KB]
	[Max (assuming 63KB total HOB size)]
Max TOLUD:	[Dynamic]
	[1 GB]
	[1.25 GB]
	[1.5 GB]
	[1.75 GB]
	[2 GB]
	[2.25 GB]
	[2.5 GB]
SA GV:	[Disabled]
	[Fixed Low]

	[Fixed Mid]
	[Fixed High]
	[Enabled]
DDR Speed Control:	
	[Auto]
	[Manual]
Retrain on Fast Fail:	
	[Disabled]
	[Enabled]
DDR4_1DPC:	
	[Disabled]
	[Enabled on DIMM0 only]
	[Enabled on DIMM1 only]
	[Enabled]
Enable RH Prevention:	
	[Disabled]
	[Enabled]
REFRESH_PANIC_WM:	9
REFRESH_HP_WM:	8
Exit On Failure (MRC):	
	[Disabled]
	[Enabled]
Enable/Disable IED (Intel Enhanced Debug):	
	[Enabled]
	[Disabled]
Ch Hash Support:	
	[Disabled]
	[Enabled]
Ch Hash Mask:	12492
Ch Hash Interleaved Bit:	
	[BIT6]
	[BIT7]
	[BIT8]
	[BIT9]
	[BIT10]
	[BIT11]
	[BIT12]
	[BIT13]
Extended Bank Hashing:	
	[Disabled]
	[Enabled]
Per Bank Refresh:	
	[Disabled]
	[Enabled]
Power Down Mode:	

	[Auto]
	[No Power Down]
	[APD]
	[PPD-DLLoff]
Page Close Idle Timeout:	
	[Enabled]
	[Disabled]
Memory Scrambler:	
	[Disabled]
	[Enabled]
Force ColdReset:	
	[Enabled]
	[Disabled]
Channel 0 DIMM Control:	
	[Enable both DIMMs]
	[Disable DIMM0]
	[Disable DIMM1]
	[Disable both DIMMs]
Channel 1 DIMM Control:	
	[Enable both DIMMs]
	[Disable DIMM0]
	[Disable DIMM1]
	[Disable both DIMMs]
Force Single Rank:	
	[Disabled]
	[Enabled]
Force Single Sub Channel:	
	[Disabled]
	[Enabled]
MRC TASK Debug Print Enable:	0
Memory Remap:	
	[Enabled]
	[Disabled]
Time Measure:	
	[Disabled]
	[Enabled]
DLL Weak Lock Support:	
	[Disabled]
	[Enabled]
Fast Boot:	
	[Disabled]
	[Enabled]
Train On Warm boot:	
	[Disabled]
	[Enabled]
Rank Margin Tool Per Task:	

	[Disabled]
	[Enabled]
Training Tracing:	
	[Disabled]
	[Enabled]
Lpddr Mem WL Set:	
	[Set A]
	[Set B]
BDAT Memory Test Type	[Rank Margin Tool Rank]
Rank Margin Tool Loop Count:	0
Low Supply for LPDDR4 Data:	
	[Disabled]
	[Enabled]
Low Supply for LPDDR4 Clock/Command/Control:	
	[Disabled]
	[Enabled]
Memory Test on Warm Boot:	
	[Disabled]
	[Enabled]
Graphics Configuration	
Graphics Configuration	
Primary Display:	
	[Auto]
	[IGFX]
	[PEG]
	[PCI]
External Gfx Card Primary Display Configuration	
External Gfx Card Primary Display Configuration	
Primary PCIE:	
	[Auto]
	[PCIE 1]
	[PCIE 2]
	[PCIE 3]
	[PCIE 4]
	[PCIE 5]
	[PCIE 6]
	[PCIE 7]
	[PCIE 8]
	[PCIE 9]
	[PCIE 10]
	[PCIE 11]
	[PCIE 12]
	[PCIE 13]

