



AL700

Qseven Board User's Manual

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Trademarks

Product names or trademarks appearing in this manual are for identification purpose only and are the properties of the respective owners.

Qseven Specification Reference

<http://www.qseven-standard.org/>

FCC and DOC Statement on Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

Notice:

1. The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
2. Shielded interface cables must be used in order to comply with the emission limits.

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Warranty

1. Warranty does not cover damages or failures that arised from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.
2. The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.
3. Unless otherwise instructed in this user's manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.
4. We will not be liable for any indirect, special, incidental or consequential damages to the product that has been modified or altered.

Static Electricity Precautions

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

1. To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.
2. Wear an antistatic wrist strap.
3. Do all preparation work on a static-free surface.
4. Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.
5. Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.



Important:

Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

Safety Measures

To avoid damage to the system:

- Use the correct AC input voltage range.

To reduce the risk of electric shock:

- Unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging the power cord.

About the Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- 1 AL700 board
- 1 Heat sink

Optional Items

- Qseven Development Board Q7X-151
- Heat spreader
- Bracket
- Bulk box

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Chapter 1 - Introduction

Specifications

SYSTEM	Processor	Intel Atom® Processor E3900 Series, BGA 1296 Intel Atom® x7-E3950 Processor, Quad Core, 2M Cache, 1.6GHz (2.0GHz), 12W Intel Atom® x5-E3940 Processor, Quad Core, 2M Cache, 1.6GHz (1.8GHz), 9.5W Intel Atom® x5-E3930 Processor, Dual Core, 2M Cache, 1.3GHz (1.8GHz), 6.5W Intel® Pentium® Processor N4200, Quad Core, 2M Cache, 1.1GHz (2.5GHz), 6W Intel® Celeron® Processor N3350, Dual Core, 2M Cache, 1.1GHz (2.4GHz), 6W
	Memory	4GB/8GB DDR3L Memory Down Dual Channel DDR3L 1600MHz
	BIOS	AMI SPI 128Mbit (supports UEFI boot only)
GRAPHICS	Controller	Intel® HD Graphics Gen9LP Series
	Feature	OpenGL 5.0, DirectX 12, OpenCL 2.1 HW Decode: AVC/H.264, MPEG2, VC1/WMV9, JPEG/MJPEG, HEVC/H.265, VP8, VP9, MVC HW Encode: AVC/H.264, JPEG/MJPEG, HEVC/H.265, VP8, VP9, MVC
	Display	1 x DDI (HDMI/DVI/DP++) 1 x LVDS/(eDP+DDI) (DDI available upon request) LVDS: NXP PTN3460, 24-bit, dual channel, resolution up to 1920x1200 @ 60Hz HDMI: resolution up to 3840x2160 @ 30Hz DP++: resolution up to 4096x2160 @ 60Hz eDP: resolution up to 3840x2160 @ 60Hz
	Dual/Triple Display	LVDS + DDI (Dual) eDP + DDI (Dual) eDP + 2DDI (Triple) (available upon request)
EXPANSION	Interface	4 x PCIe x1 (Gen 2) 1 x SDIO (with LED) 1 x LPC 1 x I ² C 1 x SMBus 1 x SPI 1 x UART (TX/RX)
AUDIO	Interface	HD Audio
ETHERNET	Controller	1 x Intel® I211AT (10/100/1000Mbps) (0 to 60°C) or 1 x Intel® I210IT (10/100/1000Mbps) (-40 to 85°C)

I/O	USB	1 x USB 3.0 + 8 x USB 2.0 3 x USB 3.0 + 4 x USB 2.0 (available upon request)
	SATA	2 x SATA 3.0 (up to 6Gb/s)
	eMMC	Supports up to 32GB eMMC eMMC 5.0, BGA-153 Ball 8~32G (MLC mode)
	GPIO	1 x 4-bit GPIO
WATCHDOG TIMER	Output & Interval	System Reset, Programmable via Software from 1 to 255 Seconds
POWER	Type	5V, 5VSB, VCC_RTC
	Consumption	Typical: E3940: 12V @ 0.53A (6.36W) Max.: E3940: 12V @ 1.78A (21.36W)
OS SUPPORT (UEFI ONLY)		Windows 10 IoT Enterprise 64-bit Ubuntu 15.10 (Intel graphic driver available)
ENVIRONMENT	Temperature	Operating: 0 to 60°C / -40 to 85°C Storage: -40 to 85°C
	Humidity	Operating: 5 to 90% RH Storage: 5 to 90% RH
	MTBF	1,020,531 hrs @ 25°C; 583,481 hrs @ 45°C; 364,855 hrs @ 60°C Calculation model: Telcordia Issue 2 Environment: GB, GC – Ground Benign, Controlled
MECHANICAL	Dimensions	Qseven form factor 70mm (2.76") x 70mm (2.76")
	Compliance	Qseven specification revision 2.1
CERTIFICATIONS		CE, FCC Class B, RoHS

Features

• DDR3L

DDR3L is a higher performance DDR3 SDRAM interface providing less voltage and higher speed successor. DDR3L SDRAM modules support 1600MHz for DDR modules. DDR3L delivers increased system bandwidth and improved performance to provide its higher bandwidth and its increase in performance at a lower power.

• Graphics

The integrated Intel® HD graphics engine delivers an excellent blend of graphics performance and features to meet business needs. It provides excellent video and 3D graphics with outstanding graphics responsiveness. These enhancements deliver the performance and compatibility needed for today's and tomorrow's business applications. Supports 1 x DDI (HDMI/DVI/DP++) and 1 x LVDS/(eDP+optional DDI) interfaces for display outputs.

• Serial ATA

Serial ATA is a storage interface that is compliant with SATA 2.0a specification. With speed of up to 6Gb/s (SATA 3.0), it improves hard drive performance faster than the standard parallel ATA whose data transfer rate is 100MB/s.

• Gigabit LAN

Intel® I211AT or I210IT Gigabit Ethernet controller supports up to 1Gbps data transmission.

• Watchdog Timer

The Watchdog Timer function allows your application to regularly "clear" the system at the set time interval. If the system hangs or fails to function, it will reset at the set time interval so that your system will continue to operate.

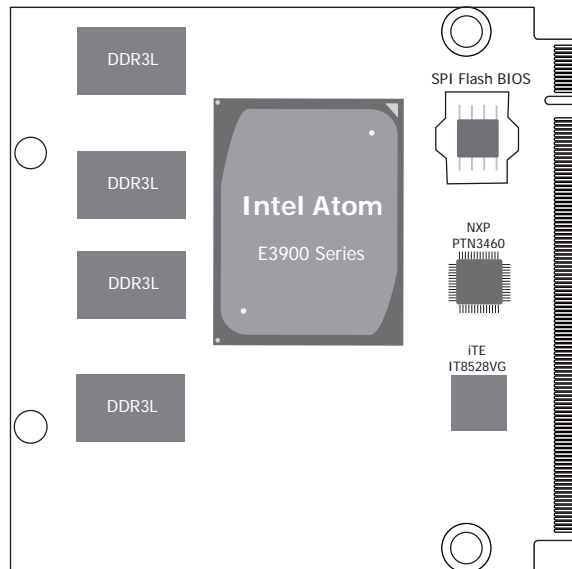
Specification Comparison Table

The table below shows the Qseven standard specifications and the corresponding specifications supported on the AL700 module.

