PICO-APL1

PICO-ITX Board

User's Manual 9th Ed

Last Updated: December 2, 2020

Copyright Notice

Acknowledgement

Packing List

Before setting up your product, please make sure the following items have been shipped:

Item	Quantity
● PICO-APL1	1
● COM + Line-out Cable (optional)	1

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

About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the product page at AAEON.com for the latest version of this document.

Safety Precautions

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. All cautions and warnings on the device should be noted.
2. Make sure the power source matches the power rating of the device.
3. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
4. Always completely disconnect the power before working on the system's hardware.
5. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
6. If the device is not to be used for a long time, disconnect it from the power supply to avoid damage by transient over-voltage.
7. Always disconnect this device from any AC supply before cleaning.
8. While cleaning, use a damp cloth instead of liquid or spray detergents.
9. Make sure the device is installed near a power outlet and is easily accessible.
10. Keep this device away from humidity.
11. Place the device on a solid surface during installation to prevent falls
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out for high temperatures when the system is running.
14. Do not touch the heat sink or heat spreader when the system is running
15. Never pour any liquid into the openings. This could cause fire or electric shock.
16. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded containers.

17. If any of the following situations arises, please the contact our service personnel:
    i. Damaged power cord or plug
    ii. Liquid intrusion to the device
    iii. Exposure to moisture
    iv. Device is not working as expected or in a manner as described in this manual
    v. The device is dropped or damaged
    vi. Any obvious signs of damage displayed on the device
18. DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WHERE THE STORAGE TEMPERATURE IS BELOW -20° C (-4°F) OR ABOVE 60°C (140°F) TO PREVENT DAMAGE.

FCC Statement

This device complies with Part 15 FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Caution:

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Attention:

Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte.
Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur.
Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON Main Board/ Daughter Board/ Backplane

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板及其电子组件	O	O	O	O	O	O
外部信号连接器及线材	O	O	O	O	O	O

O：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。

X：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。

备注：此产品所标示之环保使用期限，系指在一般正常使用状况下。

China RoHS Requirement (EN)

Poisonous or Hazardous Substances or Elements in Products

AAEON Main Board/ Daughter Board/ Backplane

Component	Poisonous or Hazardous Substances or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCB & Other Components	O	O	O	O	O	O
Wires & Connectors for External Connections	O	O	O	O	O	O

O：The quantity of poisonous or hazardous substances or elements found in each of the component's parts is below the SJ/T 11363-2006-stipulated requirement.

X: The quantity of poisonous or hazardous substances or elements found in at least one of the component's parts is beyond the SJ/T 11363-2006-stipulated requirement.

Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only

Table of Contents

Chapter 1

Product Specifications

1.1 Specifications

System	
Form Factor	Pico-ITX
CPU	Intel Atom E3900 series Intel Pentium N4200 Intel Celeron N3350 Processor SoC
CPU Frequency	Up to 2.0GHz
Chipset	Intel Atom E3900 series Intel Pentium N4200 Intel Celeron N3350 Processor SoC
Memory Type	204-pin DDR3L SODIMM x 1, DDR3L 1867MHz
Max. Memory Capacity	8GB
BIOS	AMI/SPI
Wake On LAN	Yes
Watchdog Timer	255 Levels
Power Requirement	+12V AT/ATX (default)
Power Supply Type	AT/ATX (default)
Power Consumption (Typical)	Intel® N3350 Processor, DDR3L 8GB 0.91A@+12V
System Cooling	Heat-spreader/ heatsink optional
Dimension	3.94" x 2.84" (100mm x 72mm)
Gross Weight	0.55 lbs. (0.25 kg)

System

Operating Temperature	32 °F~ 140 °F (0°C ~ 60°C),
Storage Temperature	-40 °F ~ 176 °F (-40°C ~ 80°C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing
MTBF (Hours)	170,000
Certification	CE, FCC

Display

Chipset	Intel Atom E3900 series
	Intel Pentium N4200
	Intel Celeron N3350 Processor SoC
Resolution	LVDS (18/24bit 2CH) 1920 x 1200 (optional)
	HDMI 1.4b up to 3840 x 2160
	DDI (BIO)
LCD Interface	18/24bit 2CH LVDS

I/O

Storage/SSD	SATA 6.0 Gb/s x 1
	mSATA or Mini-PCIe by BOM (Full size) x 1
Ethernet	Intel Gigabit Ethernet i210AT,
	10/100/1000Base-TX, RJ-45 x 1
USB Port	USB 3.0 x 2, Rear IO, USB 2.0 x 1
Serial Port	COM1: RS-232 x 1,
	COM2: RS-232/422/485 x 1 (Ring/ +5V/ +12V)
Audio	Line-out x1

I/O

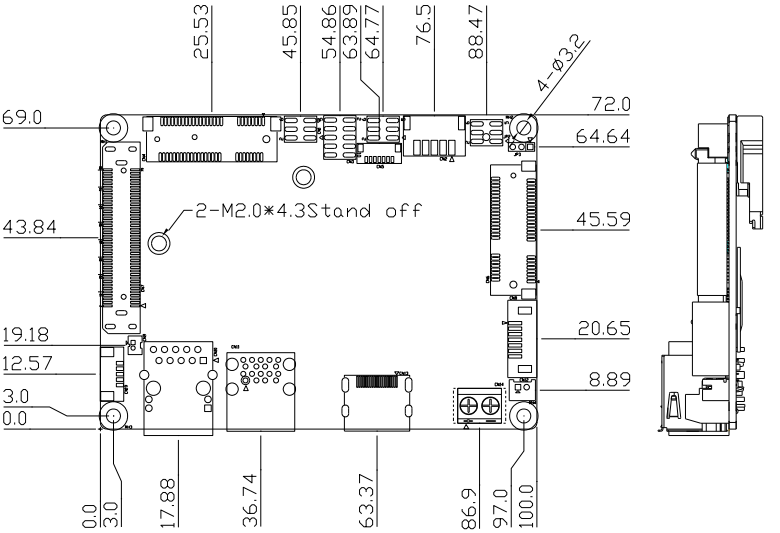
DIO	4-bit (2-in, 2-out)
Expansion Slot	Mini Card (Half-size) x 1 BIO (optional) x 1 I2C or SMBus x 1
SIM	—
TPM	—
Touch	—

Chapter 2

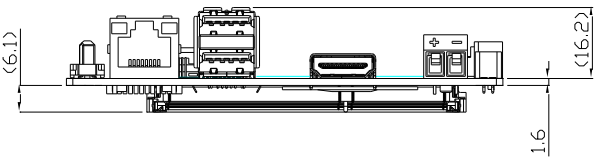
Hardware Information

2.1 Dimensions

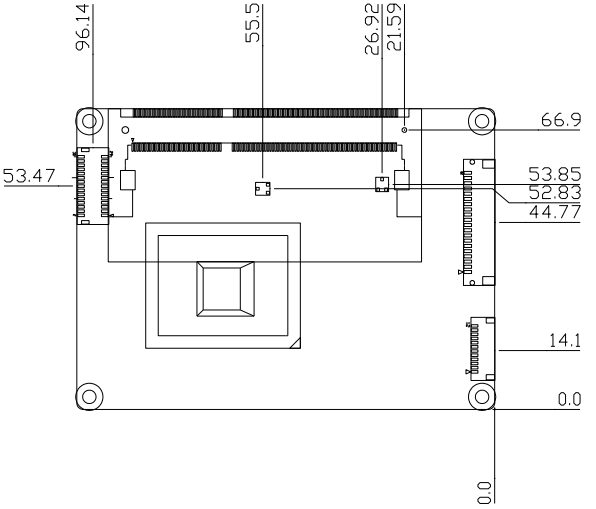
Component Side



Component Side

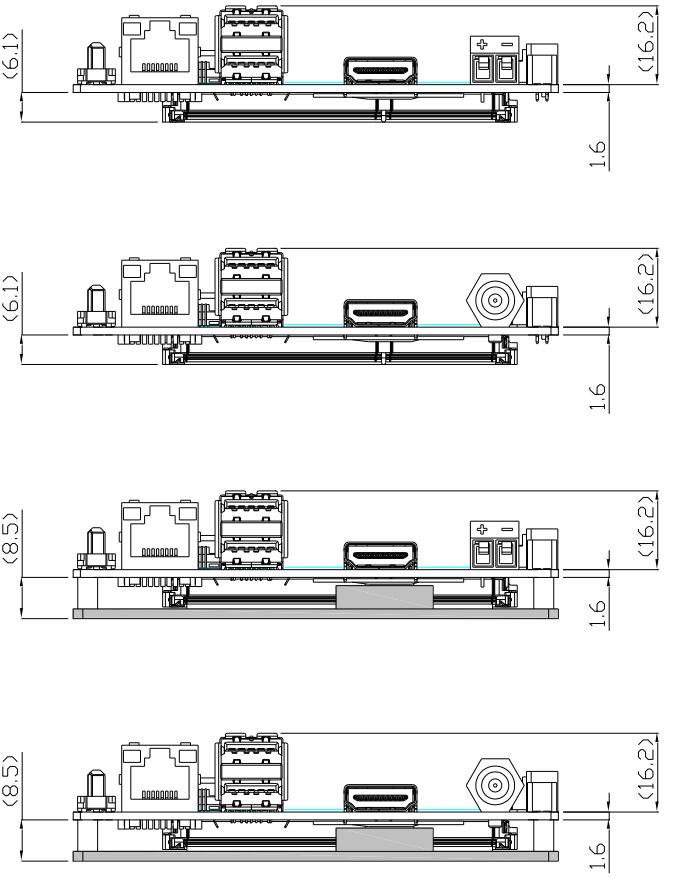


Solder Side



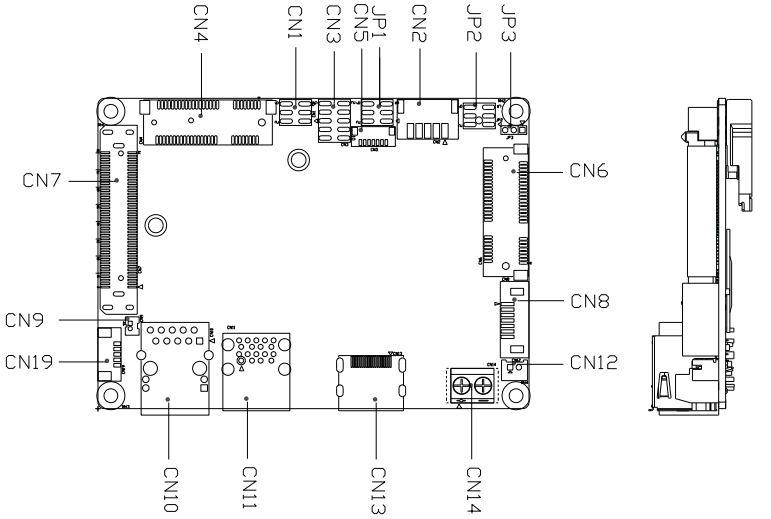
Solder Side

Rear I/O Configuration

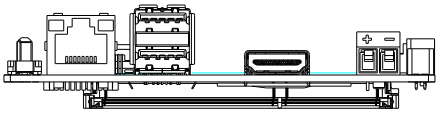


2.2 Jumpers and Connectors

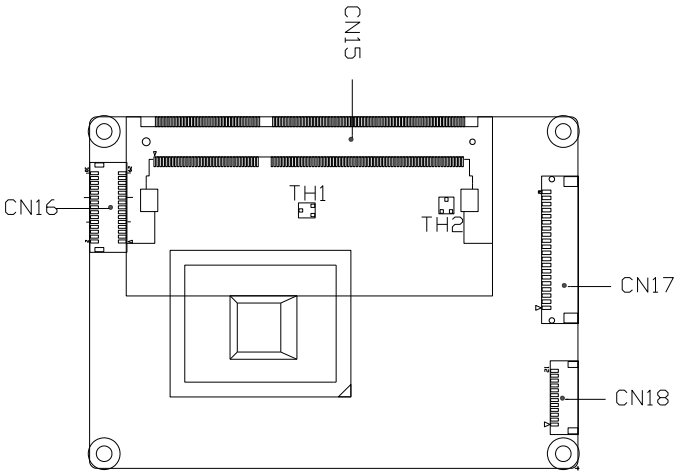
Component Side



Component Side



Solder Side



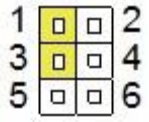
Solder Side

2.3 List of Jumpers

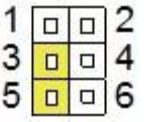
Please refer to the table below for all of the board's jumpers that you can configure for your application

Label	Function
JP1(1,3,5)	Clear CMOS Jumper
JP1(2,4,6)	Auto Power Button Enable/Disable Selection
JP2(1,3,5)	LVDS Port Operating Voltage Selection
JP2(2,4,6)	LVDS Port Backlight Inverter Voltage Selection
JP3	LVDS Port Backlight Lightness Control Mode Selection

2.3.1 Clear CMOS Jumper (JP1 1, 3, 5)

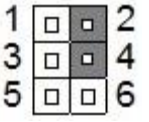


Normal (Default)

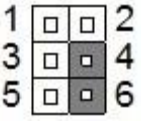


Clear CMOS

2.3.2 Auto Power Button Enable/Disable Selection (JP1 2, 4, 6)

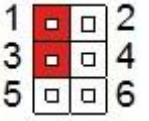


Enable (Default)

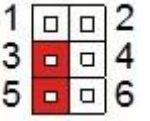


Disable

2.3.3 LVDS Port Operating Voltage Selection (JP2 1,3,5)

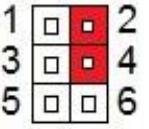


+5V

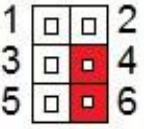


+3.3V (Default)

2.3.4 LVDS Port Backlight Inverter Voltage Selection (JP2 2,4,6)

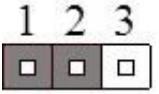


+12V

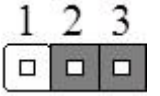


+5V (Default)

2.3.5 LVDS Port Backlight Lightness Control Mode (JP3)



VR Mode (Default)



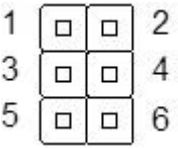
PWM Mode

2.4 List of Connectors

Please refer to the table below for all of the board's connectors that you can configure for your application

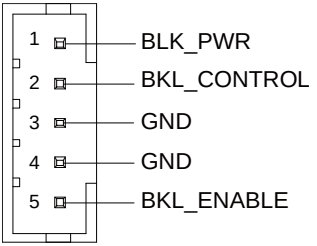
Label	Function
CN1	Digital IO Port
CN2	LVDS Port Inverter / Backlight Connector
CN3	Front Panel
CN4	Mini-Card Slot (Half-Mini Card)
CN5	SPI Programming Header
CN6	Mini-Card Slot (Full-Mini Card)/mSATA (By BOM)
CN7	BIO connector
CN8	SATA Port
CN9	Battery
CN10	LAN (RJ-45) Port
CN11	USB 3.0 Port 1,2
CN12	+5V Output for SATA HDD
CN13	HDMI port
CN14	External +12V Input
CN15	DDR3L SO-DIMM Slot
CN16	LVDS Port
CN17	COM Port 1/2 & line out connector
CN18	LPC Port
CN19	USB 2.0 Port 1

2.4.1 Digital IO Port (CN1)



Pin	Pin Name	Signal Type	Pin Name
1	+5V	PWR	+5V
2	DIO0	I/O	+5V
3	DIO1	I/O	+5V
4	DIO2	I/O	+5V
5	DIO3	I/O	+5V
6	GND	GND	

2.4.2 LVDS Port Inverter / Backlight Connector (CN2)



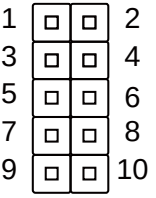
Pin	Pin Name	Signal Type	Signal level
1	BKL_PWR	PWR	+5V / +12V
2	BKL_CONTROL	OUT	
3	GND	GND	
4	GND	GND	
5	BKL_ENABLE	OUT	+3.3V

Note1: LVDS/BKL_PWR can be set to +5V or +12V by JP2.