	[PCIE 14]
	[PCIE 15]
	[PCIE 16]
	[PCIE 17]
	[PCIE 18]
	[PCIE 19]
Internal Graphics:	[Auto]
	[Disabled]
	[Enabled]
GTT Size:	
	[2 MB]
	[4 MB]
	[8 MB]
Aperture Size:	
	[128 MB]
	[256 MB]
	[512 MB]
	[1024 MB]
	[2048 MB]
PSMI SUPPORT:	
	[Disabled]
	[Enabled]
DVMT- Pre-Allocated:	
	[0M]
	[32M]
	[64M]
	[96M]
	[128M]
	[160M]
	[4M]
	[8M]
	[12M]
	[16M]
	[20M]
	[24M]
	[28M]
	[32M/F7]
	[36M]
	[40M]
	[44M]
	[48M]
	[52M]
	[56M]
	[60M]
DVMT Total Gfx Mem:	

	[128M]
	[256M]
	[MAX]
DISM Size:	
	[0GB]
	[1GB]
	[2GB]
	[3GB]
	[4GB]
	[5GB]
	[6GB]
	[7GB]
Intel Graphics Pei Display Peim:	
	[Enabled]
	[Disabled]
VDD Enable:	
	[Disabled]
	[Enabled]
Configure GT for use:	
	[Enabled]
	[Disabled]
PAVP Enable:	
	[Enabled]
	[Disabled]
Cdynmax Clamping Enable:	
	[Enabled]
	[Disabled]
Cd Clock Frequency:	
	[172.8 Mhz]
	[307.2 Mhz]
	[556.8 Mhz]
	[652.8 Mhz]
	[Max CdClock freq based on Reference C1k]
Skip Full CD Clock Init:	
	[Enabled]
	[Disabled]
VBT Select:	
	[eDP]
	[MIPI]
IUER Button Enable:	
	[Disabled]
	[Enabled]
Intel(R) Ultrabook Event Support:	
Intel(R) Ultrabook Event Support	

6.5.2	IUER Slate Enable:	[Disabled] [Enabled]
	IUER Dock Enable:	[Disabled] [Enabled]
	VT-d:	[Disabled] [Enabled]
	PCH-IO Configuration	
	PCH-IO Configuration	
	PCI Express Configuration	
	PCI Express Configuration	
	DMI Link ASPM Control:	[Disabled] [L0s] [L1] [L0sL1] [Auto]
	PCIE Port assigned to LAN	Disabled
	Port8xh Decode:	[Disabled] [Enabled]
	Peer Memory write Enable:	[Disabled] [Enabled]
	Compliance Test Mode:	[Disabled] [Enabled]
	PCH PCI Express Clock Gating:	[Platform-POR] [Enabled] [Disabled]
	PCIe function swap:	[Disabled] [Enabled]
	PCIe EQ settings	
	PCIe EQ override:	[Disabled] [Enabled]
	PCIe Express Root Port 1	
	PCIe EQ override:	[Disabled] [Enabled]
	Connection Type:	

	[Built - in] [Slot]
ASPM:	[Disabled] [L0s] [L1] [L0sL1] [Auto]
L1 Substates:	[Disabled] [L1.1] [L1.1 & L1.2]
ACS:	[Disabled] [Enabled]
PTM:	[Disabled] [Enabled]
DPC:	[Disabled] [Enabled]
EDPC:	[Disabled] [Enabled]
URR:	[Disabled] [Enabled]
FER:	[Disabled] [Enabled]
NFER:	[Disabled] [Enabled]
CER:	[Disabled] [Enabled]
SEFE:	[Disabled] [Enabled]
SENF:	[Disabled] [Enabled]
SECE:	[Disabled] [Enabled]
PME SCI:	

	[Disabled]
	[Enabled]
Hot Plug:	
	[Disabled]
	[Enabled]
Advanced Error Reporting:	
	[Disabled]
	[Enabled]
PCIe Speed:	
	[Auto]
	[Gen1]
	[Gen2]
	[Gen3]
Transmitter Half Swing:	
	[Disabled]
	[Enabled]
Detect Timeout:	0
Extra Bus Reserved:	0
Reserved Memory:	10
Reserved I/O:	4
PCH PCIe LTR Configuration	
LTR:	
	[Disabled]
	[Enabled]
Snoop Latency Override:	
	[Disabled]
	[Manual]
	[Auto]
Non Snoop Latency Override:	
	[Disabled]
	[Manual]
	[Auto]
Force LTR Override:	
	[Disabled]
	[Enabled]
LTR Lock:	
	[Disabled]
	[Enabled]
Extra options	
Detect Non-Compliance Device:	
	[Disabled]
	[Enabled]
Prefetchable Memory:	10
Reserved Memory	
Alignment:	1