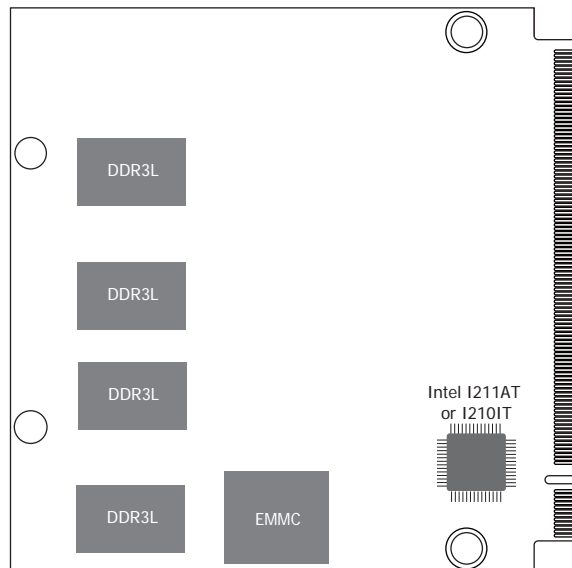
Qseven Supported Features				
System I/O Interface	ARM/RISC Based Minimum Configuration	X86 Based Minimum Configuration	Maximum Configuration	DFI AL700 Configuration
PCI Express lanes	0	1 (X1 Link)	4	4
Serial ATA channels	0	0	2	2
USB 2.0 ports	3	4	8	4 or 8 (USB2.0 Port4-7 shared with USB3.0 Port0 and Port2)
USB 3.0 ports	0	0	3	3 or 1 (USB2.0 Port4-7 shared with USB3.0 Port0 and Port2)
LVDS channels	0	0	Dual Channel 24bits	1 (LVDS shared with eDP and DP++)
embedded DisplayPort	0	0	2	2 (eDP and DP++) (LVDS shared with eDP and DP++)
DisplayPort, TMDS	0	0	1	1 (DP++)
High Definition Audio / I2S	0	0	1	1
Ethernet 10/100 Mbit/Gigabit	0	0	1 (Gigabit Ethernet)	1
UART	0	0	1	1
Low Pin Count bus	0	0	1	1
Secure Digital I/O 8-bit for SD/MMC cards	0	0	1	1 (SD Card)
System Management Bus	0	1	1	1
I ² C Bus	1	1	1	1
SPI Bus	0	0	1	1
CAN Bus	0	0	1	0
Watchdog Trigger	1	1	1	1
Power Button	1	1	1	1
Power Good	1	1	1	1
Reset Button	1	1	1	1
LID Button	0	0	1	1
Sleep Button	0	0	1	1
Suspend To RAM (S3 mode)	0	0	1	1
Wake	0	0	1	1
Battery low alarm	0	0	1	1
Thermal control	0	0	1	1
FAN control	0	0	1	1