Note2: LVDS/BKL_CONTROL can be set by JP3.

Note3: The driving current supports up to 2A.

2.4.3 Front Panel (CN3)



Pin	Pin Name	Pin	Pin Name
1	PWR_BTN-	2	PWR_BTN+
3	HDD_LED-	4	HDD_LED+
5	SPEAKER-	6	SPEAKER+
7	PWR_LED-	8	PWR_LED+
9	H/W RESET-	10	H/W RESET+

2.4.4 Mini-Card Slot (Half-Mini Card) (CN4)

Pin	Pin Name	Signal Type	Signal Level
1	PCIE_WAKE#	IN	
2	+3.3VSB	PWR	+3.3V
3	NC		
4	GND	GND	
5	NC		
6	+1.5V	PWR	+1.5V
7	PCIE_CLK_REQ#	IN	

Pin	Pin Name	Signal Type	Signal Level
8	NC	PWR	
9	GND	GND	
10	NC	I/O	
11	PCIE_REF_CLK-	DIFF	
12	NC	IN	
13	PCIE_REF_CLK+	DIFF	
14	NC		
15	GND	GND	
16	NC	PWR	
17	NC		
18	GND	GND	
19	NC		
20	W_DISABLE#	OUT	+3.3V
21	GND	GND	
22	PCIE_RST#	OUT	+3.3V
23	PCIE_RX-	DIFF	
24	+3.3VSB	PWR	+3.3V
25	PCIE_RX+	DIFF	
26	GND	GND	
27	GND	GND	
28	+1.5V	PWR	+1.5V
29	GND	GND	
30	SMB_CLK	I/O	+3.3V
31	PCIE_TX-	DIFF	
32	SMB_DATA	I/O	+3.3V
33	PCIE_TX+	DIFF	

Pin	Pin Name	Signal Type	Signal Level
34	GND	GND	
35	GND	GND	
36	USB_D-	DIFF	
37	GND	GND	
38	USB_D+	DIFF	
39	+3.3VSB	PWR	+3.3V
40	GND	GND	
41	+3.3VSB	PWR	+3.3V
42	NC		
43	GND	GND	
44	NC		
45	NC		
46	NC		
47	NC		
48	+1.5V	PWR	+1.5V
49	NC		
50	GND	GND	
51	NC		
52	+3.3VSB	PWR	+3.3V

2.4.5 Mini-Card Slot (Full Mini-Card)/mSATA (by BOM) (CN6)

Pin	Pin Name	Signal Type	Signal Level
1	PCIE_WAKE#	IN	
2	+3.3VSB/+3.3V	PWR	+3.3V
3	NC		
4	GND	GND	
5	NC		
6	+1.5V	PWR	+1.5V
7	PCIE_CLK_REQ#	IN	
8	UIM_PWR	PWR	
9	GND	GND	
10	UIM_DATA	I/O	
11	PCIE_REF_CLK-	DIFF	
12	UIM_CLK	IN	
13	PCIE_REF_CLK+	DIFF	
14	UIM_RST	IN	
15	GND	GND	
16	UIM_VPP	PWR	
17	NC		
18	GND	GND	
19	NC		
20	W_DISABLE#	OUT	+3.3V
21	GND	GND	
22	PCIE_RST#	OUT	+3.3V
23	PCIE_RX-/mSATARX+	DIFF	
24	+3.3VSB/+3.3V	PWR	+3.3V

Pin	Pin Name	Signal Type	Signal Level
25	PCIE_RX+/mSATARX-	DIFF	
26	GND	GND	
27	GND	GND	
28	+1.5V	PWR	+1.5V
29	GND	GND	
30	SMB_CLK	I/O	+3.3V
31	PCIE_TX-/mSATATX-	DIFF	
32	SMB_DATA	I/O	+3.3V
33	PCIE_TX+/mSATATX+	DIFF	
34	GND	GND	
35	GND	GND	
36	USB_D-	DIFF	
37	GND	GND	
38	USB_D+	DIFF	
39	+3.3VSB/+3.3V	PWR	+3.3V
40	GND	GND	
41	+3.3VSB/+3.3V	PWR	+3.3V
42	NC		
43	GND	GND	
44	NC		
45	NC		
46	NC		
47	NC		
48	+1.5V	PWR	+1.5V
49	NC		
50	GND	GND	

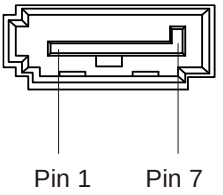
Pin	Pin Name	Signal Type	Signal Level
51	NC		
52	+3.3VSB/+3.3V	PWR	+3.3V

2.4.6 BIO connector (CN7)

Pin	Pin Name	Pin	Pin Name
1	+12VSB	2	GND
3	GND	4	PCIE_TXN0
5	PCIE_RXN0	6	PCIE_TXP0
7	PCIE_RXP0	8	GND
9	GND	10	PCIE_TXN4
11	PCIE_RXN4	12	PCIE_TXP4
13	PCIE_RXP4	14	GND
15	GND	16	PS_ON#
17	DDI0_DDCCLK_3P3	18	DDI0_DDCDATA_3P3
19	+5VSB	20	+5VSB
21	+5VSB	22	+5VSB
23	PCIE_REF_CLK0	24	RESET#
25	PCIE_REF_CLK0#	26	GND
27	GND	28	DDI0_TXN1
29	DDI0_TXN0	30	DDI0_TXP1
31	DDI0_TXP0	32	GND
33	GND	34	DDI0_TXN3
35	DDI0_TXN2	36	DDI0_TXP3
37	DDI0_TXP2	38	GND
39	GND	40	BIO_DDI0_HPD

Pin	Pin Name	Pin	Pin Name
41	DDI0_AUXN	42	GND
43	DDI0_ AUXP	44	USB3_TX2_N
45	GND	46	USB3_TX2_P
47	USBN4	48	GND
49	USBP4	50	USB3_RX2_N
51	GND	52	USB3_RX2_P
53	SMB_CLK	54	GND
55	SMB_DATA	56	WAKE#
57	GND	58	USB_OC0#
59	+5V	60	USB_OC1#
61	+5V	62	+5V
63	+5V	64	+5V
65	LPC_AD0	66	LPC_FRAME#
67	LPC_AD1	68	SERIRQ
69	LPC_AD2	70	LPC_DRQ
71	LPC_AD3	72	GPIO0/BIO-POWEROK
73	GND	74	AGND
75	LPC_CLK	76	AUD_LINEOUT_L
77	PME#	78	AUD_LINEOUT_R
79	GND	80	GND

2.4.7 SATA Port (CN8)

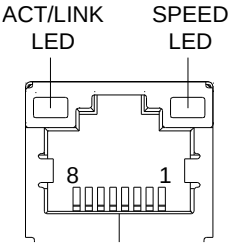


Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	
2	SATA_TX1+	DIFF	
3	SATA_TX1-	DIFF	
4	GND	GND	
5	SATA_RX1-	DIFF	
6	SATA_RX1+	DIFF	
7	GND	GND	

2.4.8 Battery (CN9)

Pin	Pin Name	Signal Type	Signal Level
1	+3.3V	PWR	3.3V
2	GND	GND	

2.4.9 LAN (RJ-45) Port (CN10)



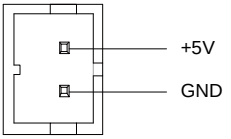
Pin	Pin Name	Signal Type	Signal Level
1	MDI0+	DIFF	
2	MDI0-	DIFF	
3	MDI1+	DIFF	
4	MDI2+	DIFF	
5	MDI2-	DIFF	
6	MDI1-	DIFF	
7	MDI3+	DIFF	
8	MDI3-	DIFF	

2.4.10 USB3.0 Ports 0 and 1 (CN11)

Pin	Pin Name	Signal Type	Signal Level
1	+5VSB	PWR	+5V
2	USB0_D-	DIFF	
3	USB0_D+	DIFF	
4	GND	GND	
5	USB0_SSRX−	DIFF	
6	USB0_SSRX+	DIFF	

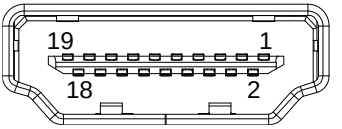
Pin	Pin Name	Signal Type	Signal Level
7	GND	GND	
8	USB0_SSTX–	DIFF	
9	USB0_SSTX+	DIFF	
10	+5VSB	PWR	+5V
11	USB1_D-	DIFF	
12	USB1_D+	DIFF	
13	GND	GND	
14	USB1_SSRX–	DIFF	
15	USB1_SSRX+	DIFF	
16	GND	GND	
17	USB1_SSTX–	DIFF	
18	USB1_SSTX+	DIFF	

2.4.11 +5V Output for SATA HDD (CN12)



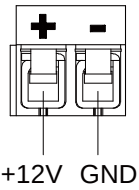
Pin	Pin Name	Signal Type	Signal Level
1	+5V	PWR	+5V
2	GND	GND	

2.4.12 HDMI Port (CN13)



Pin	Pin Name	Signal Type	Signal level
1	TMDS_DAT2+	DIFF	
2	GND	GND	
3	TMDS_DAT2-	DIFF	
4	TMDS_DAT1+	DIFF	
5	GND	GND	
6	TMDS_DAT1-	DIFF	
7	TMDS_DAT0+	DIFF	
8	GND	GND	
9	TMDS_DAT0-	DIFF	
10	TMDS_CLK+	DIFF	
11	GND	GND	
12	TMDS_CLK-	DIFF	
13	NC		
14	NC		
15	DDC_CLK	I/O	+5V
16	DDC_DATA	I/O	+5V
17	GND	GND	
18	+5V	I/O	+5V
19	HPLG_DETECT	IN	

2.4.13 External +12V Input (CN14)



Pin	Pin Name	Signal Type	Signal Level
1	+121V	PWR	+12V
2	GND	GND	

2.4.14 DDR3L SO-DIMM Slot (CN15)

Standard specification

2.4.15 LVDS Port (CN16)

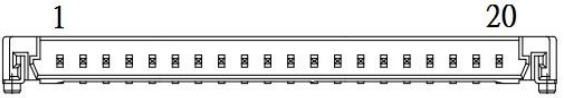
Note1: LVDS LCD_PWR can be set to +3.3V or +5V by JP2

Note2: The max. driving current is 2A.

Pin	Pin Name	Signal Type	Signal Level
1	BKL_ENABLE	OUT	
2	BKL_CONTROL	OUT	
3	LCD_PWR	PWR	+3.3V/+5V
4	GND	GND	
5	LVDS_A_CLK-	DIFF	
6	LVDS_A_CLK+	DIFF	
7	LCD_PWR	PWR	+3.3V/+5V
8	GND	GND	

Pin	Pin Name	Signal Type	Signal Level
9	LVDS_DA0-	DIFF	
10	LVDS_DA0+	DIFF	
11	LVDS_DA1-	DIFF	
12	LVDS_DA1+	DIFF	
13	LVDS_DA2-	DIFF	
14	LVDS_DA2+	DIFF	
15	LVDS_DA3-	DIFF	
16	LVDS_DA3+	DIFF	
17	DDC_DATA	I/O	+3.3V
18	DDC_CLK	I/O	+3.3V
19	LVDS_DB0-	DIFF	
20	LVDS_DB0+	DIFF	
21	LVDS_DB1-	DIFF	
22	LVDS_DB1+	DIFF	
23	LVDS_DB2-	DIFF	
24	LVDS_DB2+	DIFF	
25	LVDS_DB3-	DIFF	
26	LVDS_DB3+	DIFF	
27	LCD_PWR	PWR	+3.3V/+5V
28	GND	GND	
29	LVDS_B_CLK-	DIFF	
30	LVDS_B_CLK+	DIFF	

2.4.16 COM Port 1/2 & line out connector (CN17)



Pin	Pin Name	Signal Type	Signal Level
1	DCDB	IN	
2	DSRB	IN	
3	RXB	IN	
4	RTSB	OUT	±9V
5	TXB	OUT	±9V
6	CTSB	IN	
7	DTRB	OUT	±9V
8	RIB/+5V/+12V	IN/ PWR	+5V/+12V
9	DCDA	IN	
10	DSRA	IN	
11	RXA	IN	
12	RTSA	OUT	±9V
13	TXA	OUT	±9V
14	CTSA	IN	
15	DTRA	OUT	±9V
16	RIA	IN	
17	GND	GND	
18	AGND	GND	
19	LOUT_R	I/O	
20	LOUT_L	I/O	

2.4.17 COM Port2 RS-485

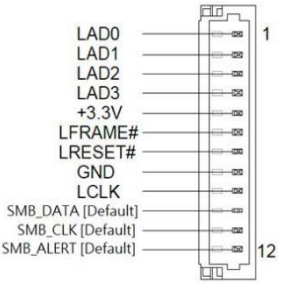
Pin	Pin Name	Signal Type	Signal Level
1	RS485_D-	I/O	±5V
2	NC		
3	RS485_D+	I/O	±5V
4	NC		
5	NC		
6	NC		
7	NC		
8	NC/+5V/+12V	PWR	+5V/+12V
17	GND	GND	

2.4.18 COM Port2 RS-422

Pin	Pin Name	Signal Type	Signal Level
1	RS422_TX-	OUT	±5V
2	NC		
3	RS422_TX+	OUT	±5V
4	NC		
5	RS422_RX+	IN	
6	NC		
7	RS422_RX-	IN	
8	NC/+5V/+12V	PWR	+5V/+12V
17	GND	GND	

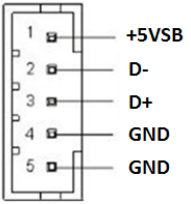
Note1: COM2 RS-232/422/485 can be set by BIOS setting. Default is RS-232.
Note2: COM2 RI/+5V/+12V function can be set by BOM (R248-RI/ R256-+12V/ R250-+5V)

2.4.19 LPC Port (CN18)



Pin	Pin Name	Signal Type	Signal Level
1	LAD0	I/O	+3.3V
2	LAD1	I/O	+3.3V
3	LAD2	I/O	+3.3V
4	LAD3	I/O	+3.3V
5	+3.3V	PWR	+3.3V
6	LFRAME#	IN	
7	LRESET#	OUT	+3.3V
8	GND	GND	
9	LCLK	OUT	
10	SMB_DATA [Default]/I2C_DATA	I/O	+3.3V
11	SMB_CLK [Default]/I2C_CLK	OUT	+3.3V
12	SMB_ALERT [Default]/INT_SERIRQ	I/O	+3.3V