Prefetchable Memory	
Alignment:	1
PCIe Express Root Port 2	
PCIe EQ override:	[Disabled] [Enabled]
Connection Type:	[Built - in] [Slot]
ASPM:	[Disabled] [L0s] [L1] [L0sL1] [Auto]
L1 Substates:	[Disabled] [L1.1] [L1.1 & L1.2]
ACS:	[Disabled] [Enabled]
PTM:	[Disabled] [Enabled]
DPC:	[Disabled] [Enabled]
EDPC:	[Disabled] [Enabled]
URR:	[Disabled] [Enabled]
FER:	[Disabled] [Enabled]
NFER:	[Disabled] [Enabled]
CER:	[Disabled] [Enabled]
SEFE:	[Disabled] [Enabled]

SENFE:	[Disabled] [Enabled]
SECE:	[Disabled] [Enabled]
PME SCI:	[Disabled] [Enabled]
Hot Plug:	[Disabled] [Enabled]
Advanced Error Reporting:	[Disabled] [Enabled]
PCIe Speed:	[Auto] [Gen1] [Gen2] [Gen3]
Transmitter Half Swing:	[Disabled] [Enabled]
Detect Timeout:	0
Extra Bus Reserved:	0
Reserved Memory:	10
Reserved I/O:	4
PCH PCIe LTR Configuration	
LTR:	[Disabled] [Enabled]
Snoop Latency Override:	[Disabled] [Manual] [Auto]
Non Snoop Latency Override:	[Disabled] [Manual] [Auto]
Force LTR Override:	[Disabled] [Enabled]
LTR Lock:	[Disabled] [Enabled]

Extra options	
Detect Non-Compliance Device:	[Disabled]
	[Enabled]
Prefetchable Memory:	10
Reserved Memory	
Alignment:	1
Prefetchable Memory	
Alignment:	1
PCIe Express Root Port 3	
PCIe EQ override:	[Disabled]
	[Enabled]
Connection Type:	[Built - in]
	[Slot]
ASPM:	[Disabled]
	[L0s]
	[L1]
	[L0sL1]
	[Auto]
L1 Substates:	[Disabled]
	[L1.1]
	[L1.1 & L1.2]
ACS:	[Disabled]
	[Enabled]
PTM:	[Disabled]
	[Enabled]
DPC:	[Disabled]
	[Enabled]
EDPC:	[Disabled]
	[Enabled]
URR:	[Disabled]
	[Enabled]
FER:	[Disabled]
	[Enabled]
NFER:	[Disabled]

	[Enabled]
CER:	[Disabled]
	[Enabled]
SEFE:	[Disabled]
	[Enabled]
SENE:	[Disabled]
	[Enabled]
SECE:	[Disabled]
	[Enabled]
PME SCI:	[Disabled]
	[Enabled]
Hot Plug:	[Disabled]
	[Enabled]
Advanced Error Reporting:	[Disabled]
	[Enabled]
PCIe Speed:	[Auto]
	[Gen1]
	[Gen2]
	[Gen3]
Transmitter Half Swing:	[Disabled]
	[Enabled]
Detect Timeout:	0
Extra Bus Reserved:	0
Reserved Memory:	10
Reserved I/O:	4
PCH PCIe LTR Configuration	
LTR:	[Disabled]
	[Enabled]
Snoop Latency Override:	[Disabled]
	[Manual]
	[Auto]
Non Snoop Latency Override:	[Disabled]
	[Manual]