Chapter 2 - Hardware Installation

Board Layout

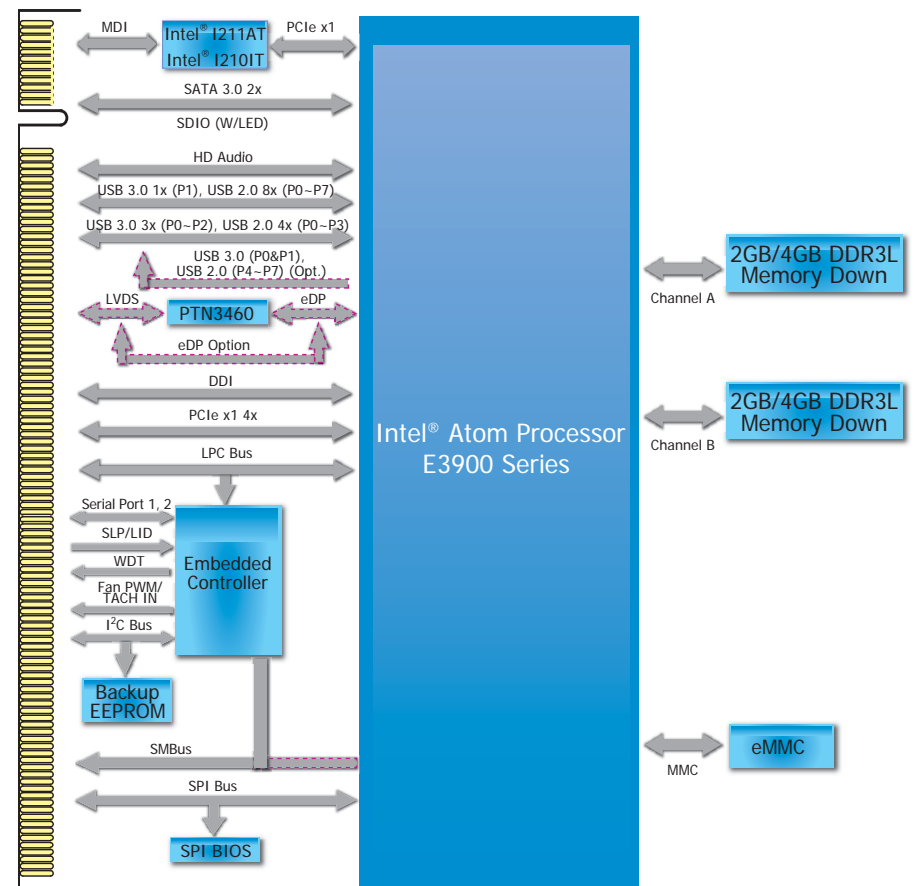


Top View



Bottom View

Block Diagram



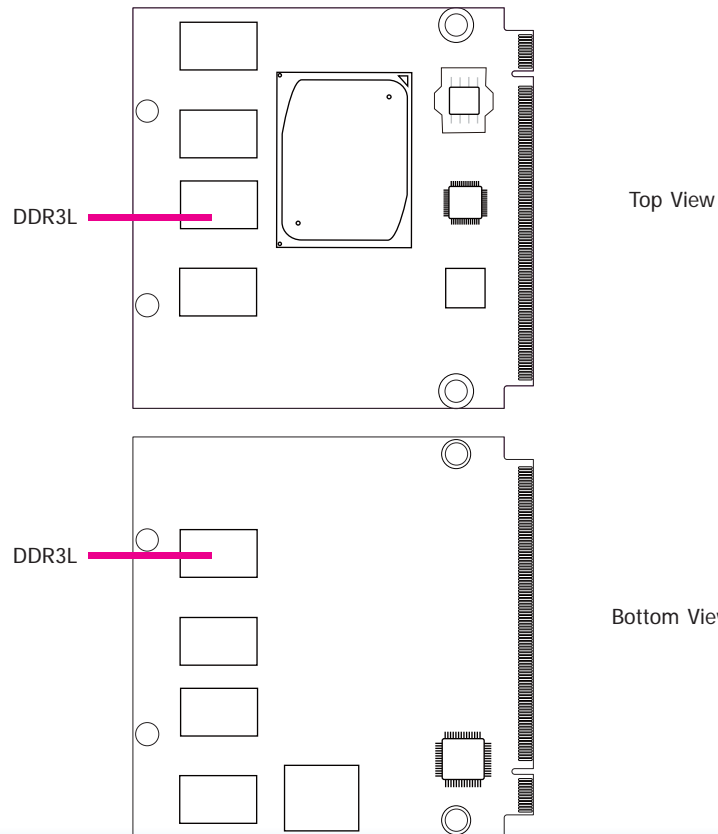
**Important:**

Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

System Memory

The system board is equipped with eight 4GB/8GB DDR3L onboard memory interfaces.

- Supports DDR3L 1600MHz
- Supports dual channel memory interface

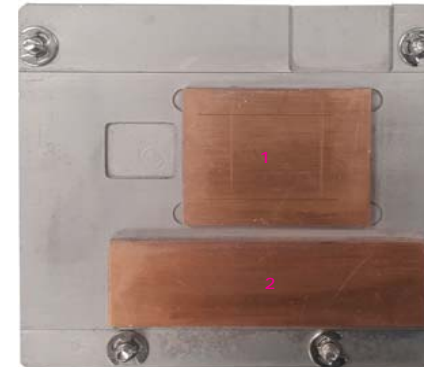


Cooling Option

Heat Sink



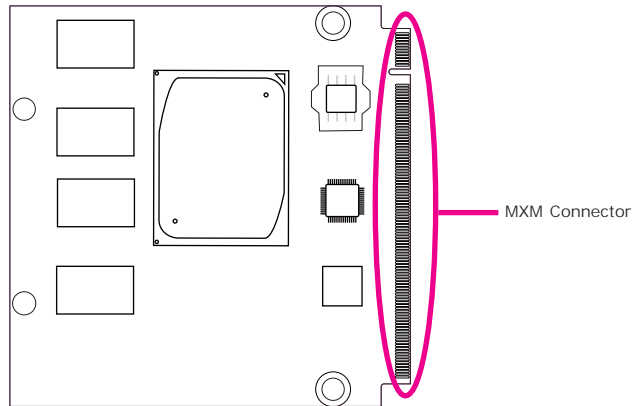
Top View of the Heat Sink



Bottom View of the Heat Sink

- "1" and "2" denote the locations of the thermal pads designed to contact the corresponding components that are on AL700.
- Remove the plastic covering from the thermal pads prior to mounting the heat sink onto AL700.

MXM Connector



The MXM connector is used to interface with the carrier board. Insert AL700 to the MXM connector on the carrier board. Refer to the following pages for the pin functions of this connector.

Refer to “Installing AL700 onto a Carrier Board” section for more information.

Pin	Q7 R2.1 Signal	AL700 Signal	Pin	Q7 R2.1 Signal	AL700 Signal
1	GND	GND	2	GND	GND
3	GBE_MDI3-	GBE MDI3-	4	GBE_MDI2-	GBE MDI2-
5	GBE_MDI3+	GBE MDI3+	6	GBE_MDI2+	GBE MDI2+
7	GBE_LINK100#	GBE_LED_100-	8	GBE_LED_1000-	GBE_LED_1000-
9	GBE_MDI1-	GBE MDI1-	10	GBE_MDI0-	GBE MDI0-
11	GBE_MDI1+	GBE MDI1+	12	GBE_MDI0+	GBE MDI0+
13	GBE_LINK#	GBE_LED_LINK-	14	GBE_ACT#	GBE_LED_ACT-
15	GBE_CTREF	NC	16	SUS_S5#	EC_PM_SLP_S4-
17	WAKE#	WAKE-	18	SUS_S3#	EC_PM_SLP_S3-
19	GPIO0	GPIO0_C	20	PWRBTN#	CB_PWRBTN-
21	SLP_BTN# / GPII1	SLP_BTN-	22	LID_BTN# / GPII0	LID_BTN-
23	GND	GND	24	GND	GND
25	KEY	KEY	26	KEY	KEY
27	GND	GND	28	PWGIN	CB_PWRBROK_C
29	BATLOW# / GPII2	GPIO2_C	30	RSTBTN#	SYS_RST-
31	SATA0_TX+	SATA_TX0P	32	SATA1_TX+	SATA_TX1P
33	SATA0_TX-	SATA_TX0N	34	SATA1_TX-	SATA_TX1N
35	SATA0_RX+	SATA_RX0P	36	SATA1_RX+	SATA_RX1P
37	SATA0_RX-	SATA_RX0N	38	SATA1_RX-	SATA_RX1N
39	GND	GND	40	GND	GND
41	BIOS_DISABLE# / BOOT_ALT#	BIOS_DIS0-	42	SDIO_CLK#	SDIO_CLK
43	SDIO_CD#	SDIO_CD-	44	RSVD	SDIO_LED
45	SDIO_CMD	SDIO_CMD	46	SDIO_WP	SDIO_WP
47	SDIO_PWR#	SDIO_PWR	48	SDIO_DAT1	SDIO_D1
49	SDIO_DAT0	SDIO_D0	50	SDIO_DAT3	SDIO_D3
51	SDIO_DAT2	SDIO_D2	52	RSVD	NC
53	RSVD	NC	54	RSVD	NC
55	RSVD	NC	56	USB_OTG_PEN	USB_OTG_PEN
57	GND	GND	58	GND	GND
59	HDA_SYNC / I2S_WS	HDA_SYNC_3V3	60	SMB_CLK / GP1_I2C_CLK	SMBCK_BT B
61	HDA_RST# / I2S_RST#	I2S_HDA_RST-	62	SMB_DAT / GP1_I2C_DAT	SMBDAT_BT B
63	HDA_BITCLK / I2S_CLK	HDA_BITCLK_3V3	64	SMB_ALERT#	SMB_ALERT- EC_BT B
65	HDA_SDI / I2S_SDI	HDA_SDI0_3V3	66	GP0_I2C_CLK	I2C_SCL1
67	HDA_SDO / I2S_SDO	HDA_SDO_3V3	68	GP0_I2C_DAT	I2C_SDA1
69	THRM#	THRM-	70	WDTRIG#	WDTRIG# C
71	THRMTRIP#	THRMTRIP-	72	WDOUT	WDOUT_C
73	GND	GND	74	GND	GND
75	USB_P7- / USB_SSTX0-	USB3_TXP0N (option USB_P7-)	76	USB_P6- / USB_SSRX0-	USB3_RXP0N (option USB_P6-)
77	USB_P7+ / USB_SSTX0+	USB3_TXP0P (option USB_P7+)	78	USB_P6+ / USB_SSRX0+	USB3_RXP0P (option USB_P6+)
79	USB_6_7_OC#	USB67_OC-	80	USB_4_5_OC#	USB45_OC-
81	USB_P5- / USB_SSTX2-	USB3_TXP2N (option USB_P5-)	82	USB_P4- / USB_SSRX2-	USB3_RXP2N (option USB_P4-)
83	USB_P5+ / USB_SSTX2+	USB3_TXP2P (option USB_P5+)	84	USB_P4+ / USB_SSRX2+	USB3_RXP2P (option USB_P4+)
85	USB_2_3_OC#	USB23_OC-	86	USB_0_1_OC#	USB01_OC-
87	USB_P3-	USB2_DN3	88	USB_P2-	USB2_DN2
89	USB_P3+	USB2_DP3	90	USB_P2+	USB2_DP2
91	USB_VBUS	USB_VBUS_SUS_C	92	USB_ID	USB_OTG_ID_3V3
93	USB_P1-	USB2_DN0	94	USB_P0-	USB2_DN1
95	USB_P1+	USB2_DP0	96	USB_P0+	USB2_DP1
97	GND	GND	98	GND	GND
99	eDP0_TX0+ / LVDS_A0+	LVDSA_0+ R (option eDP0_TX0+)	100	eDP1_TX0+ / LVDS_B0+	LVDS_B0+ R (option eDP1_TX0+)
101	eDP0_TX0- / LVDS_A0-	LVDSA_0- R (option eDP0_TX0-)	102	eDP1_TX0- / LVDS_B0-	LVDS_B0- R (option eDP1_TX0-)
103	eDP0_TX1+ / LVDS_A1+	LVDSA_1+ R (option eDP0_TX1+)	104	eDP1_TX1+ / LVDS_B1+	LVDS_B1+ R (option eDP1_TX1+)
105	eDP0_TX1- / LVDS_A1-	LVDSA_1- R (option eDP0_TX1-)	106	eDP1_TX1- / LVDS_B1-	LVDS_B1- R (option eDP1_TX1-)
107	eDP0_TX2+ / LVDS_A2+	LVDSA_2+ R (option eDP0_TX2+)	108	eDP1_TX2+ / LVDS_B2+	LVDS_B2+ R (option eDP1_TX2+)
109	eDP0_TX2- / LVDS_A2-	LVDSA_2- R (option eDP0_TX2-)	110	eDP1_TX2- / LVDS_B2-	LVDS_B2- R (option eDP1_TX2-)
111	LVDS_PPEN	LVDS_VDD_EN_R	112	LVDS_BLEN	LVDS_BKLT_EN_R
113	eDP0_TX3+ / LVDS_A3+	LVDSA_3+ R (option eDP0_TX3+)	114	eDP1_TX3+ / LVDS_B3+	LVDS_B3+ R (option eDP1_TX3+)
115	eDP0_TX3- / LVDS_A3-	LVDSA_3- R (option eDP0_TX3-)	116	eDP1_TX3- / LVDS_B3-	LVDS_B3- R (option eDP1_TX3-)