2.4.20 USB 2.0 Port 1 (CN19)

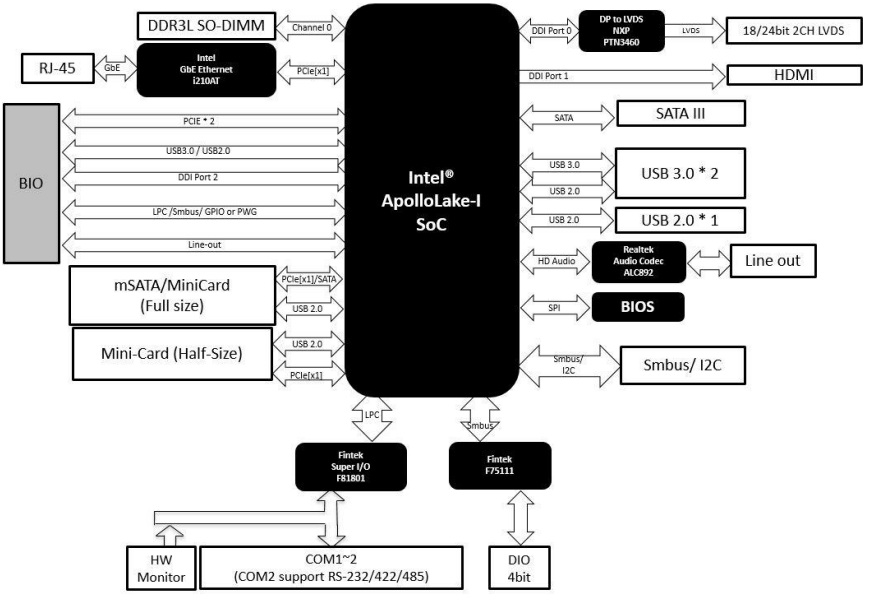


Pin	Pin Name	Signal Type	Signal Level
1	+5VSB	PWR	+5V
2	USBD5-	DIFF	
3	USBD5+	DIFF	
4	GND	GND	
5	GND	GND	

2.5 Specifications for I/O Port

I/O	Reference	Signal Name	Rate Output
Digital IO Port	CN1	D0~D3	+5V/ (Open drain)
LVDS Port Inverter/ Backlight Connector	CN2	VDD	+5V/2A or +12V/2A
Mini-Card Slot	CN4	+3.3VSB +1.5V	+3.3V/1.1A +1.5V/0.375A
Mini-Card Slot	CN6	+3.3VSB +1.5V	+3.3V/1.1A +1.5V/0.375A
USB 3.0 Port 1 & 2	CN10	+5VSB	+5VSB/1A (per channel)
+5V Output for SATA HDD	CN12	+5V	+5V/1A
LVDS Port	CN16	VCC	+3.3V/2A or +5V/2A
COM Port 2	CN17	+5V/+12V	+5V/1A or +12V/1A
LPC Port	CN18	+3.3V	+3.3V/0.5A
USB 2.0 Port 1	CN19	+5VSB	+5VSB/0.5A

2.6 Function Block



Chapter 3

AMI BIOS Setup

3.1 System Test and Initialization

The system uses certain routines to perform testing and initialization during the boot up sequence. If an error, fatal or non-fatal, is encountered, the system will output a few short beeps or display an error message. The system can usually continue the boot up sequence with non-fatal errors.

The system configuration verification routines check the current system configuration against the values stored in the CMOS memory and BIOS NVRAM. If a system configuration is not found or an error is detected, the system will load the default configuration and reboot automatically.

There are four situations in which you will need to setup system configuration:

1. You are starting your system for the first time
2. You have changed the hardware attached to your system
3. The system configuration was reset by the Clear-CMOS jumper
4. The CMOS memory has lost power and the configuration information has been erased.

The system CMOS memory has an integral lithium battery backup for data retention. However, you will need to replace the battery unit when it runs down.

3.2 AMI BIOS Setup

AMI BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM and BIOS NVRAM so that it retains the Setup information when the power is turned off.

Entering Setup

Power on the computer and press <Del>or <ESC> immediately. This will allow you to enter Setup.

Main

Set the date, use tab to switch between date elements.

Advanced

Enable/disable boot option for legacy network devices.

Chipset

Host bridge parameters.

Security

Set setup administrator password.

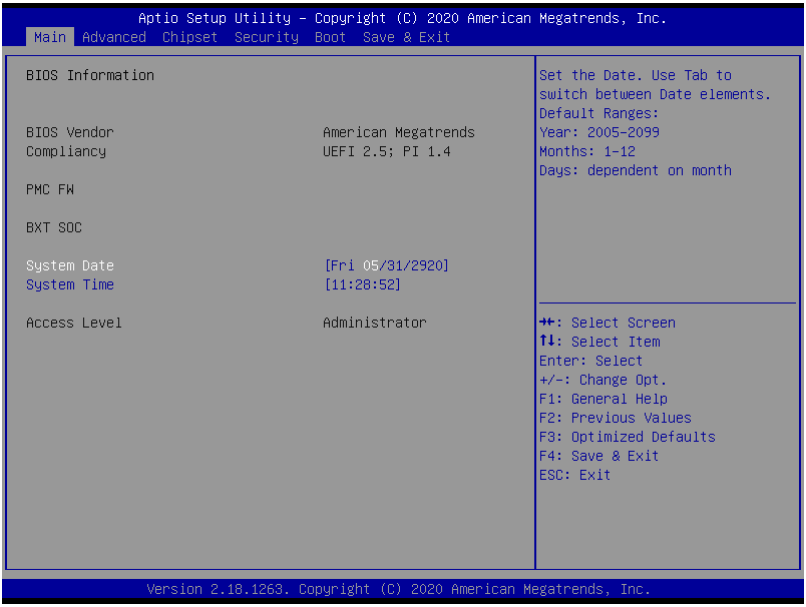
Boot

Enables/disable quiet boot option.

Save & Exit

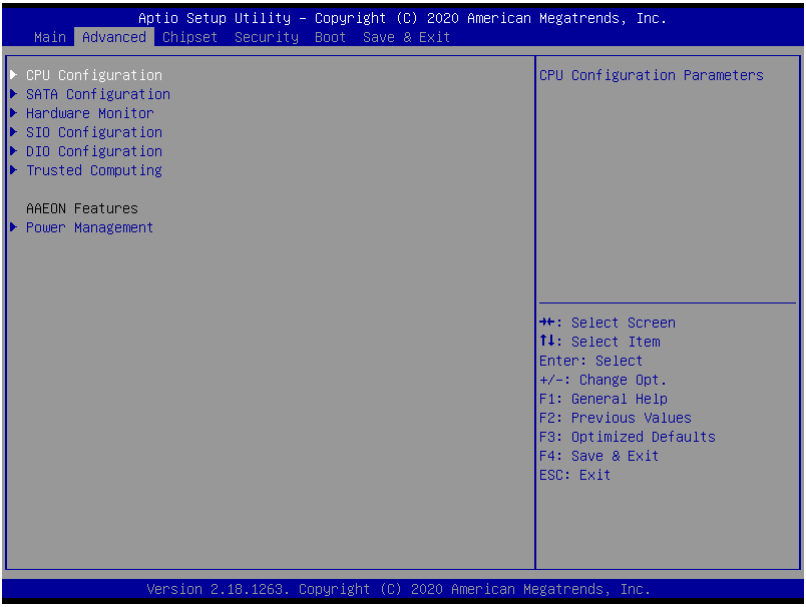
Save changes and exit setup.

3.3 Main



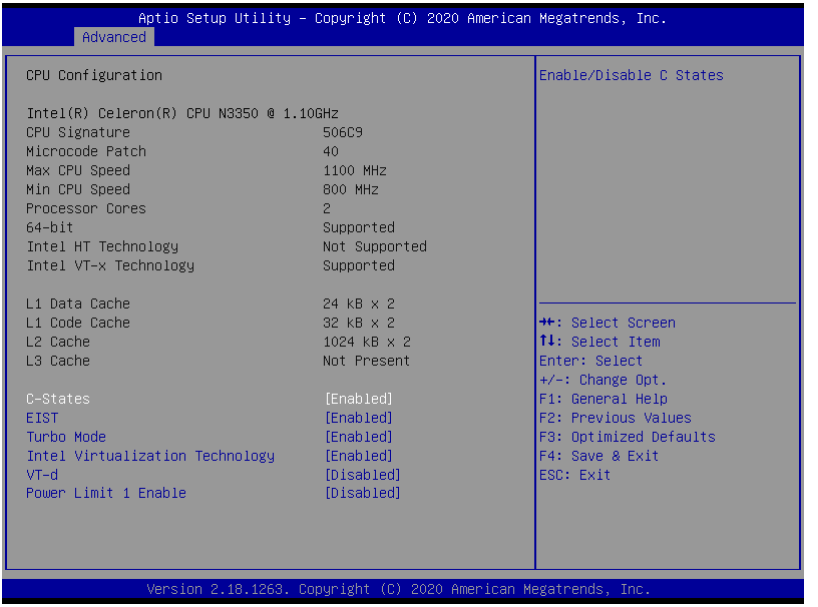
Options Summary		
System Date	Day MM:DD:YYYY	
Change the month, year and century. The 'Day' is changed automatically.		
System Time	HH : MM : SS	
Change the clock of the system.		

3.4 Advanced



Options Summary	
CPU Configuration	Menu for CPU Configuration Parameters
SATA Configuration	Menu for SATA Device Configuration
Hardware Monitor	Display system hardware status (CPU temperature, etc.)
SIO Configuration	SIO Chip configuration. Enable or Disable SIO Logical Devices, Resources and Features settings, etc.
DIO Configuration	Set Input/ Output of Digital Port Configuration
Trusted Computing	Set Security Device Support Parameters
Power Management	System ACPI/ Power Mode/ Wake Event Configuration

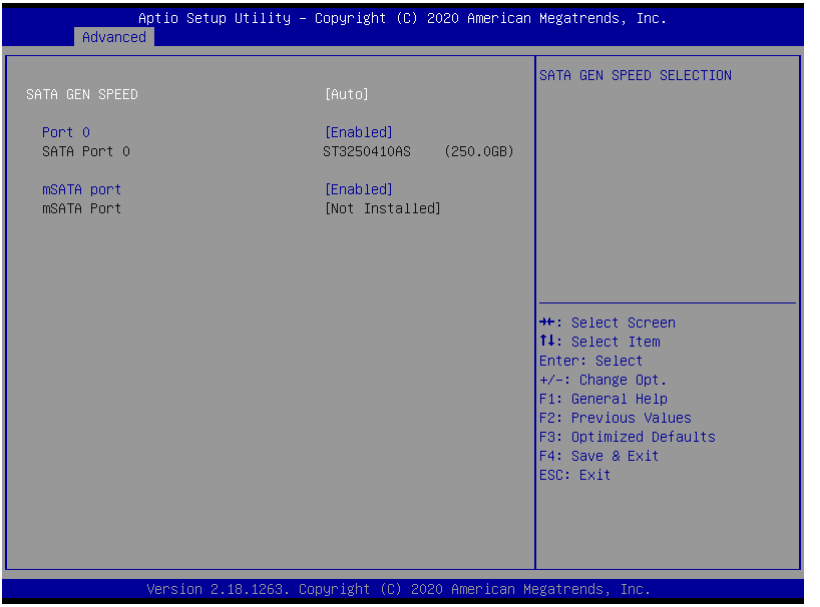
3.4.1 CPU Configuration



Options Summary		
C-States	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disable C States.		
EIST™	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disable Intel SpeedStep.		
Turbo Mode	Disabled	
	Enabled	Optimal Default, Failsafe Default
Turbo mode		
Intel Virtualization Technology	Disabled	
	Enabled	Optimal Default, Failsafe Default
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.		
VT-d	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable/Disable CPU VT-d		

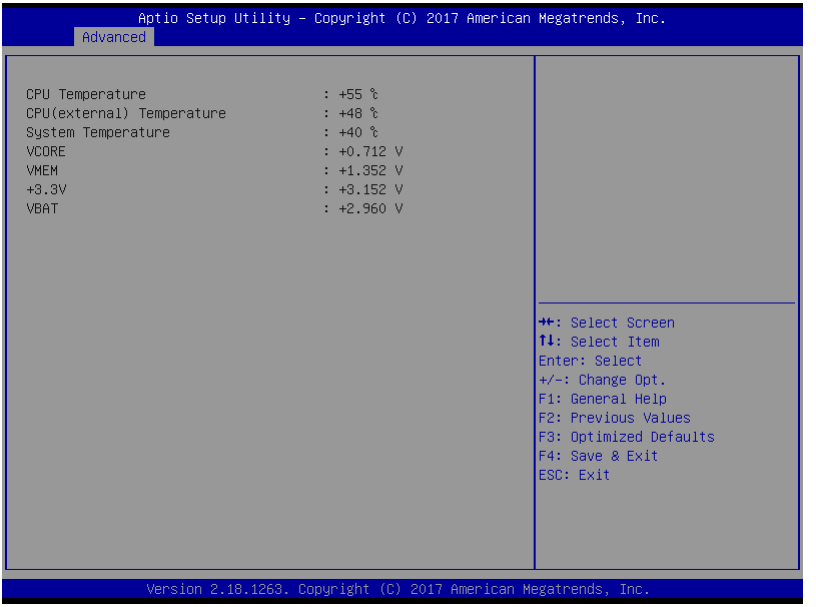
Options Summary		
Power Limit 1 Enable	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable/Disable Power Limit 1		

3.4.2 SATA Configuration

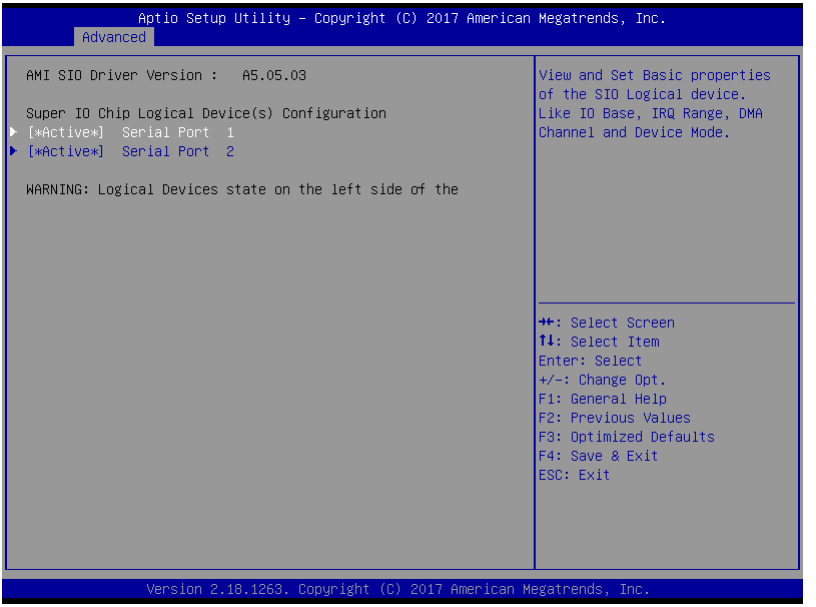


Options Summary		
SATA GEN SPEED	AUTO	Optimal Default, Failsafe Default
	GEN1	
	GEN2	
	GEN3	
SATA GEN SPEED selection		
Port 0/ mSATA port	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/ Disable SATA port		