Force LTR Override:	[Auto]
	[Disabled]
	[Enabled]
LTR Lock:	
	[Disabled]
	[Enabled]
Extra options	
Detect Non-Compliance Device:	
	[Disabled]
	[Enabled]
Prefetchable Memory:	10
Reserved Memory	
Alignment:	1
Prefetchable Memory	
Alignment:	1
PCI Express Root Port 4	Lane configured as USB/SATA/UFS
PCI Express Root Port 5	
PCI Express Root Port 5:	
	[Disabled]
	[Enabled]
Connection Type:	
	[Built-in]
	[Slot]
ASPM:	
	[Disabled]
	[L0s]
	[L1]
	[L0sL1]
	[Auto]
L1 Substates:	
	[Disabled]
	[L1.1]
	[L1.1 & L1.2]
ACS:	
	[Disabled]
	[Enabled]
Multi-VC:	
	[Disabled]
	[Enabled]
VC to TC Mapping	
TC0:	VC0
TC1:	
	[VC0]
	[VC1]

TC2:	[VC0] [VC1]
TC3:	[VC0] [VC1]
TC4:	[VC0] [VC1]
TC5:	[VC0] [VC1]
TC6:	[VC0] [VC1]
TC7:	[VC0] [VC1]
PTM:	[Disabled] [Enabled]
DPC:	[Disabled] [Enabled]
EDPC:	[Disabled] [Enabled]
URR:	[Disabled] [Enabled]
FER:	[Disabled] [Enabled]
NFER:	[Disabled] [Enabled]
CER:	[Disabled] [Enabled]
SEFE:	[Disabled] [Enabled]
SENF:	[Disabled] [Enabled]

SECE:	[Disabled]
	[Enabled]
PME SCI:	[Disabled]
	[Enabled]
Hot Plug:	[Disabled]
	[Enabled]
Advanced Error Reporting:	[Disabled]
	[Enabled]
PCIe Speed:	[Auto]
	[Gen1]
	[Gen2]
	[Gen3]
Transmitter Half Swing:	[Disabled]
	[Enabled]
Detect Timeout:	0
Extra Bus Reserved:	0
Reserved Memory:	10
Reserved I/O:	4
PCH PCIe LTR Configuration	
LTR:	[Disabled]
	[Enabled]
Snoop Latency Override:	[Disabled]
	[Manual]
	[Auto]
Non Snoop Latency Override:	[Disabled]
	[Manual]
	[Auto]
Force LTR Override:	[Disabled]
	[Enabled]
LTR Lock:	[Disabled]
	[Enabled]
Extra options	
Detect Non-Compliance Device:	[Disabled]

	[Enabled]
Prefetchable Memory:	10
Reserved Memory	
Alignment:	1
Prefetchable Memory	
Alignment:	1
PCI Express Root Port 6	Lane configured as USB/SATA/UFS
PCI Express Root Port 7	
PCI Express Root Port 7:	
	[Disabled]
	[Enabled]
Connection Type:	
	[Built-in]
	[Slot]
ASPM:	
	[Disabled]
	[L0s]
	[L1]
	[L0sL1]
	[Auto]
L1 Substates:	
	[Disabled]
	[L1.1]
	[L1.1 & L1.2]
ACS:	
	[Disabled]
	[Enabled]
Multi-VC:	
	[Disabled]
	[Enabled]
VC to TC Mapping	
TC0:	VC0
TC1:	
	[VC0]
	[VC1]
TC2:	
	[VC0]
	[VC1]
TC3:	
	[VC0]
	[VC1]
TC4:	
	[VC0]
	[VC1]
TC5:	

	[VC0]
	[VC1]
TC6:	
	[VC0]
	[VC1]
TC7:	
	[VC0]
	[VC1]
PTM:	
	[Disabled]
	[Enabled]
DPC:	
	[Disabled]
	[Enabled]
EDPC:	
	[Disabled]
	[Enabled]
URR:	
	[Disabled]
	[Enabled]
FER:	
	[Disabled]
	[Enabled]
NFER:	
	[Disabled]
	[Enabled]
CER:	
	[Disabled]
	[Enabled]
SEFE:	
	[Disabled]
	[Enabled]
SENF:	
	[Disabled]
	[Enabled]
SECE:	
	[Disabled]
	[Enabled]
PME SCI:	
	[Disabled]
	[Enabled]
Hot Plug:	
	[Disabled]
	[Enabled]
Advanced Error Reporting:	