Pin	Q7 R2.1 Signal	AL700 Signal	Pin	Q7 R2.1 Signal	AL700 Signal
117	GND	GND	118	GND	GND
119	eDP0_AUX+ / LVDS_A_CLK+	LVDS_A_CLK+ (option eDP0_AUX+)	120	eDP1_AUX+ / LVDS_B_CLK+	LVDS_B_CLK+ R (option eDP1_AUX+)
121	eDP0_AUX- / LVDS_A_CLK-	LVDS_A_CLK- (option eDP0_AUX-)	122	eDP1_AUX- / LVDS_B_CLK-	LVDS_B_CLK- R (option eDP1_AUX-)
123	LVDS_BKLT_CTRL / GP_PWM_OUT0	LVDS_BKLT_CTRL_R	124	GP_1-Wire_Bus / HDMI_CEC	GP_1-Wire_Bus
125	GP2_I2C_DAT / LVDS_DID_DAT	LVDS_DDC_DATA_R (option eDP1_DDC_DAT)	126	eDP0_HPD# / LVDS_BLC_DAT	eDP_HPD# C
127	GP2_I2C_CLK / LVDS_DID_CLK	LVDS_DDC_CLK_R (option eDP1_DDC_CLK)	128	eDP1_HPD# / LVDS_BLC_CLK	DDI1_HPD# C
129	CAN0_TX	NC	130	CAN0_RX	NC
131	DP_LANE3+ / TMD5_CLK+	DDIO_3P	132	USB_SSTX1-	USB3_P1_TXN_C
133	DP_LANE3- / TMD5_CLK-	DDIO_3N	134	USB_SSTX1+	USB3_P1_TXP_C
135	GND	GND	136	GND	GND
137	DP_LANE1+ / TMD5_LANE1+	DDIO_1P	138	DP_AUX+	DP0_AUX_C_P
139	DP_LANE1- / TMD5_LANE1-	DDIO_1N	140	DP_AUX-	DP0_AUX_C_N
141	GND	GND	142	GND	GND
143	DP_LANE2+ / TMD5_LANE0+	DDIO_2P	144	USB_SSRX1-	USB3_P1_RXN
145	DP_LANE2- / TMD5_LANE0-	DDIO_2N	146	USB_SSRX1+	USB3_P1_RXP
147	GND	GND	148	GND	GND
149	DP_LANE0+ / TMD5_LANE2+	DDIO_0P	150	HDMI_CTRL_DAT	DDIO_DDC_SDA_C
151	DP_LANE0- / TMD5_LANE2-	DDIO_0N	152	HDMI_CTRL_CLK	DDIO_DDC_SCL_C
153	HDMI_HPD#	DDIO_HDMI_HPD	154	DP_HPD#	DDIO_DP_HPD
155	PCIE_CLK_REF+	PCIE_CLK_REF+	156	PCIE_WAKE#	PCIE_WAKE2-
157	PCIE_CLK_REF-	PCIE_CLK_REF-	158	PCIE_RST#	CB_PLTRST- BUFF
159	GND	GND	160	GND	GND
161	PCIE3_TX+	PCIE_P3_TXP_C	162	PCIE3_RX+	PCIE_P3_RXP
163	PCIE3_TX-	PCIE_P3_TXN_C	164	PCIE3_RX-	PCIE_P3_RXN
165	GND	GND	166	GND	GND
167	PCIE2_TX+	PCIE_P2_TXP_C	168	PCIE2_RX+	PCIE_P2_RXP
169	PCIE2_TX-	PCIE_P2_TXN_C	170	PCIE2_RX-	PCIE_P2_RXN
171	UART0_TX	EC_SOUT1	172	UART0_RTS#	EC_RTS1#
173	PCIE1_TX+	PCIE_P1_TXP_C	174	PCIE1_RX+	PCIE_P1_RXP
175	PCIE1_TX-	PCIE_P1_TXN_C	176	PCIE1_RX-	PCIE_P1_RXN
177	UART0_RX	EC_SIN1	178	UART0_CTS#	EC_CTS1#
179	PCIE0_TX+	PCIE_P0_TXP_C	180	PCIE0_RX+	PCIE_P0_RXP
181	PCIE0_TX-	PCIE_P0_TXN_C	182	PCIE0_RX-	PCIE_P0_RXN
183	GND	GND	184	GND	GND
185	LPC_AD0 / GPIO0	LPC_AD0	186	LPC_AD1 / GPIO1	LPC_AD1
187	LPC_AD2 / GPIO2	LPC_AD2	188	LPC_AD3 / GPIO3	LPC_AD3
189	LPC_CLK / GPIO4	CLK1_25M_CB	190	LPC_FRAME# / GPIO5	LPC_FRAME-
191	SERIRQ / GPIO6	LPC_SERIRQ	192	LPC_LDRQ# / GPIO7	NC
193	VCC_RTC	V_3P0_BAT	194	SPKR / GP_PWM_OUT2	HDA_SPKR_3V3
195	FAN_TACHOIN / GP_TIMER_IN	SYSFAN	196	FAN_PWMOUT / GP_PWM_OUT1	PWMOUT
197	GND	GND	198	GND	GND
199	SPI_MOSI	SPI_MOSI_D0_3VSB	200	SPI_CS0#	SPI_CS0_CB
201	SPI_MISO	SPI_MISO_D1_3VSB	202	SPI_CS1#	NC
203	SPI_SCK	SPI_CLK_3VSB	204	MFG_NC4	NC
205	VCC_5V_SB	5VSB_P	206	VCC_5V_SB	VCC_5V_SB
207	MFG_NC0	NC	208	MFG_NC2	NC
209	MFG_NC1	NC	210	MFG_NC3	NC
211	NC	NC	212	NC	NC
213	NC	NC	214	NC	NC
215	NC	NC	216	NC	NC
217	NC	NC	218	NC	NC
219	VCC	CB_VIN	220	VCC	CB_VIN
221	VCC	CB_VIN	222	VCC	CB_VIN
223	VCC	CB_VIN	224	VCC	CB_VIN
225	VCC	CB_VIN	226	VCC	CB_VIN
227	VCC	CB_VIN	228	VCC	CB_VIN
229	VCC	CB_VIN	230	VCC	CB_VIN