3.4.3 Hardware Monitor

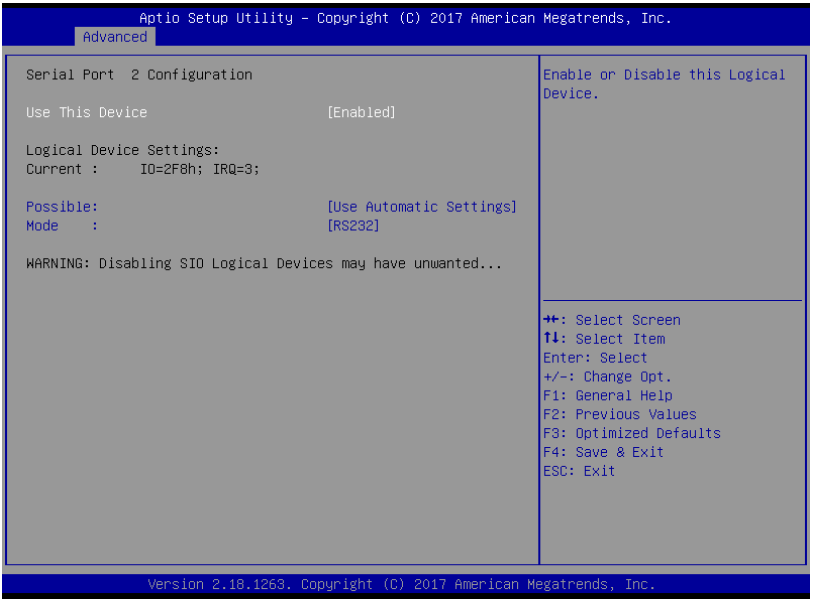


3.4.4 SIO Configuration



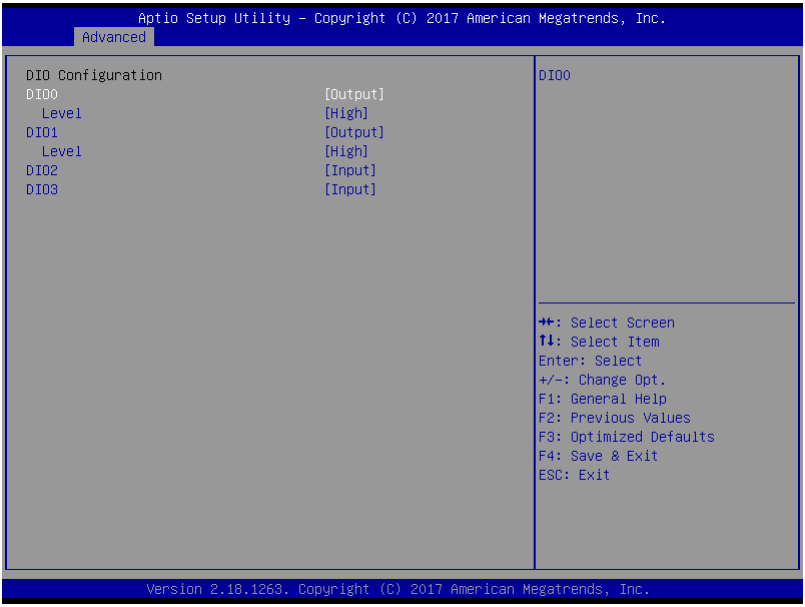
Options Summary	
Serial Port 1/2 Configuration	
View and Set Basic properties of the SIO Logical device. Like IO Base , IRQ Range , DMA Channel and Device Mode.	

3.4.4.1 Serial Port Configuration



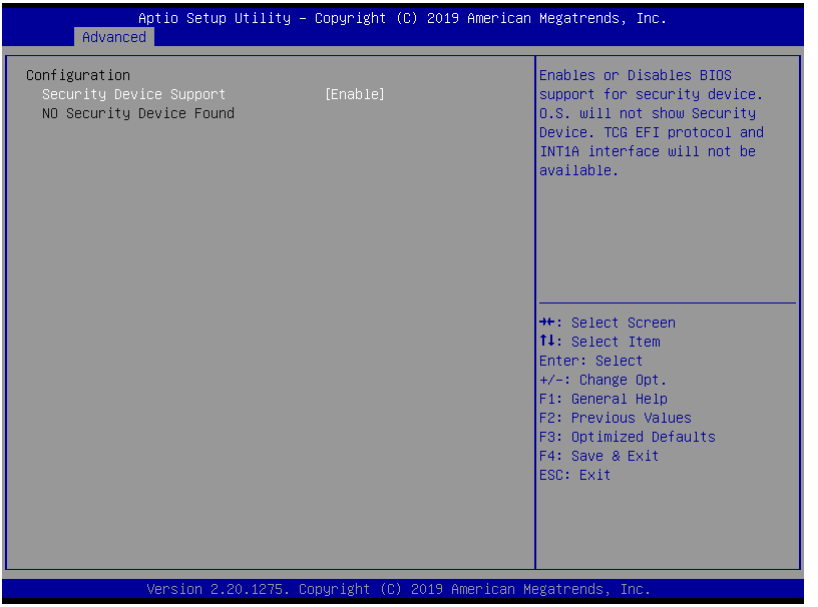
Options Summary		
Use This Device	Disable	
	Enable	Optimal Default, Failsafe Default
Enable or Disable this Logical Device.		
Possible:	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=2F8h; IRQ=3	
	IO=3F8h; IRQ=4	
Allows user to change Device's Resource settings. New settings will be reflected on This Setup Page after System restarts.		
Mode:	RS232	Optimal Default, Failsafe Default
	RS422	
	RS485	
UART RS232, 422, 485 selection.		

3.4.5 DIO Configuration



Options Summary		
DIO *	Output	
	Input	
Set DIO as Input or Output		
Level	High	Optimal Default, Failsafe Default
	Low	
Set output level when DIO pin is output		

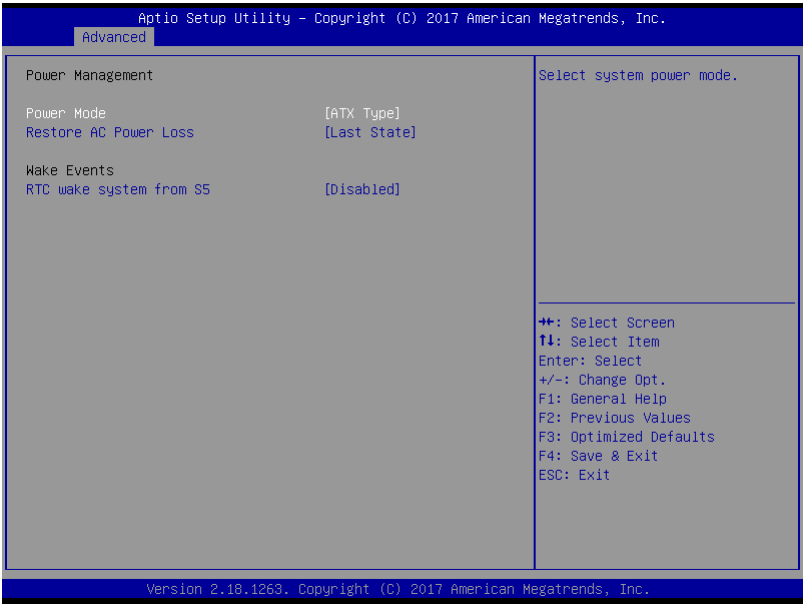
3.4.6 Trusted Computing



Options Summary		
Security Device Support	Disable	
	Enable	Optimal Default, Failsafe Default
Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.		
SHA-1 PCR Bank	Disable	
	Enable	Optimal Default, Failsafe Default
Enable or Disable SHA-1 PCR Bank		
SHA256 PCR Bank	Disable	
	Enable	Optimal Default, Failsafe Default
Enable or Disable SHA256 PCR Bank		
Pending Operation	None	Optimal Default, Failsafe Default
	TPM Clear	
Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.		

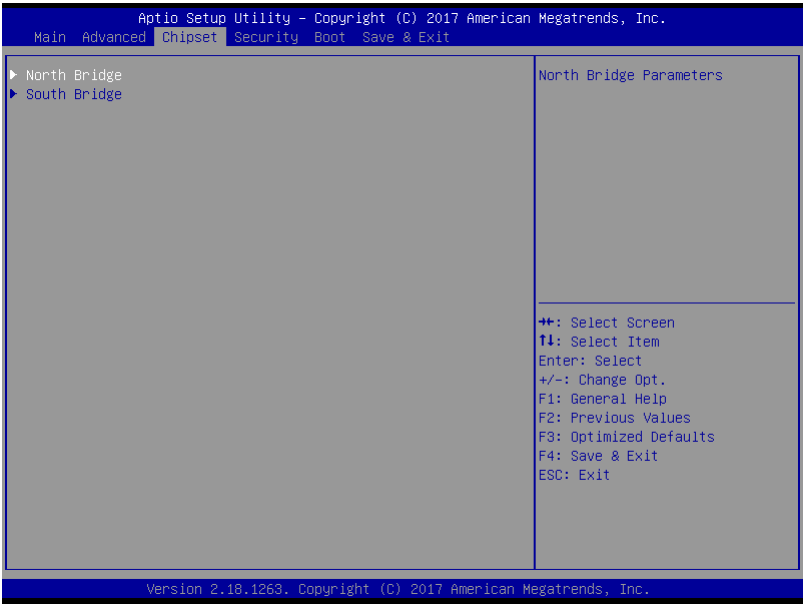
Options Summary		
Platform Hierarchy	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or disable Platform Hierarchy		
Storage Hierarchy	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Storage Hierarchy		
Endorsement Hierarchy	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Endorsement Hierarchy		
TPM2.0 UEFI Spec Version	TCG_1_2	
	TCG_2	Optimal Default, Failsafe Default
Select the TCG2 Spec Version Support, TCG_1_2: The compatible mode for Win8/Win10 TCG_2: Support new TCG2 protocol and event format for Win10 or later		
Physical Presence Spec Version	1.2	
	1.3	Optimal Default, Failsafe Default
Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.		

3.4.7 Power Management

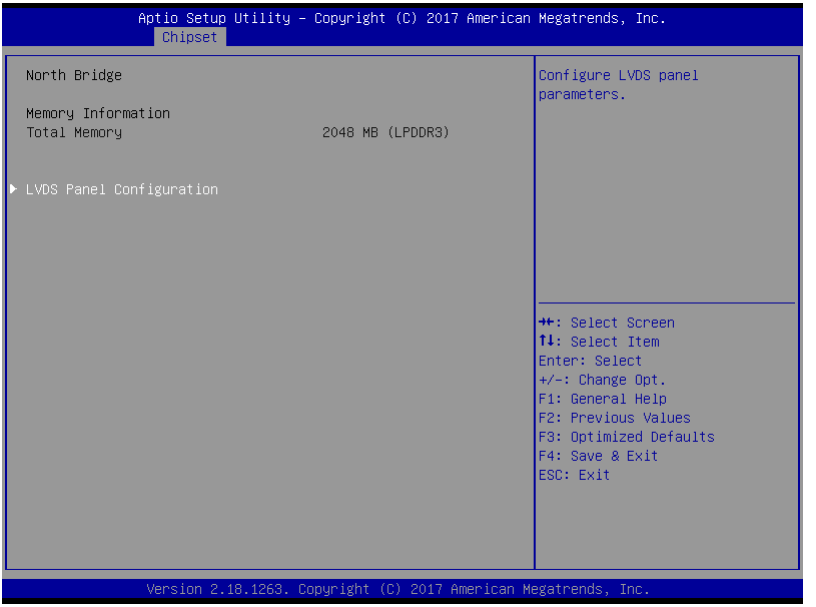


Options Summary		
Power Mode	ATX Type	Optimal Default, Failsafe Default
	AT Type	
Select system power mode		
Restore AC Power Loss	Last State	Optimal Default, Failsafe Default
	Always On	
	Always Off	
Determine if the system turns on or off after AC resume from G3 to S5 state		
RTC wake system from S5	Disable	Optimal Default, Failsafe Default
	Fixed Time	
RTC wake		

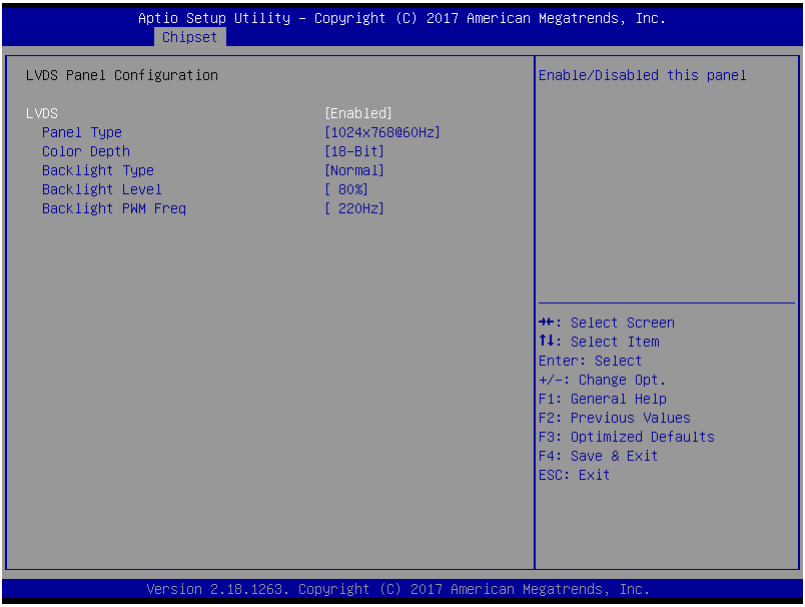
3.5 Chipset


Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
Main Advanced Chipset Security Boot Save & Exit
North Bridge
South Bridge
North Bridge Parameters
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.