	[Disabled]
	[Enabled]
PCIe Speed:	
	[Auto]
	[Gen1]
	[Gen2]
	[Gen3]
Transmitter Half Swing:	
	[Disabled]
	[Enabled]
Detect Timeout:	0
Extra Bus Reserved:	0
Reserved Memory:	10
Reserved I/O:	4
PCH PCIe LTR Configuration	
LTR:	
	[Disabled]
	[Enabled]
Snoop Latency Override:	
	[Disabled]
	[Manual]
	[Auto]
Non Snoop Latency Override:	
	[Disabled]
	[Manual]
	[Auto]
Force LTR Override:	
	[Disabled]
	[Enabled]
LTR Lock:	
	[Disabled]
	[Enabled]
Extra options	
Detect Non-Compliance Device:	
	[Disabled]
	[Enabled]
Prefetchable Memory:	10
Reserved Memory	
Alignment:	1
Prefetchable Memory	
Alignment:	1
PCIE clocks	
Clock0 assignment:	
	[Platform-POR]
	[Enabled]

	[Disabled]
ClkReq for Clock0:	[Platform-POR] [Disabled]
Clock1 assignment:	[Platform-POR] [Enabled] [Disabled]
ClkReq for Clock1:	[Platform-POR] [Disabled]
Clock2 assignment:	[Platform-POR] [Enabled] [Disabled]
ClkReq for Clock2:	[Platform-POR] [Disabled]
Clock3 assignment:	[Platform-POR] [Enabled] [Disabled]
ClkReq for Clock3:	[Platform-POR] [Disabled]
Clock4 assignment:	[Platform-POR] [Enabled] [Disabled]
ClkReq for Clock4:	[Platform-POR] [Disabled]
Clock5 assignment:	[Platform-POR] [Enabled] [Disabled]
ClkReq for Clock5:	[Platform-POR] [Disabled]
SATA Configuration	
SATA Configuration	
SATA Controller(s):	[Enabled] [Disabled]

SATA Mode Selection:	AHCI
SATA Ports Multiplier:	[Enabled] [Disabled]
SATA Test Mode:	[Enabled] [Disabled]
Software Feature Mask Configuration	
Software Feature Mask Configuration	
HDD Unlock:	[Disabled] [Enabled]
LED Locate:	[Disabled] [Enabled]
Aggressive LPM Support:	[Disabled] [Enabled]
Serial ATA Port 0	Empty
Software Preserve	unknown
Port 0:	[Disabled] [Enabled]
Hot Plug:	[Disabled] [Enabled]
Configured as eSATA	Hot Plug supported
External:	[Disabled] [Enabled]
Spin Up Device:	[Disabled] [Enabled]
SATA Device Type:	[Hard Disk Drive] [Solid State Drive]
Topology:	[Unknown] [ISATA] [Direct Connect] [Flex] [M2]
SATA Port 0 DevSlp:	[Disabled]

	[Enabled]
SATA Port 0 RxPolarity:	[Disabled]
	[Enabled]
DITO Configuration:	[Disabled]
	[Enabled]
DITO Value	625
DM Value	15
Serial ATA Port 1	Empty
Software Preserve	unknown
Port 1:	
	[Disabled]
	[Enabled]
Hot Plug:	
	[Disabled]
	[Enabled]
Configured as eSATA	Hot Plug supported
External:	
	[Disabled]
	[Enabled]
Spin Up Device:	
	[Disabled]
	[Enabled]
SATA Device Type:	
	[Hard Disk Drive]
	[Solid State Drive]
Topology:	
	[Unknown]
	[ISATA]
	[Direct Connect]
	[Flex]
	[M2]
SATA Port 1 DevSlp:	
	[Disabled]
	[Enabled]
SATA Port 1 RxPolarity:	
	[Disabled]
	[Enabled]
DITO Configuration:	
	[Disabled]
	[Enabled]
DITO Value	625
DM Value	15
Serial ATA Port 2	Empty
Software Preserve	unknown