MXM Connector Signal Description

Pin Types
 I Input Pin
 O Output Pin
 I/O Bi-directional Input / output Pin
 OD Open drain
 OC Open Collector
 PP Push Pull
 NC Not Connected

PCI Express Interface Signals Descriptions

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
PCIE_P0_RXP	180	I PCIE	PCIE		Device - Connect AC Coupling cap 0.1uF Slot - Connect to PCIE Conn pin	PCI Express channel 0, Receive Input differential pair.
PCIE_P0_RXN	182			AC Coupling capacitor		
PCIE_P0_TXP_C	179	O PCIE	PCIE		Connect to PCIE device or slot	PCI Express channel 0, Transmit Output differential pair.
PCIE_P0_TXN_C	181			AC Coupling capacitor		
PCIE_P1_RXP	174	I PCIE	PCIE		Device - Connect AC Coupling cap 0.1uF Slot - Connect to PCIE Conn pin	PCI Express channel 1, Receive Input differential pair.
PCIE_P1_RXN	176					
PCIE_P1_TXP_C	173	O PCIE	PCIE		Connect to PCIE device or slot	PCI Express channel 1, Transmit Output differential pair.
PCIE_P1_TXN_C	175			AC Coupling capacitor		
PCIE_P2_RXP	168	I PCIE	PCIE		Device - Connect AC Coupling cap 0.1uF Slot - Connect to PCIE Conn pin	PCI Express channel 2, Receive Input differential pair.
PCIE_P2_RXN	170					
PCIE_P2_TXP_C	167	O PCIE	PCIE		Connect to PCIE device or slot	PCI Express channel 2, Transmit Output differential pair.
PCIE_P2_TXN_C	169			AC Coupling capacitor		
PCIE_P3_RXP	162	I PCIE	PCIE		Device - Connect AC Coupling cap 0.1uF (This Port is BOM Option with On board LAN) Slot - Connect to PCIE Conn pin	PCI Express channel 3, Receive Input differential pair.(This Port is BOM Option with On board LAN)
PCIE_P3_RXN	164					
PCIE_P3_TXP_C	161	O PCIE	PCIE		Connect to PCIE device or slot (This Port is BOM Option with On board LAN)	PCI Express channel 3, Transmit Output differential pair.(This Port is BOM Option with On board LAN)
PCIE_P3_TXN_C	163			AC Coupling capacitor		
PCIE_CLK_REF+	155	O PCIE	PCIE		Connect to PCIE device, PCIE CLK Buffer or slot	PCI Express Reference Clock for Lanes 0 to 3.
PCIE_CLK_REF-	157					
PCIE_WAKE2-	156	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3V Suspend		PCI Express Wake Event: Sideband wake signal asserted by components requesting wakeup.
CB_PLTRST-_BUFF	158	O CMOS	3.3V/3.3V			Reset Signal for external devices.

UART Interface Signals

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
EC_SOUT1	171	O CMOS	3.3V/3.3V		Connect to EC	Serial Data Transmitter
EC_SIN1	177	I CMOS	3.3V/3.3V		Connect to EC	Serial Data Receiver
EC_CTS1#	178	I CMOS	3.3V/3.3V		Connect to EC	Handshake signal, ready to send data
EC_RTS1#	172	O CMOS	3.3V/3.3V		Connect to EC	Handshake signal, ready to receive data