3.5.1 North Bridge



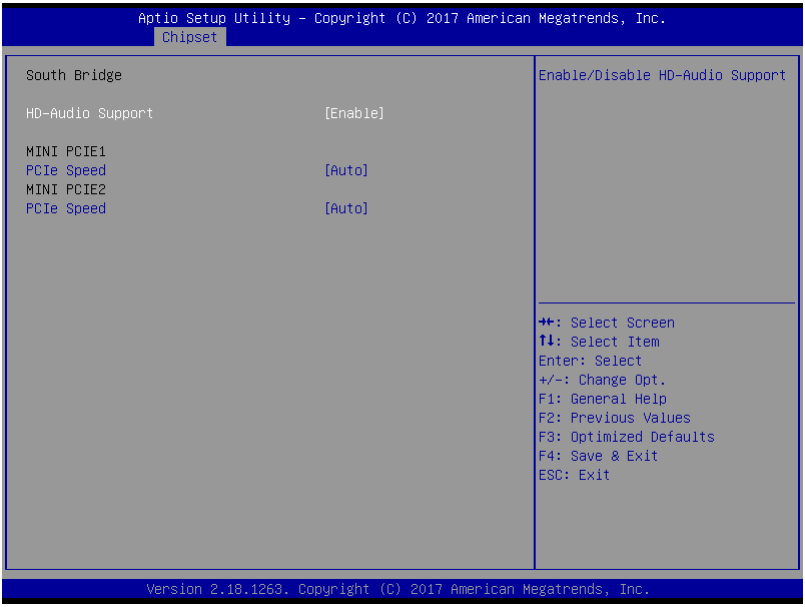
3.5.1.1 LVDS Panel Configuration



Options Summary		
LVDS	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disabled this panel.		
LVDS Panel Type	640X480@60HZ	Optimal Default, Failsafe Default
	800X480@60HZ	
	800X600@60HZ	
	1024X600@60HZ	
	1024X768@60HZ	
	1280X768@60HZ	
	1280X800@60HZ	
	1280X1024@60HZ	
	1366X768@60HZ	
	1440X900@60HZ	
	1600X1200@60HZ	
	1920X1080@60HZ	
	1920X1200@60HZ	

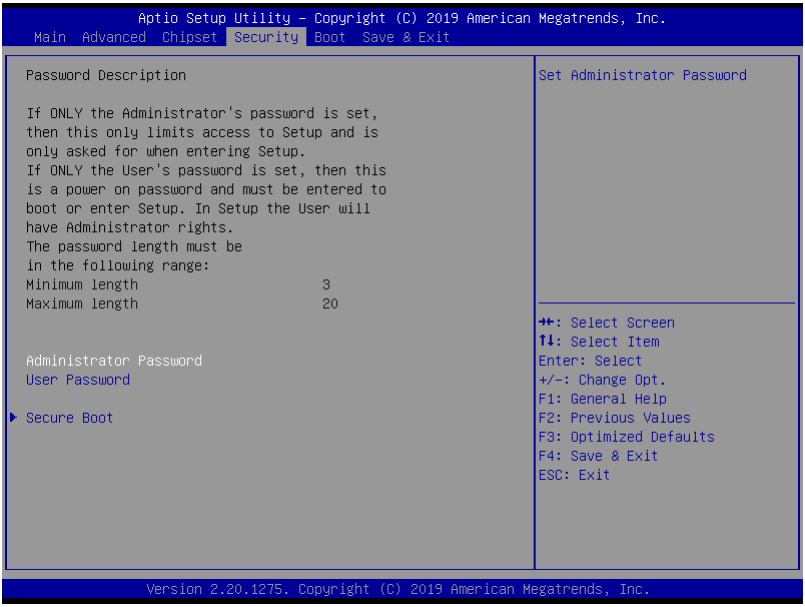
Options Summary		
Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.		
Color Depth	18-bit	Optimal Default, Failsafe Default
	24-bit	
	36-bit	
	48-bit	
Select panel depth		
Backlight Type	Normal	Optimal Default, Failsafe Default
	Inverted	
Select backlight control signal type		
Backlight Level	0%	Optimal Default, Failsafe Default
	10%	
	20%	
	30%	
	40%	
	50%	
	60%	
	70%	
	80%	
	90%	
	100%	
Select backlight control level		
Backlight PWM Freq	100Hz	Optimal Default, Failsafe Default
	200Hz	
	220Hz	
	500Hz	
	1.1KHz	
	2.2KHz	
	6.5KHz	
Select PWM frequency of backlight control signal		

3.5.2 South Bridge



Options Summary		
HD-Audio Support	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disabled HD audio		
PCIe Speed	Auto	Optimal Default, Failsafe Default
	Gen1	
	Gen2	
Configure PCIe Speed		

3.6 Security



Change User/Administrator Password

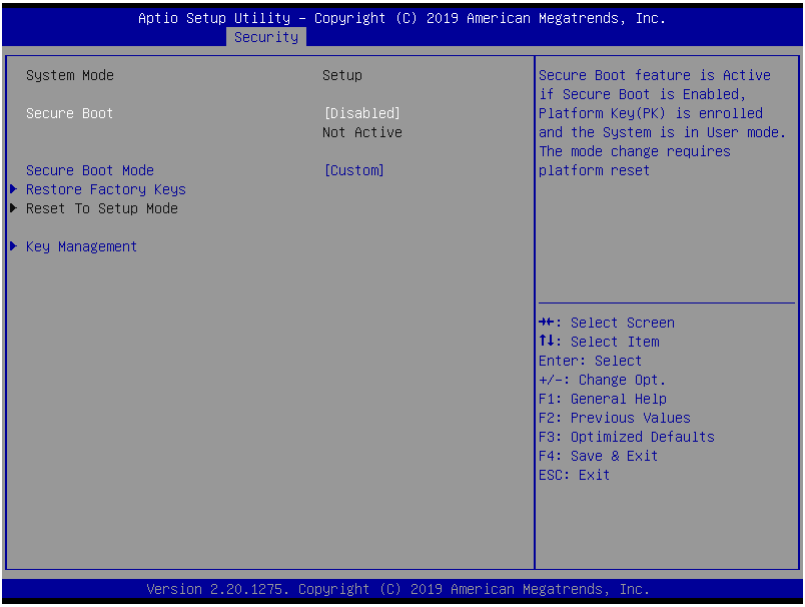
You can set an Administrator Password or User Password. An Administrator Password must be set before you can set a User Password. The password will be required during boot up, or when the user enters the Setup utility. A User Password does not provide access to many of the features in the Setup utility.

Select the password you wish to set, and press Enter. In the dialog box, enter your password (must be between 3 and 20 letters or numbers). Press Enter and retype your password to confirm. Press Enter again to set the password.

Removing the Password

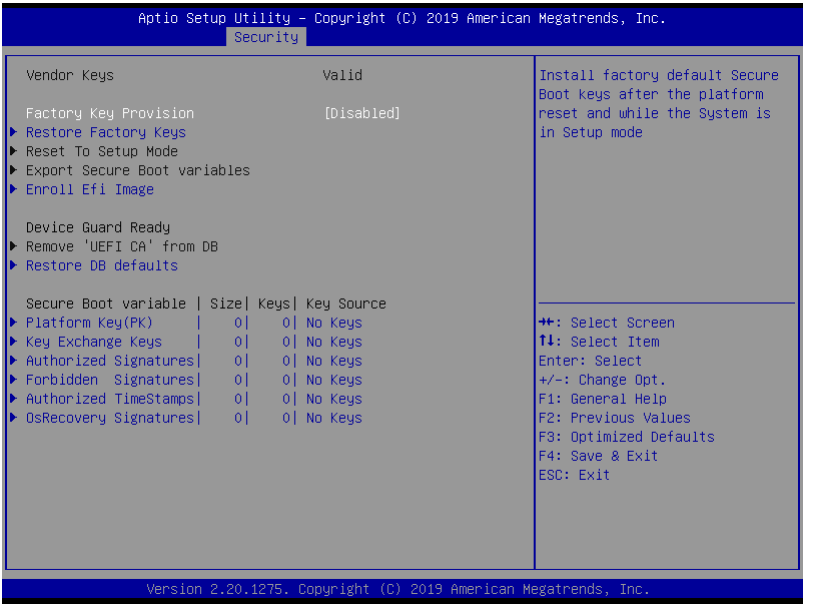
Select the password you want to remove and enter the current password. At the next dialog box press Enter to disable password protection.

3.6.1 Secure Boot



Options Summary		
Secure Boot	Disabled	Optimal Default, Failsafe Default
	Enabled	
Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset		
Secure Boot Mode	Custom	Optimal Default, Failsafe Default
	Standard	
Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication		
Restore Factory Keys		
Force System to User Mode. Install factory default Secure Boot key databases		
Reset To Setup Mode		
Delete all Secure Boot key databases from NVRAM		

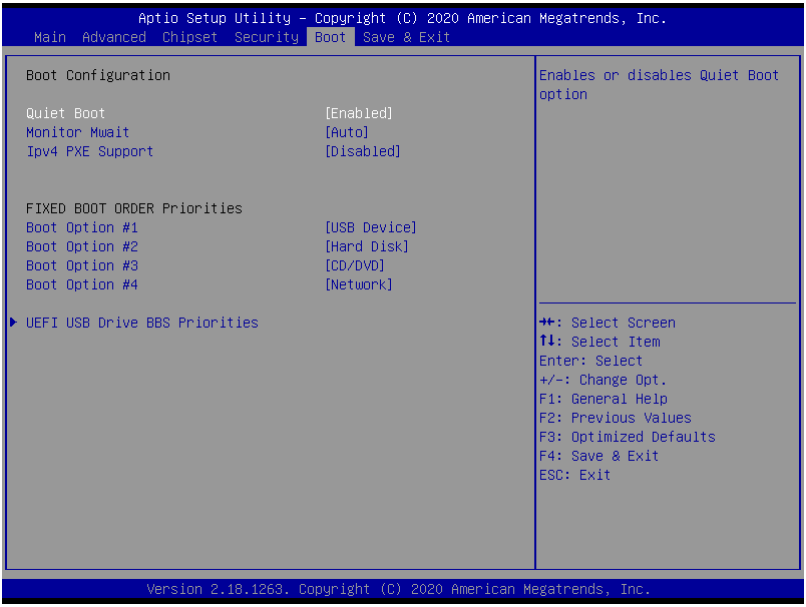
3.6.1.1 Key Management



Options Summary		
Factory Key Provision	Disabled	Optimal Default, Failsafe Default
	Enabled	
Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset		
Restore Factory Keys		
Force System to User Mode. Install factory default Secure Boot key databases		
Reset To Setup Mode		
Delete all Secure Boot key databases from NVRAM		
Export Secure Boot variables		
Copy NVRAM content of Secure Boot variables to files in a root folder on a file system device		
Enroll Efi Image		
Allow the image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db)		

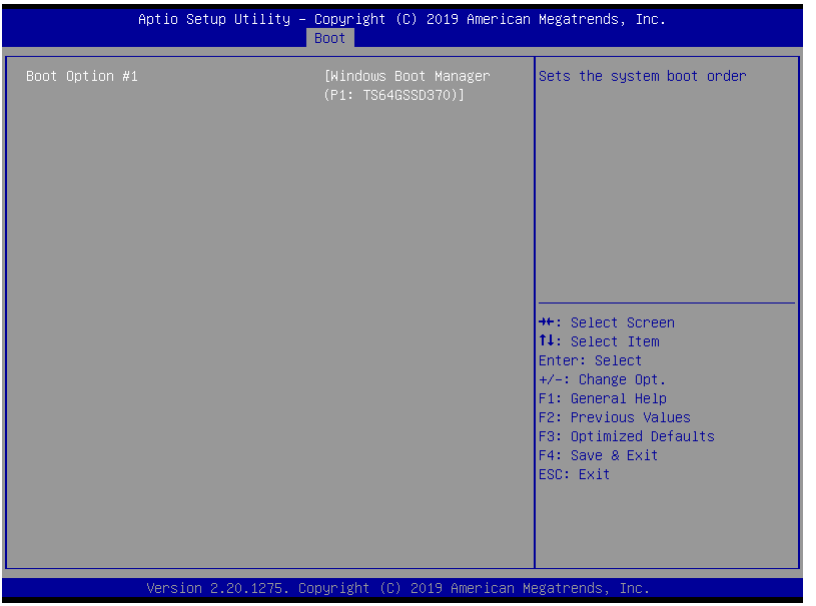
Options Summary		
Remove 'UEFI CA' from DB		
Device Guard ready system must not list 'Microsoft UEFI CA' Certificate in Authorized Signature database (db)		
Restore DB defaults		
Restore DB variable to factory defaults		
Platform Key(PK)	Details	
	Export	
	Update	
	Delete	
Key Exchange Keys	Details	
	Export	
	Update	
	Append	
	Delete	
Authorized Signatures	Details	
	Export	
	Update	
	Append	
	Delete	
Forbidden Signatures	Details	
	Export	
	Update	
	Append	
	Delete	
Authorized TimeStamps	Update	
	Append	
OsRecovery Signatures	Update	
	Append	
Enroll Factory Defaults or load certificates from a file: 1. Public Key Certificate: a) EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER) c) EFI_CERT_RSA2048 (bin) d) EFI_CERT_SHAXXX 2. Authenticated UEFI Variable 3. EFI PE/COFF Image (SHA256) Key Source: Factory, External, Mixed		

3.7 Boot

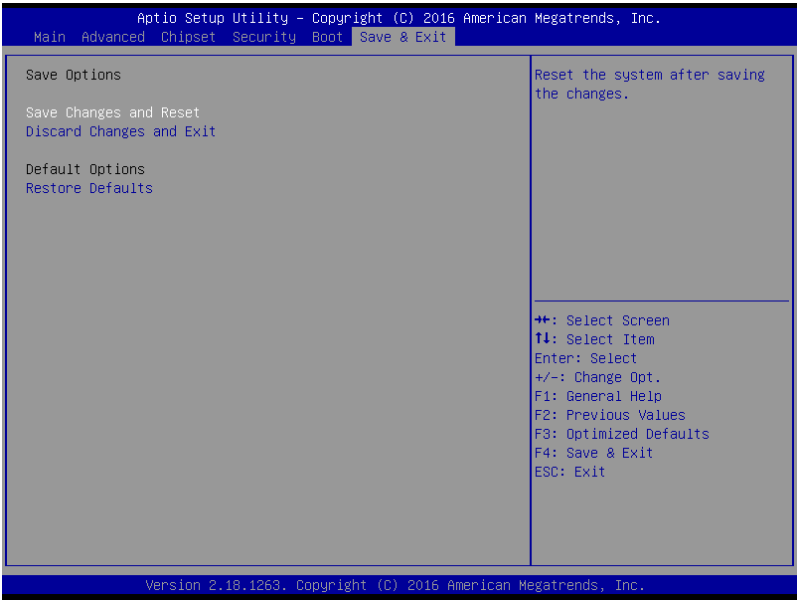


Options Summary		
Quiet Boot	Disabled	
	Enabled	Optimal Default, Failsafe Default
EnableDisable showing boot logo.		
Monitor Mwait	Disable	
	Enabled	
	Auto	Optimal Default, Failsafe Default
Enable/Disable Monitor Mwait. To install Linux OS, please set this item to disable.		
Ipv4 PXE Support	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable Ipv4 PXE Boot Support. If disabled IPV4 PXE boot option will not be created.		

3.7.1 BBS Priorities



3.8 Save & Exit


Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
Main Advanced Chipset Security Boot Save & Exit
Save Options
Save Changes and Reset
Discard Changes and Exit
Default Options
Restore Defaults
Reset the system after saving the changes.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.

Chapter 4

Drivers Installation

4.1 Driver Download/Installation

Drivers for the PICO-APL1 can be downloaded from the product page on the AAEON website by following this link:

https://www.aaeon.com/en/p/pico-itx-boards-pico-apl1#downloads

Download the driver(s) you need and follow the steps below to install them.