Port 2:	[Disabled] [Enabled]
Hot Plug:	[Disabled] [Enabled]
Configured as eSATA External:	Hot Plug supported
	[Disabled] [Enabled]
Spin Up Device:	[Disabled] [Enabled]
SATA Device Type:	[Hard Disk Drive] [Solid State Drive]
Topology:	[Unknown] [ISATA] [Direct Connect] [Flex] [M2]
SATA Port 2 DevSlp:	[Disabled] [Enabled]
SATA Port 2 RxPolarity:	[Disabled] [Enabled]
DITO Configuration:	[Disabled] [Enabled]
DITO Value	625
DM Value	15
USB Configuration	
USB Configuration	
XHCI Compliance Mode:	[Disabled] [Enabled]
xDCI Support:	[Disabled] [Enabled]
USB2 PHY Sus Well Power Gating:	[Disabled] [Enabled]
USB3 Link Speed Selection:	

	[GEN1]
	[GEN2]
USB PDO Programming:	
	[Disabled]
	[Enabled]
USB Overcurrent:	
	[Disabled]
	[Enabled]
USB Internal Pullup resistor:	
	[Disabled]
	[Enabled]
USB Overcurrent Lock:	
	[Disabled]
	[Enabled]
USB Port Disable Override:	
	[Disabled]
	[Select Per-Pin]
USB Device/HOST Mode Override:	
	[Disabled]
	[Select Per-Pin]
USB UCSI ACPI device:	
	[Disabled]
	[Enabled]
SCS Configuration	
eMMC 5.1 Controller:	
	[Disabled]
	[Enabled]
eMMC 5.1 HS400 Mode:	
	[Disabled]
	[Enabled]
Enable HS400 software tuning:	
	[Disabled]
	[Enabled]
Enable HS400 software tuning:	
	[33 Ohm]
	[40 Ohm]
	[50 Ohm]
SDCard 3.0 Controller:	
	[Disabled]
	[Enabled]

6.6 Security Settings

Aptio Setup - AMI					
Main	Advanced	Chipset	Security	Boot	Save & Exit
Password Description 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 3 Maximum length 20			Set Administrator Password		
Administrator Password User Password			→←: Select Screen ↑↓ : Select Item Enter: Select +/- : Change Opt. F1 : General Help F2: Previous Values F3:Optimized Defaults F4:Save and Exit ESC Exit		
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6.6.1 Administrator Password

Create New Password

6.6.2 User Password

Create New Password

6.7 Boot Settings

Aptio Setup - AMI		
Main	Advanced	Chipset
Security Boot Save & Exit		
Boot Configuration Setup Prompt Timeout 1 Bootup NumLock State [Off] Quiet Boot [Enabled] Boot Option Priorities Fast Boot [Disabled] Number of seconds toWait for Setup Activation key. 65535(0xFFFF)means Indefinite waiting. →←: Select Screen ↑↓ : Select Item Enter: Select +/- : Charge Opt. F1 : General Help F2: Previous Values F3:Optimized Defaults F4:Save and Exit ESC Exit		

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Setup Prompt Timeout	[1]
Bootup Numlock State:	[On]
	[off]
Quiet Boot:	[Disabled]
	[Enabled]
Fast Boot:	[Disabled]
	[Enabled]

6.8 Save & Exit Settings

Aptio Setup - AMI					
Main	Advanced	Chipset	Boot	Security	Save & Exit
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 Save as user Defaults Restore user Defaults Boot Override					Exit system setup after Saving the changes. →←: Select Screen ↑↓ : Select Item Enter: Select +/- : Charge Opt. F1 : General Help F2: Previous Values F3:Optimized Defaults F4:Save and Exit ESC Exit
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Save Changes and Exit

Save & Exit Setup save Configuration and exit ?

[Yes]

[No]

Discard Changes and Exit

Exit Without Saving Quit without saving?

[Yes]

[No]

Save Changes and Reset

Reset the system after Saving The changes?

[Yes]

[No]

Discard Changes and Reset

Reset system setup without Saving any changes?

[Yes]

[No]

Save Changes

Save Setup done so far to any of the setup options?

[Yes]

[No]

Discard Changes

Discard Changes done so far to any of the setup options?

[Yes]

[No]

Restore Defaults

Restore /Load Defaults values for all the setup options?

[Yes]

[No]

Save as user Defaults

Save the changes done so far as User Defaults?

[Yes]

[No]

Restore user Defaults

Restore the User Defaults to all the setup options?

[Yes]

[No]