Gigabit Ethernet Signals

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
GBE_MDIO+	12	I/O GB_LAN	GB_LAN		Connect to Magnetics Module MDIO+/-	Media Dependent Interface (MDI) differential pair 0. The MDI can operate in 1000, 100, and 10Mbit/sec modes. This signal pair is used for all modes.
GBE_MDIO-	10					
GBE_MDIO1+	11	I/O GB_LAN	GB_LAN		Connect to Magnetics Module MDIO1+/-	Media Dependent Interface (MDI) differential pair 1. The MDI can operate in 1000, 100, and 10Mbit/sec modes. This signal pair is used for all modes.
GBE_MDIO1-	9					
GBE_MDIO2+	6	I/O GB_LAN	GB_LAN		Connect to Magnetics Module MDIO2+/-	Media Dependent Interface (MDI) differential pair 2. The MDI can operate in 1000, 100, and 10Mbit/sec modes. This signal pair is used for all modes.
GBE_MDIO2-	4					
GBE_MDIO3+	5	I/O GB_LAN	GB_LAN		Connect to Magnetics Module MDIO3+/-	Media Dependent Interface (MDI) differential pair 3. The MDI can operate in 1000, 100, and 10Mbit/sec modes. This signal pair is used for all modes.
GBE_MDIO3-	3					
NC	15	REF		NC		Reference voltage for carrier board Ethernet channel 0 magnetics center tap. The reference voltage is determined by the requirements of the module's PHY and may be as low as 0V and as high as 3.3V. The reference voltage output should be current limited on the module. In a case in which the reference is shorted to ground, the current must be limited to 250mA or less.
GBE_LED_LINK-	13	O CMOS 3.3V PP	3.3V/3.3V			Ethernet controller 0 link indicator, active low.
GBE_LED_100-	7	O CMOS 3.3V PP	3.3V/3.3V			Ethernet controller 0 100Mbit/sec link indicator, active low.
GBE_LED_1000-	8	O CMOS 3.3V PP	3.3V/3.3V			Ethernet controller 0 1000Mbit/sec link indicator, active low.
GBE_LED_ACT-	14	O CMOS 3.3V PP	3.3V/3.3V			Ethernet controller 0 activity indicator, active low.

Serial ATA Interface Signals

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
SATA_RXOP	35	I SATA	SATA	AC Coupling capacitor	Connect to SATA0 Conn RX pin	Serial ATA channel 0, Receive Input differential pair.
SATA_RXON	37			AC Coupling capacitor		
SATA_TXOP	29	O SATA	SATA	AC Coupling capacitor	Connect to SATA0 Conn TX pin	Serial ATA channel 0, Transmit Output differential pair.
SATA_TXON	31			AC Coupling capacitor		
SATA_RX1P	36	I SATA	SATA	AC Coupling capacitor	Connect to SATA1 Conn RX pin	Serial ATA channel 1, Receive Input differential pair.
SATA_RX1N	38			AC Coupling capacitor		
SATA_TX1P	30	O SATA	SATA	AC Coupling capacitor	Connect to SATA1 Conn TX pin	Serial ATA channel 1, Transmit Output differential pair.
SATA_TX1N	32			AC Coupling capacitor		
SATA_ACT-	33	O OC 3.3V	3.3V/3.3V			Serial ATA Led. Open collector output pin driven during SATA command activity.

USB Interface Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
USB3_P1_RXP	146	I USB	USB		Connect 90 Ω @100MHz Common Choke in series and ESD suppressors to GND to USB connector	USB Superspeed receive signal differential pair
USB3_P1_RXN	144	I USB				USB Superspeed receive signal differential pair
USB3_P1_TXP_C	134	O USB	USB	AC Coupling capacitor	Connect 90 Ω @100MHz Common Choke in series and ESD suppressors to GND to USB connector	USB Superspeed transmit signal differential pair
USB3_P1_TXN_C	132	O USB		AC Coupling capacitor		USB Superspeed transmit signal differential pair
USB2_DP1	96	I/O USB	USB		Connect 90 Ω @100MHz Common Choke in series and ESD suppressors to GND to USB connector	Universal Serial Bus Port 0 differential pair.
USB2_DN1	94					
USB2_DP0	95	I/O USB	USB		Connect 90 Ω @100MHz Common Choke in series and ESD suppressors to GND to USB connector	Universal Serial Bus Port 1 differential pair. This port may be optionally used as USB client port.
USB2_DN0	93					
USB2_DP2	90	I/O USB	USB		Connect 90 Ω @100MHz Common Choke in series and ESD suppressors to GND to USB connector	Universal Serial Bus Port 2 differential pair.
USB2_DN2	88					
USB2_DP3	89	I/O USB	USB		Connect 90 Ω @100MHz Common Choke in series and ESD suppressors to GND to USB connector	Universal Serial Bus Port 3 differential pair.
USB2_DN3	87					
USB3_RXP2P (option USB_P4+)	84	I/O USB	USB		Connect 90 Ω @100MHz Common Choke in series and ESD suppressors to GND to USB connector	Universal Serial Bus Port 4 differential pair. Multiplexed with receive signal differential pairs for the Superspeed USB data path.
USB3_RXP2N (option USB_P4-)	82	I USB				
USB3_TXP2P (option USB_P5+)	83	I/O USB	USB	AC Coupling capacitor	Connect 90 Ω @100MHz Common Choke in series and ESD suppressors to GND to USB connector	Universal Serial Bus Port 5 differential pair. Multiplexed with transmit signal differential pairs for the Superspeed USB data path.
USB3_TXP2N (option USB_P5-)	81	O USB		AC Coupling capacitor		
USB3_RXPOP (option USB_P6+)	78	I/O USB	USB			Universal Serial Bus Port 6 differential pair. Multiplexed with receive signal differential pairs for the Superspeed USB data path.
USB3_RXPON (option USB_P6-)	76	I USB			Connect Common Choke in series and ESD suppressors to GND to USB connector (This Port is BOM Option with USB_P6 / USB_P7)	
USB3_TXPOP (option USB_P7+)	77	I/O USB	USB	AC Coupling capacitor		Universal Serial Bus Port 7 differential pair. Multiplexed with transmit signal differential pairs for the Superspeed USB data path.
USB3_TXPON (option USB_P7-)	75	O USB		AC Coupling capacitor		
USB01_OC-	86	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3V Suspend	Connect to Overcurrent of USB Power Switch	Over current detect input 1. This pin is used to monitor the USB power over current of the USB Ports 0 and 1.
USB23_OC-	85	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3V Suspend	Connect to Overcurrent of USB Power Switch	Over current detect input 2. This pin is used to monitor the USB power over current of the USB Ports 2 and 3.
USB45_OC-	80	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3V Suspend	Connect to Overcurrent of USB Power Switch	Over current detect input 3. This pin is used to monitor the USB power over current of the USB Ports 4 and 5.
USB67_OC-	79	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3V Suspend	Connect to Overcurrent of USB Power Switch	Over current detect input 4. This pin is used to monitor the USB power over current of the USB Ports 6 and 7.
USB_OTG_ID_3V3	92	I CMOS	3.3V Suspend/3.3V			USB ID pin. Configures the mode of the USB Port 1. If the signal is detected as being 'high active' the BIOS will automatically configure USB Port 1 as USB Client and enable USB Client support. This signal should be driven as OC signal by external circuitry.
USB_VBUS_SUS_C	91	I CMOS	CMOS 5.0V			USB VBUS pin, 5V tolerant VBUS resistance has to be placed on the module VBUS capacitance has to be placed on the carrier board
USB_OTG_PEN	56	O CMOS	CMOS 3.3V			USB Power enable pin for USB Port 1 Enables the Power for the USB-OTG port on the carrier board.