Step 1 – Install Chipset Driver

1. Open the **STEP1 - CHIPSET** folder and open the **SetupChipset.exe** file
2. Follow the instructions
3. Drivers will be installed automatically

Step 2 – Install Graphic Driver

1. Open the **STEP2 - VGA** folder and open the **Setup.exe** file
2. Follow the instructions
3. Driver will be installed automatically

Step 3 – Install LAN Driver

1. Open the **STEP3 - LAN** folder and select your OS
2. Open the **.exe** file in the folder
3. Follow the instructions
4. Driver will be installed automatically

Step 4 – Install Audio Driver

1. Open the **STEP4 - AUDIO** folder and open the **0006-64bit_Win7_Win8_Win81_Win10_R279.exe** file
2. Follow the instructions
3. Driver will be installed automatically

Step 5 – Install TXE Driver

1. Open the **STEP5 - TXE** folder and open the **SetupTXE.exe** file
2. Follow the instructions
3. Driver will be installed automatically

Step 6 – Install FintekSerial_Patch_T4R8 Driver

1. Open the **STEP6-FintekSerial_Patch_T4R8** folder and open the **Setup.exe** file
2. Follow the instructions
3. Driver will be installed automatically

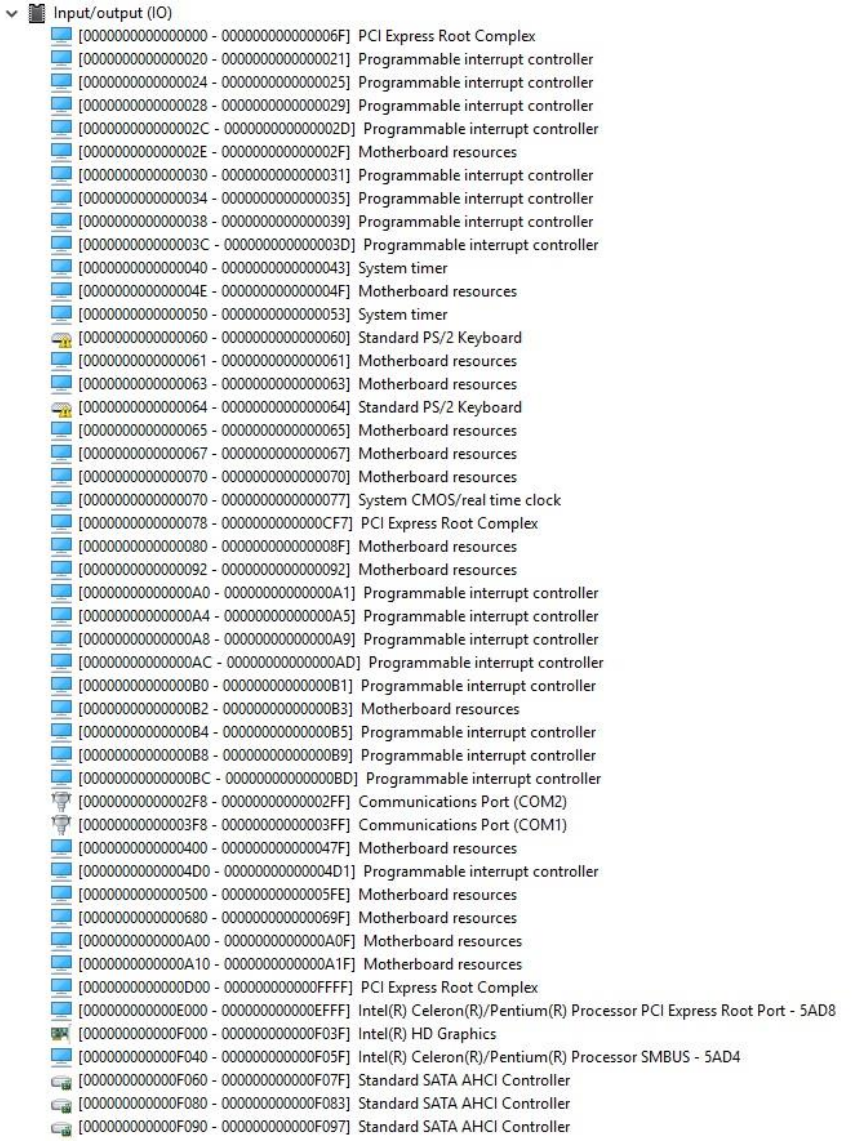
Step 7 – Install GPIO Driver

1. Open the **STEP7 - GPIO** folder and open the **SetupSerialIO.exe** file
2. Follow the instructions
3. Driver will be installed automatically

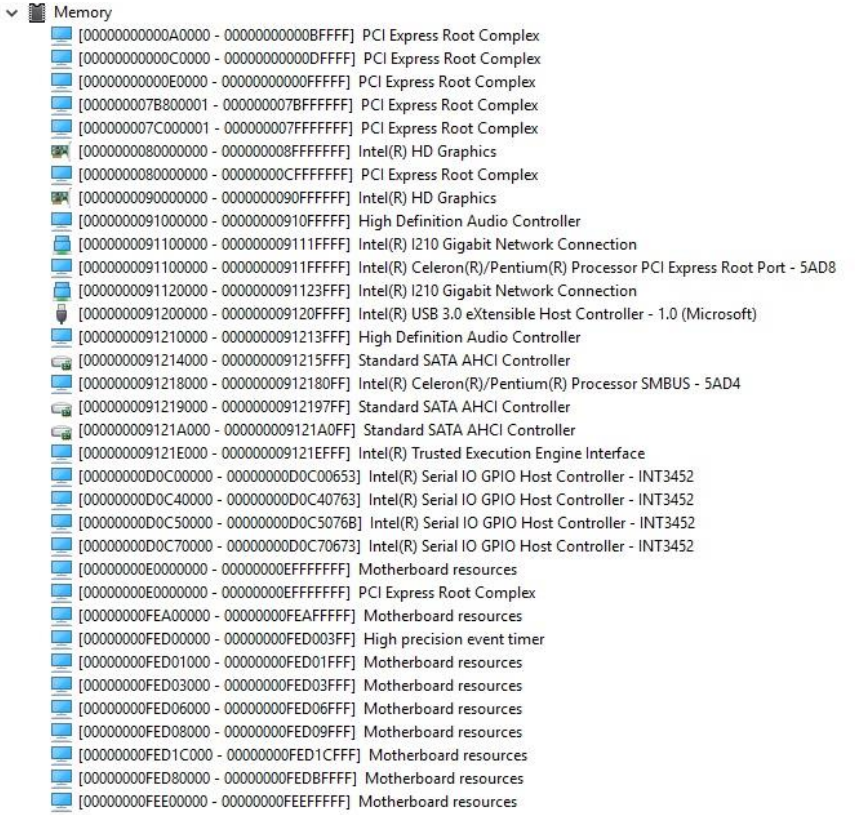
Appendix A

I/O Information

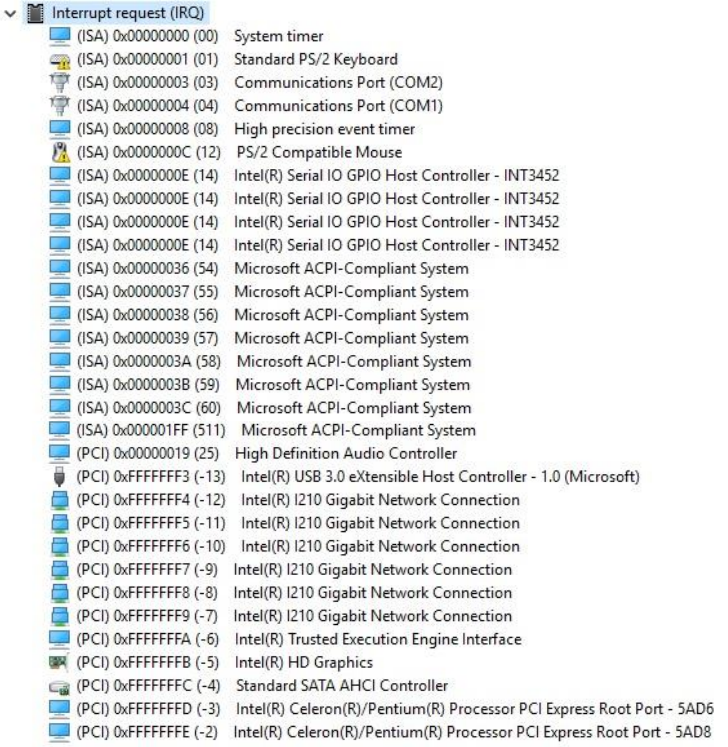
A.1 I/O Address Map



A.2 Memory Address Map



A.3 IRQ Mapping Chart



Appendix B

Mating Connectors

B.1 List of Mating Connectors and Cables

The table notes mating connectors and available cables.

Connector Label	Function	Mating Connector		Available Cable	Cable P/N
		Vendor	Model no		
CN1	Digital IO Port	Molex	51110-0650	N/A	N/A
CN2	LVDS Port Inverter / Backlight Connector	JST	PHR-5	N/A	N/A
CN3	Front Panel Connector	Molex	51110-1050	Front Panel Cable	1701100156
CN7	BIO connector	Hirose	FX18-80S-0.8SV20	N/A	N/A
CN8	SATA Port	Molex	887505318	SATA Cable	1709070500
CN9	Battery	Molex	51021-0200	Battery Cable	175011301C
CN10	LAN Connector	Molex	44915-0001	N/A	N/A
CN12	+5V Output for SATA HDD	JST	PHR-2	SATA power cable	1702150155
CN14	External +12V Input	Molex	19211-0003	Power cable	170204010R
CN16	LVDS Port	ACES	50247-030H0H0-001	LVDS Cable	1704300030
CN17	COM Port 1/2 & line out connector	HRS	DF14-20S-1.25C	COM Port 1/2 & line out cable	1703200153
CN18	LPC Port	JST	SHR-12V-S-B	AAEON LPC Cable	1703120130

Connector Label	Function	Mating Connector		Available Cable	Cable P/N
		Vendor	Model no		
CN19	USB Connector	Molex	51021-0500	USB Cable	1700050207

Appendix C

PICO-APL1-SEMI Quick Installation Guide

C.1 Packing List

Before setting up your product, please make sure the following items have been shipped:

Item	Description	Remark
1	PICO-APL1	MB
2	Chassis (Major parts)	
3	Bottom Cover of Chassis	
4	Accessory kits (w/ power button)	
5	QIG (This Document)	A0.3

1

2

3

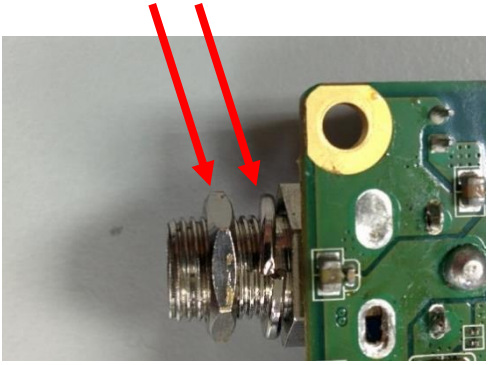
4

C.2 Assembly procedure

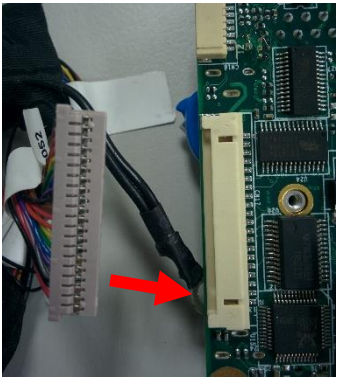
Step 1. Assemble the MB

a. Insert memory into the socket at about 30 degrees. Push it down gently until secured.

b. Remove the nut and shim ring from the DC-Jack on the MB.

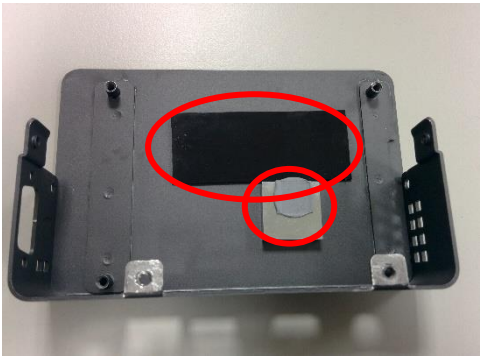


c. Gently insert the COM Port 1/2 & line out connector cable. It will "click" once in place. Make sure to orient the connector as in the picture below.

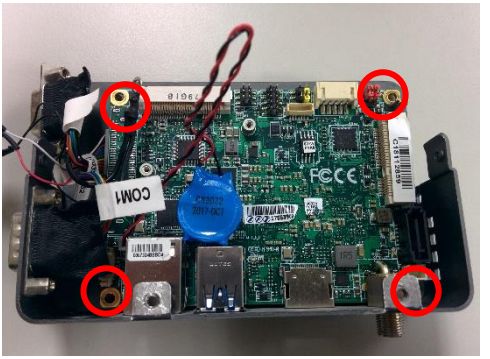


Step 2. Install MB into Chassis

a. Remove the protective liner from thermal pad.

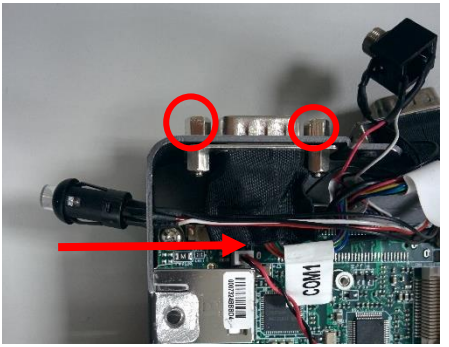


b. Set MB onto chassis, being sure to line up the four holes with the posts. Fasten the MB to the chassis with four screws.



c. Fasten 2 screws on the side of the chassis for COM Port.

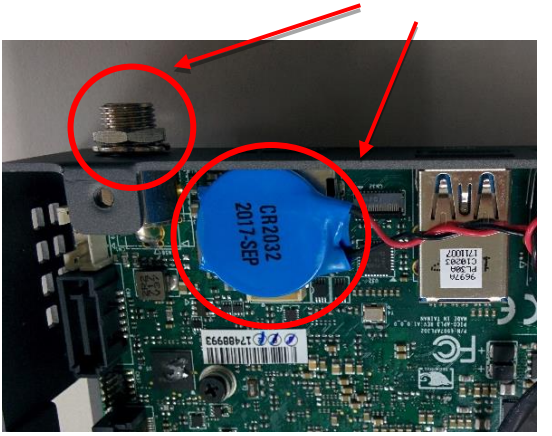
d. Thread the power button cable from outside to inside of the chassis. Gently insert the button (it will 'click' when in place).



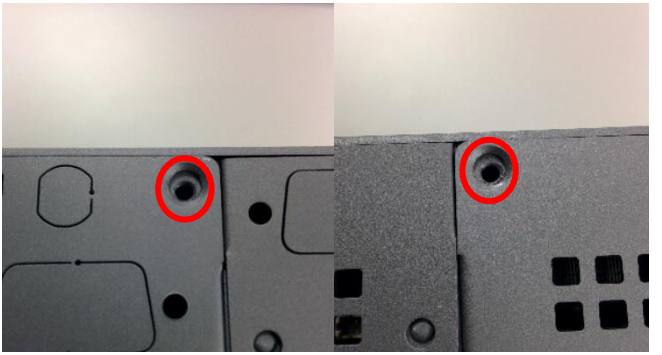
e. Connect the power button cable to CN3 PIN1,2,3.