SDIO Interface Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
SDIO_CD-	43	I/O CMOS	3.3V/3.3V		Connect to SD Card	SDIO Card Detect. This signal indicates when a SDIO/MMC card is present.
SDIO_CLK	42	O CMOS	3.3V/3.3V		Connect to SD Card	SDIO Clock. With each cycle of this signal a one-bit transfer on the command and each data line occurs. This signal has maximum frequency of 48 MHz.
SDIO_CMD	45	I/O OD/PP CMOS	3.3V/3.3V		Connect to SD Card	SDIO Command/Response. This signal is used for card initialization and for command transfers. During initialization mode this signal is open drain. During command transfer this signal is in push-pull mode.
SDIO_WP	46	I/O CMOS	3.3V/3.3V		Connect to SD Card	SDIO Write Protect. This signal denotes the state of the write-protect tab on SD cards.
SDIO_PWR	47	O CMOS	3.3V/3.3V			SDIO Power Enable. This signal is used to enable the power being supplied to a SD/MMC card device.
SDIO_D1	48	I/O PP CMOS	3.3V/3.3V		Connect to SD Card	SDIO Data lines. These signals operate in push-pull mode
SDIO_D0	49	I/O PP CMOS	3.3V/3.3V		Connect to SD Card	SDIO Data lines. These signals operate in push-pull mode
SDIO_D3	50	I/O PP CMOS	3.3V/3.3V		Connect to SD Card	SDIO Data lines. These signals operate in push-pull mode
SDIO_D2	51	I/O PP CMOS	3.3V/3.3V		Connect to SD Card	SDIO Data lines. These signals operate in push-pull mode

High Definition Audio Signals/AC'97						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
3V3_HDA_RST-	61	O CMOS	3.3V/3.3V		Connect to CODEC	HD Audio/AC'97 Codec Reset. Multiplexed with I2S Codec Reset.
HDA_SYNC_3V3	59	O CMOS	3.3V/3.3V		Connect to CODEC	Serial Bus Synchronization. Multiplexed with I2S Word Select from Codec.
HDA_BITCLK_3V3	63	O CMOS	3.3V/3.3V		Connect to CODEC	HD Audio/AC'97 24 MHz Serial Bit Clock from Codec. Multiplexed with I2S Serial Data Clock from Codec.
HDA_SDO_3V3	67	O CMOS	3.3V/3.3V		Connect to CODEC	HD Audio/AC'97 Serial Data Output to Codec. Multiplexed with I2S Serial Data Output from Codec.
HDA_SDI0_3V3	65	I CMOS	3.3V/3.3V		Connect to CODEC	HD Audio/AC'97 Serial Data Input to Codec. Multiplexed with I2S Serial Data Input from Codec.

LVDS Flat Panel Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
LVDS_VDD_EN_R	111	O CMOS	3.3V/3.3V		Connect to enable control of LVDS panel power circuit	Controls panel power enable.
LVDS_BKLT_EN_R	112	O CMOS	3.3V/3.3V		Connect to enable control of LVDS panel backlight power circuit.	Controls panel Backlight enable.
LVDS_BKLT_CTRL_R	123	O CMOS	3.3V/3.3V		Connect to brightness control of LVDS panel backlight power circuit.	Primary functionality is to control the panel backlight brightness via pulse width modulation (PWM). When not in use for this primary purpose it can be used as General Purpose PWM Output.
LVDSA_0+_R (option eDP0_TX0+)	99	O LVDS	LVDS	eDP AC Coupling capacitor	Connect to LVDS connector	LVDS primary channel differential pair 0. Display Port primary channel differential pair 0.
LVDSA_0-_R (option eDP0_TX0-)	101			eDP AC Coupling capacitor		
LVDSA_1+_R (option eDP0_TX1+)	103	O LVDS	LVDS	eDP AC Coupling capacitor	Connect to LVDS connector	LVDS primary channel differential pair 1. Display Port primary channel differential pair 1.
LVDSA_1-_R (option eDP0_TX1-)	105			eDP AC Coupling capacitor		
LVDSA_2+_R (option eDP0_TX2+)	107	O LVDS	LVDS	eDP AC Coupling capacitor	Connect to LVDS connector	LVDS primary channel differential pair 2. Display Port primary channel differential pair 2.
LVDSA_2-_R (option eDP0_TX2-)	109			eDP AC Coupling capacitor		
LVDSA_3+_R (option eDP0_TX3+)	113	O LVDS	LVDS	eDP AC Coupling capacitor	Connect to LVDS connector	LVDS primary channel differential pair 3. Display Port primary channel differential pair 3.
LVDSA_3-_R (option eDP0_TX3-)	115			eDP AC Coupling capacitor		
LVDS_A_CLK+ (option eDP0_AUX+)	119	O LVDS	LVDS	eDP AC Coupling capacitor	Connect to LVDS connector	LVDS primary channel differential pair clock lines. Display Port primary auxiliary channel.
LVDS_A_CLK- (option eDP0_AUX-)	121			eDP AC Coupling capacitor		
LVDS_B0+_R (option eDP1_TX0+)	100	O LVDS	LVDS	eDP AC Coupling capacitor	Connect to LVDS connector	LVDS secondary channel differential pair 0. Display Port secondary channel differential pair 0.
LVDS_B0-_R (option eDP1_TX0-)	102			eDP AC Coupling capacitor		
LVDS_B1+_R (option eDP1_TX1+)	104	O LVDS	LVDS	eDP AC Coupling capacitor	Connect to LVDS connector	LVDS secondary channel differential pair 1. Display Port secondary channel differential pair 1.
LVDS_B1-_R (option eDP1_TX1-)	106			eDP AC Coupling capacitor		
LVDS_B2+_R (option eDP1_TX2+)	108	O LVDS	LVDS	eDP AC Coupling capacitor	Connect to LVDS connector	LVDS secondary channel differential pair 2. Display Port secondary channel differential pair 2.
LVDS_B2-_R (option eDP1_TX2-)	110			eDP AC Coupling capacitor		
LVDS_B3+_R (option eDP1_TX3+)	114	O LVDS	LVDS	eDP AC Coupling capacitor	Connect to LVDS connector	LVDS secondary channel differential pair 3. Display Port secondary channel differential pair 3.
LVDS_BKLT_EN_R	112			eDP AC Coupling capacitor		
LVDS_B_CLK+_R (option eDP1_AUX+)	120	O LVDS	LVDS		Connect to LVDS connector	LVDS secondary channel differential pair clock lines. Display Port secondary auxiliary channel.
LVDS_B_CLK-_R (option eDP1_AUX-)	122					
LVDS_DDC_CLK_R (option eDP1_DDC_CLK)	127	I/O OD CMOS	3.3V/3.3V	PU 2.2K to 3.3V	Connect to DDC clock of LVDS panel	Primary functionality is DisplayID DDC clock line used for LVDS flat panel detection. If primary functionality is not used it can be as General Purpose I ² C bus clock line.
LVDS_DDC_DATA_R (option eDP1_DDC_DAT)	125	I/O OD CMOS	3.3V/3.3V	PU 2.2K to 3.3V	Connect to DDC clock of LVDS panel	Primary functionality DisplayID DDC data line used for LVDS flat panel detection. If primary functionality is not used it can be as General Purpose I ² C bus data line.
DDI1_HPD#_C	128	I/O OD CMOS	3.3V/3.3V	NC		Control clock signal for external SSC clock chip. If the primary functionality is not used, it can be used as an embedded DisplayPort secondary Hotplug detection.
eDP_HPD#_C	126	I/O OD CMOS	3.3V/3.3V	NC		Control data signal for external SSC clock chip. If the primary functionality is not used, it can be used as an embedded DisplayPort primary Hotplug detection.
DisplayPort Interface Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
DDIO_3N	133	O PCIE	DP	AC Coupling capacitor		DisplayPort differential pair lines lane 3.
DDIO_3P	131					
DDIO_2N	145	O PCIE	DP	AC Coupling capacitor		DisplayPort differential pair lines lane 2.
DDIO_2P	143					
DDIO_1N	139	O PCIE	DP	AC Coupling capacitor		DisplayPort differential pair lines lane 1.
DDIO_1P	137					
DDIO_0N	151	O PCIE	DP	AC Coupling capacitor		DisplayPort differential pair lines lane 0.
DDIO_0P	149					
DPIO_AUX_C_N	140	I/O PCIE	DP	AC Coupling capacitor	Connect AC Coupling Capacitors 0.1uF to Device, PU 100K to 3.3V	Auxiliary channel used for link management and device control. Differential pair lines.
DPIO_AUX_C_P	138				Connect AC Coupling Capacitors 0.1uF to Device, PD 100K to GND	
DDIO_DP_HPD	154	I CMOS	3.3V/3.3V	PU 10K to 3.3V		Hot plug detection signal that serves as an interrupt request.
HDMI Interface Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
DDIO_3N	133	O TMDS	TMDS	AC coupled off Module	Connect AC Coupling Capacitors 0.1uF to Device	TMDS differential pair clock lines.
DDIO_3P	131				Connect AC Coupling Capacitors 0.1uF to Device	
DDIO_2N	145	O TMDS	TMDS	AC coupled off Module	Connect AC Coupling Capacitors 0.1uF to Device	TMDS differential pair lines lane 0.
DDIO_2P	143				Connect AC Coupling Capacitors 0.1uF to Device	
DDIO_1N	139	O TMDS	TMDS	AC coupled off Module	Connect AC Coupling Capacitors 0.1uF to Device	TMDS differential pair lines lane 1.
DDIO_1P	137				Connect AC Coupling Capacitors 0.1uF to Device	
DDIO_0N	151	O TMDS	TMDS	AC coupled off Module	Connect AC Coupling Capacitors 0.1uF to Device	TMDS differential pair lines lane 2.
DDIO_0P	149				Connect AC Coupling Capacitors 0.1uF to Device	
DDIO_DDC_SCL_C	152	I/O OD CMOS	3.3V/3.3V	PU 2.2K to 3.3V		DDC based control signal (clock) for HDMI device. Note: Level shifters must be implemented on the carrier board for this signal in order to be compliant with the HDMI Specification.
DDIO_DDC_SDA_C	150	I/O OD CMOS	3.3V/3.3V	PU 2.2K to 3.3V		DDC based control signal (data) for HDMI device. Note: Level shifters must be implemented on the carrier board for this signal in order to be compliant with the HDMI Specification.
DDIO_HDMI_HPD	153	I CMOS	3.3V/3.3V	PU 10K to 3.3V		Hot plug detection signal that serves as an interrupt request.