Step 3. Finish System Assembly

a. Fasten the nut and shim ring of DC-Jack on MB (be sure to put the shim ring on before the nut, as shown below).
b. Stick the battery to the board.



c. Slide the bottom cover onto the main chassis.
d. Fasten the bottom cover to main chassis with four flat black screws; two on the bottom, one on each side as shown.



Appendix D

PICO-APL1 AI Core Kit Installation Guide

D.1 Product Brief

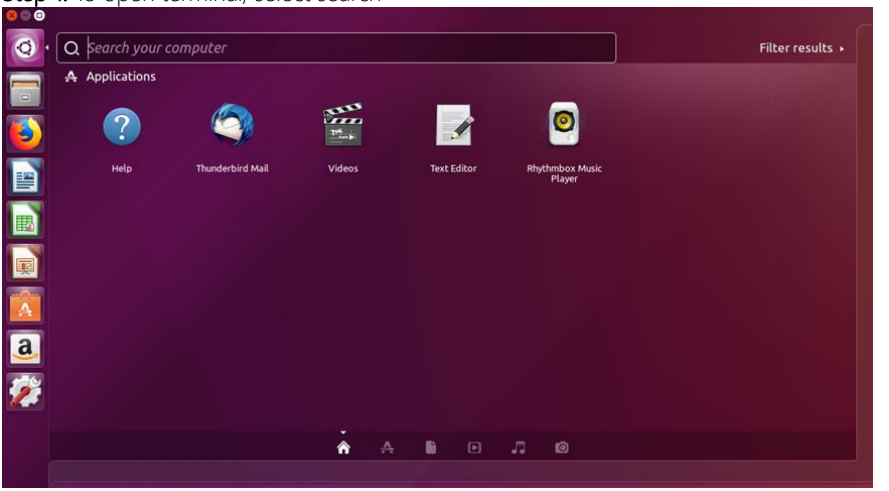
The AAEON PICO-APL1 AI (artificial intelligence) Core product is bundled with the Intel Movidius Myriad 2 VPU. Before you start to set up the development environment, we suggest you prepare the following items:

1. Up to 2G DRAM
2. At least 4GB of free storage space connected to the CN8 or CN12 SATA connector for SATA +5V power
3. HDMI monitor
4. USB keyboard/mouse
5. Ubuntu 16.04
6. An Internet connection

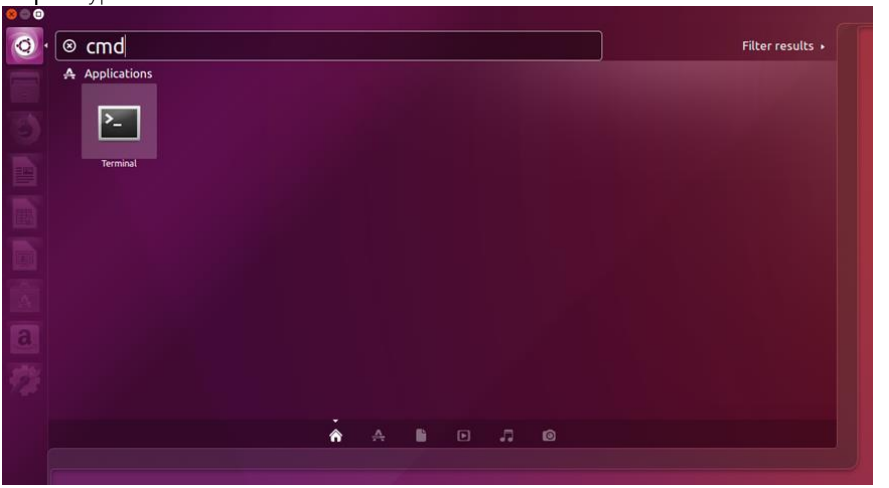
Connect all the above peripherals, then power on and open terminal (command mode) in Ubuntu.

D.2 Update Ubuntu and Kernel

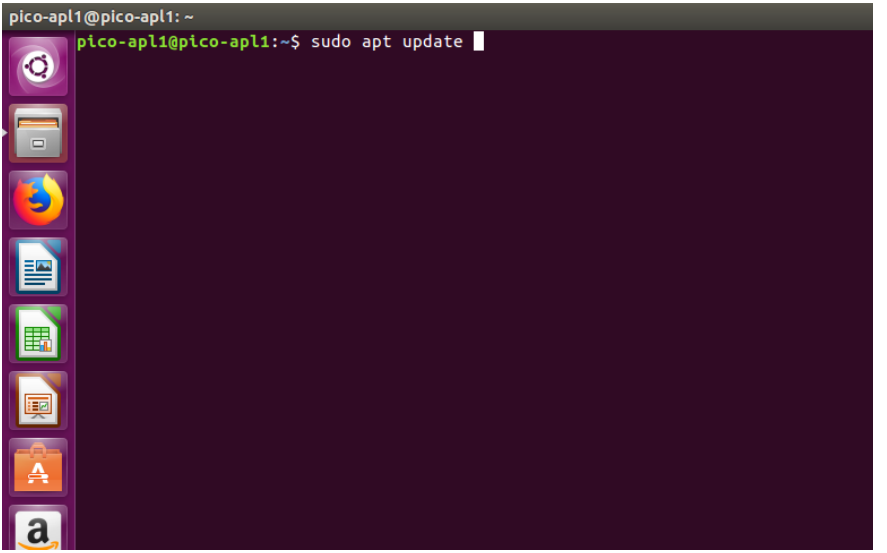
Step 1. To open terminal, select search



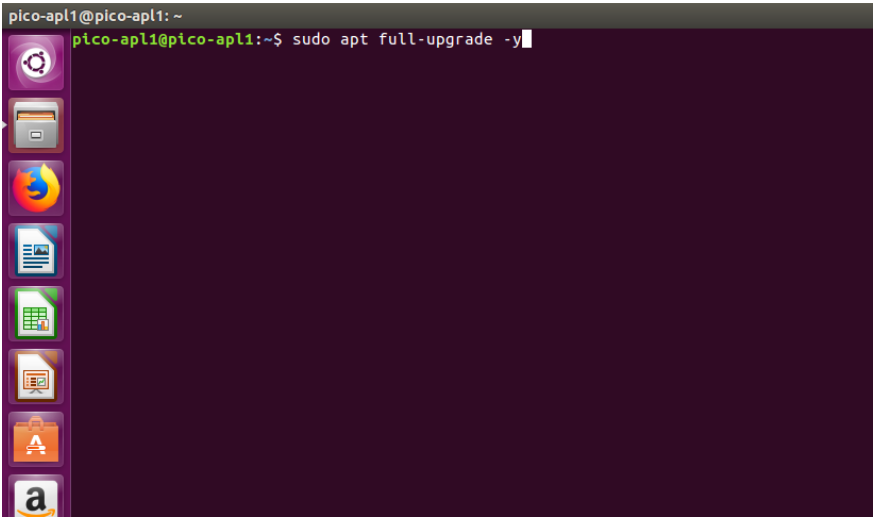
Step 2. Type 'cmd' or 'terminal'



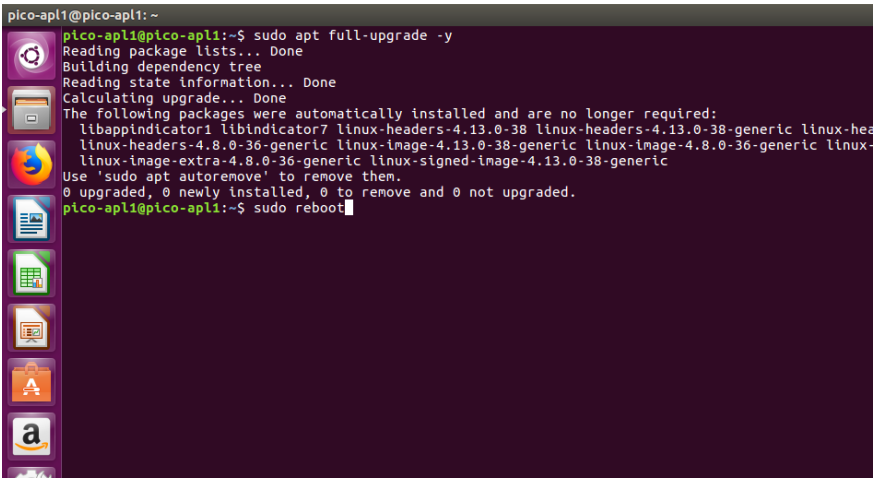
Step 3. Type **sudo apt update** and press enter.



Step 4. Type **sudo apt full-upgrade -y**



Step 5. After system finishes, type **sudo reboot** and the system will restart

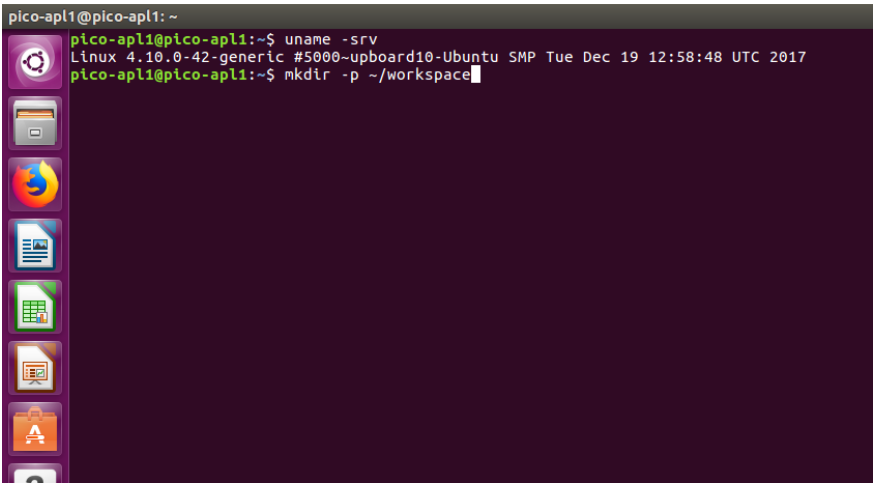


Step 6. After the restart, open terminal again.

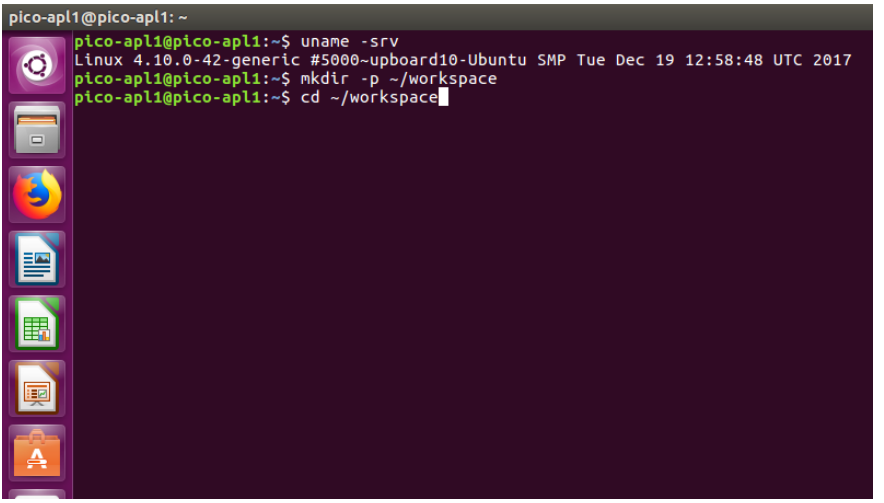
D.3 Install NCSDK

(Please refer to https://developer.movidius.com/start)

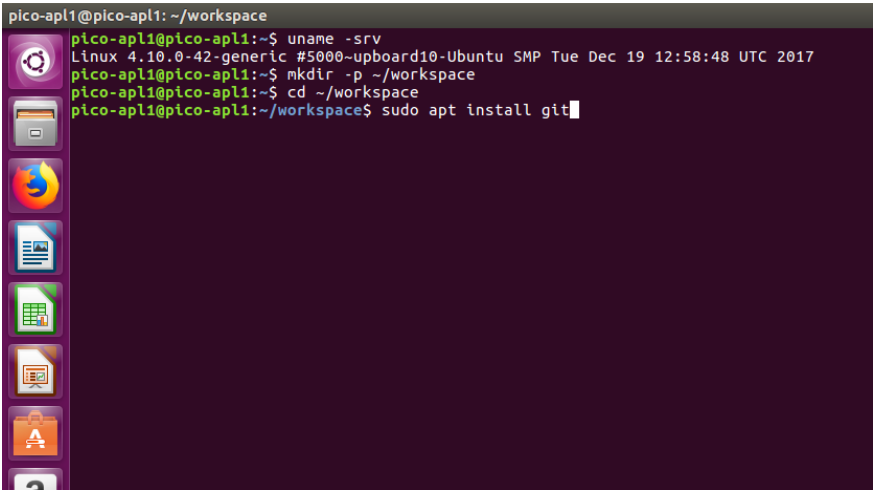
Step 1. In terminal, type **`mkdir -p ~/workspace`**



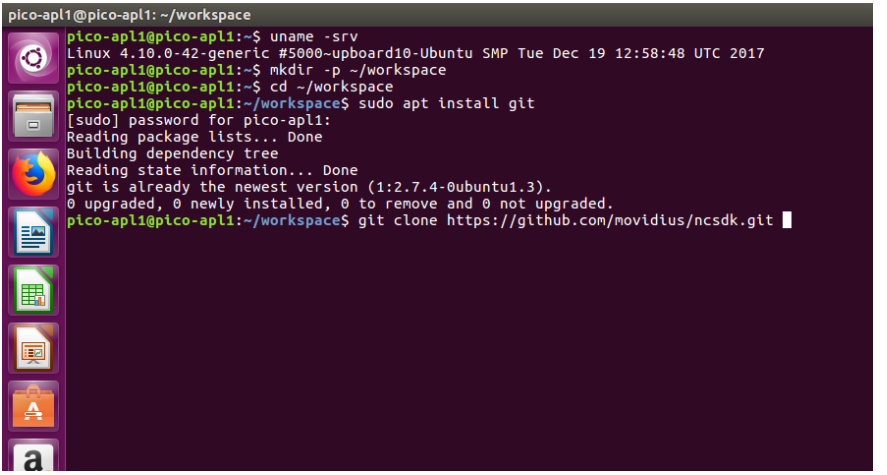
Step 2. Type **`cd~/workspace`**



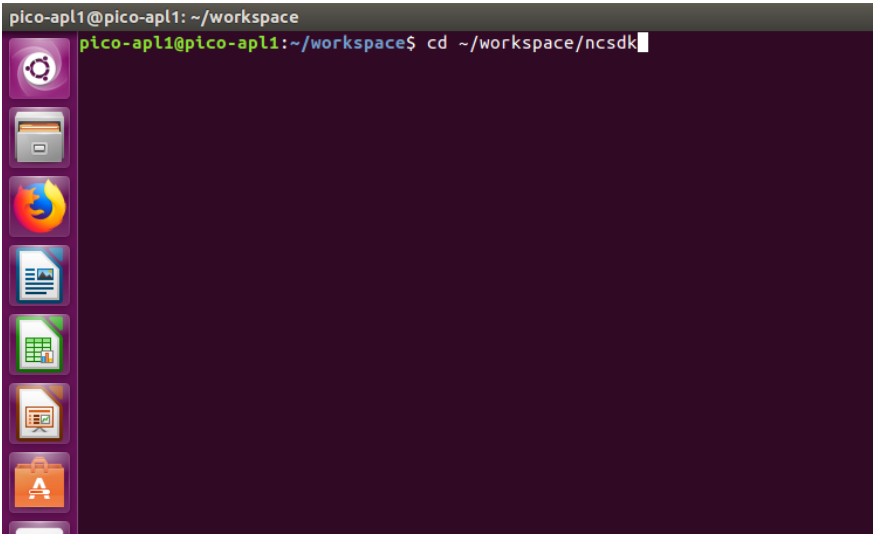
Step 3. Type **`sudo apt install git`**



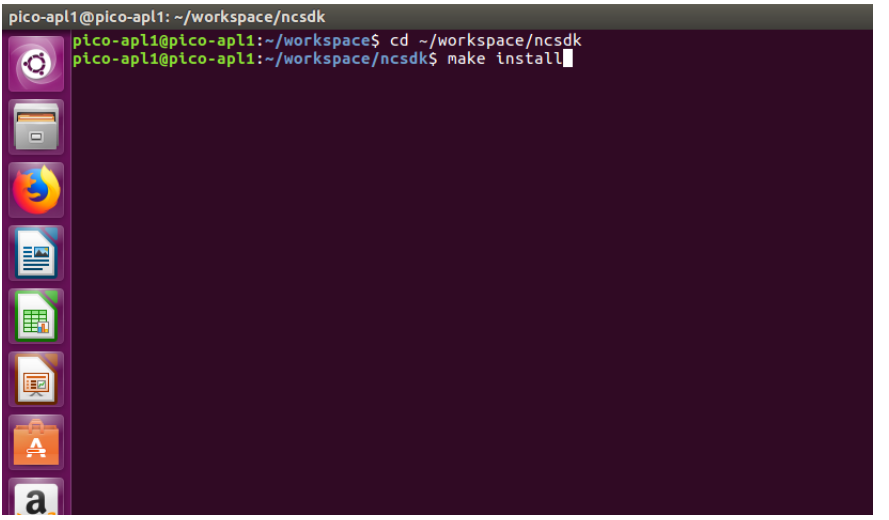
Step 4. Type **`git clone https://github.com/movidius/ncsdk.git`**



Step 5. Type **`cd ~/workspace/ncsdk`**



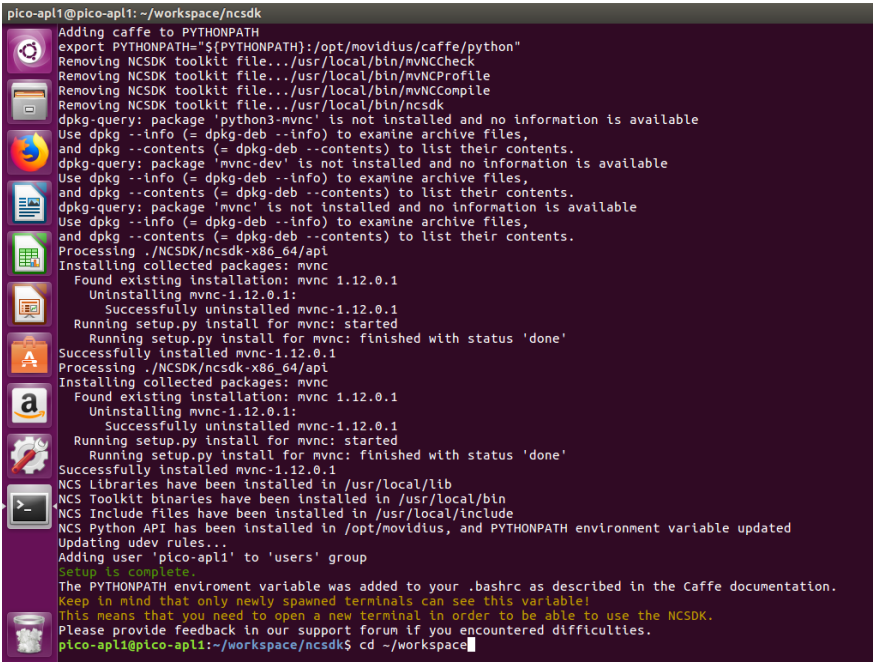
Step 6. Type **`make install`**



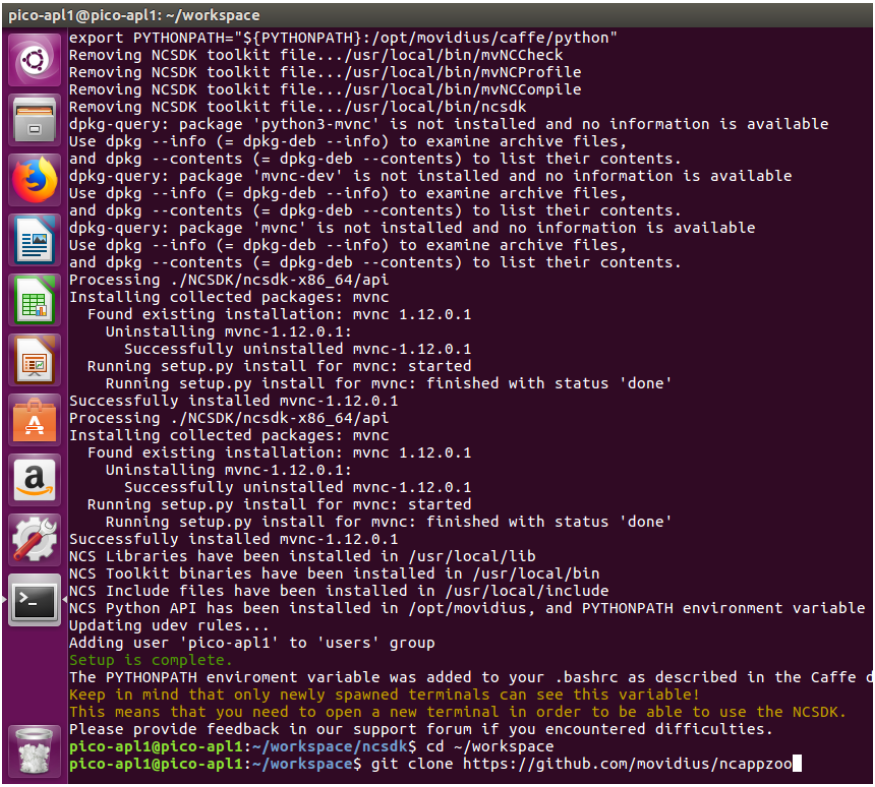
Note: If the installation fails, run '**`make install`**' again.

D.4 Download Movidius Ncappzoo

Step 1. In terminal, type **`cd ~/workspace`**



Step 2. Type **`git clone https://github.com/movidius/ncappzoo`**



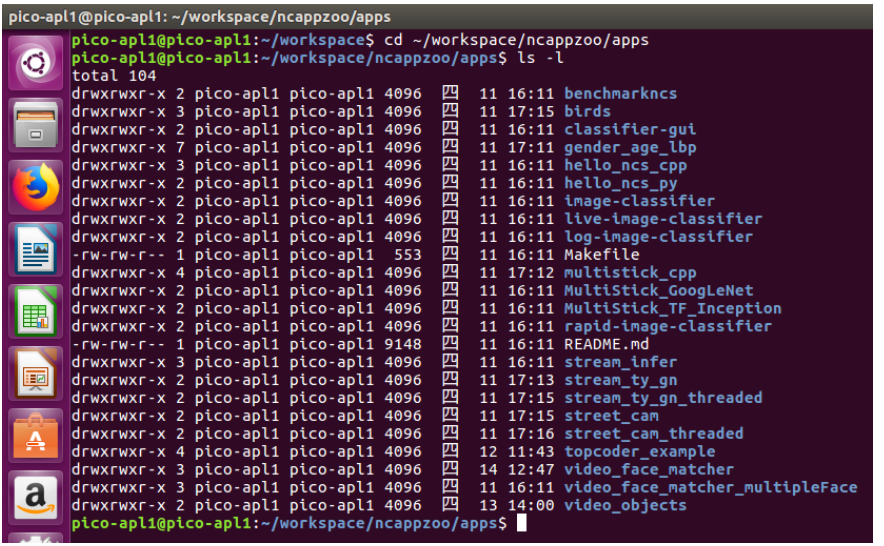
Step 3. Type **`cd ~/workspace/ncappzo/apps/street_cam && make opencv`**

After installing NCSDK, Ncappzoo and OpenCV, you can start running demos.

Step 1. Type **`cd ~/workspace/ncappzoo/apps`**

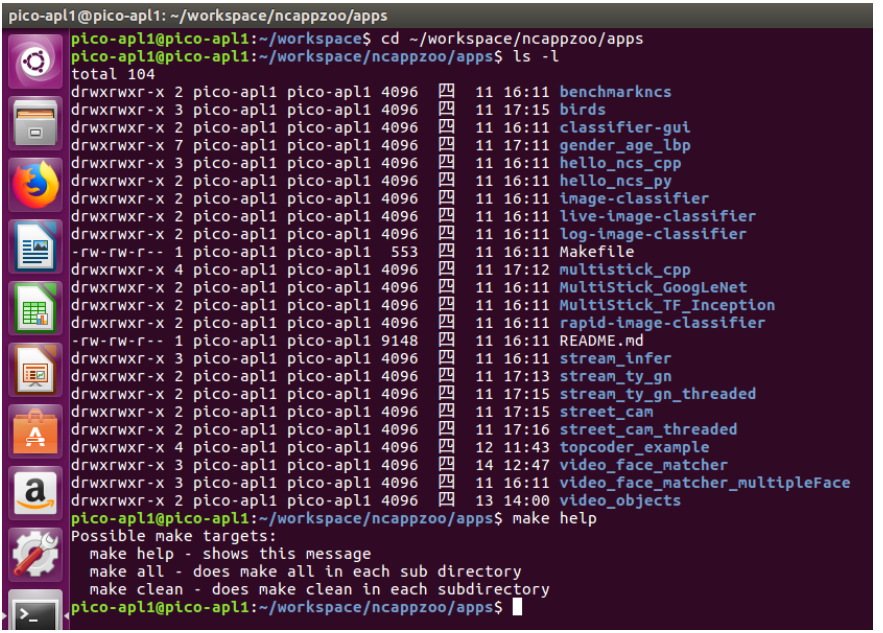
Step 2. Type **`ls -I`**

You will see the names of the folders in the directory.



Step 3. Type **cd folder name** to open the folder you want.

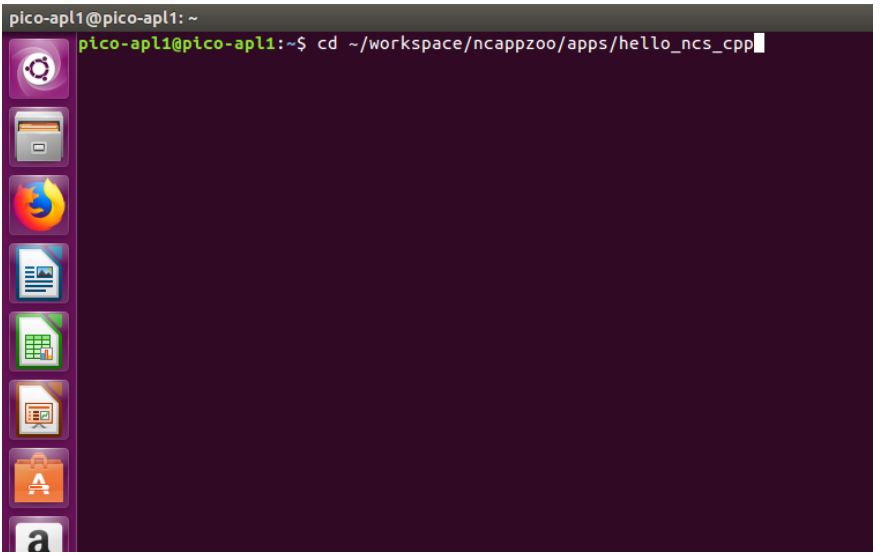
Step 4. Type **make help** to view the commands you can use in each folder.



D.5 Example in Movidius Ncappzoo

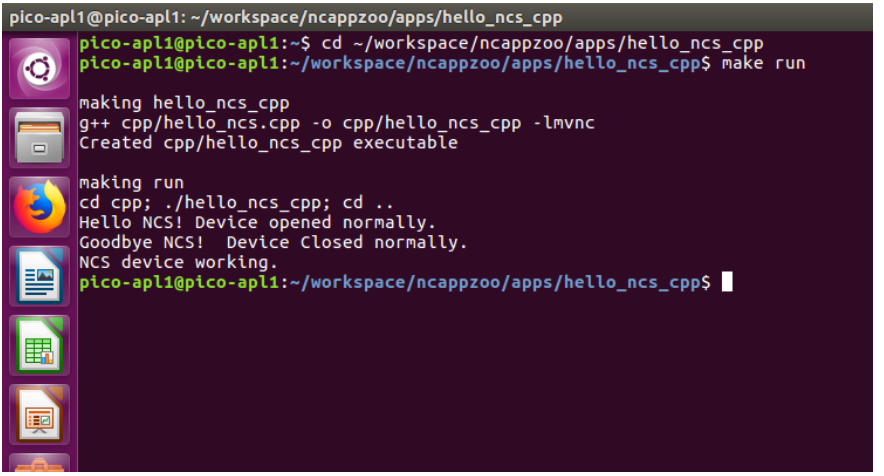
*(example: **cd ~/workspace/ncappzoo/apps/hello_ncs_cpp && make run**)

Step 1. Type **cd ~/workspace/ncappzoo/apps/hello_ncs_cpp**



Step 2. Type **`make help`** to view the commands you can use in the folder.

Step 3. Type **`make run`**



D.4 Additional Information

With some relative directories, for example "video or graphic" relative directories, you need to install "opencv" before you can start working.

You can install "opencv" with the following commands in terminal:

```
cd~ workspace/ncappzo/apps/stree_cam
make opencv.
```

Other

Some demos might need two or more Movidius modules, an Internet connection, or a USB Camera. Customers can purchase more USB type Movidius Neural Compute Sticks and plug them in to a USB port.

Helpful links for more information:

https://developer.movidius.com/start

https://github.com/movidius/ncappzoo

AAEON Accessories:

968C064G52 – 64GB SATA DOM with Power Cable.

PICO-APL1-HSP01 – Heat-spreader

PICO-APL1-HSK01 – Heat-sink, to be used with Heat-spreader