LPC Interface Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
LPC_AD[0..3]	185-188	I/O CMOS	3.3V/3.3V		Connect to LPC device	Multiplexed Command, Address and Data. General purpose input/output [0..3]
LPC_FRAME-	190	I/O CMOS	3.3V/3.3V		Connect to LPC device	LPC frame indicates the start of a new cycle or the termination of a broken cycle. General purpose input/output 5.
NC	192	I/O CMOS	3.3V/3.3V	NC		LPC DMA request. General purpose input/output 7.
CLK1_25M_CB	189	I/O CMOS	3.3V/3.3V		Connect to LPC device	LPC clock. General purpose input/output 4.
LPC_SERIRQ	191	I/O CMOS	3.3V/3.3V		Connect to LPC device	Serialized Interrupt. General purpose input/output 6.
SPI Interface Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
SPI_MOSI_DD_3VSB	199	O CMOS	3.3V/3.3V		Connect a series resistor to Carrier Board SPI Device SI pin	Master serial output/Slave serial input signal. SPI serial output data from Oseven module to the SPI device.
SPI_MISO_D1_3VSB	201	I CMOS	3.3V/3.3V		Connect a series resistor to Carrier Board SPI Device SO pin	Master serial input/Slave serial output signal. SPI serial input data from the SPI device to Oseven module.
SPI_CLK_3VSB	203	O CMOS	3.3V/3.3V		Connect a series resistor to Carrier Board SPI Device SCK pin	SPI clock output.
SPI_CS0_CB	200	O CMOS	3.3V/3.3V		Connect a series resistor to Carrier Board SPI Device CS# pin	SPI chip select 0 output.
NC	202	O CMOS	3.3V/3.3V	NC		SPI Chip Select 1 signal is used as the second chip select when two devices are used. Do not use when only one SPI device is used.
CAN Bus Interface Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
NC	129	O CMOS	3.3V/3.3V	NC		CAN (Controller Area Network) TX output for CAN Bus channel 0. In order to connect a CAN controller device to the Oseven module's CAN bus it is necessary to add transceiver hardware to the carrier board.
NC	130	I CMOS	3.3V/3.3V	NC		RX input for CAN Bus channel 0. In order to connect a CAN controller device to the Oseven module's CAN bus it is necessary to add transceiver hardware to the carrier board.
Power Control Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
CB_PWR0K_C	26	I CMOS	CMOS/5V	PU 1K to 5V		High active input for the Oseven® module indicates that all power rails located on the carrier board are ready for use.
CB_PWRBTN-	20	I CMOS	3.3V Standby	PU 10K to 3.3V Suspend		Power Button: Low active power button input. This signal is triggered on the falling edge.
Power Management Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
SYS_RST-	28	I CMOS	3.3V/3.3V	PU 10K to 3.3V Suspend		Reset button input. This input may be driven active low by an external circuitry to reset the Oseven module.
GPIO2_C	27	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3V Suspend		Battery low input. This signal may be driven active low by external circuitry to signal that the system battery is low or may be used to signal some other external battery management event.
WAKE-	17	I CMOS	3.3V Suspend/3.3V	PU 10K to 3.3V Suspend		External system wake event. This may be driven active low by external circuitry to signal an external wake-up event.
EC_PM_SLP_S3-	18	O CMOS	3.3V Suspend/3.3V			S3 State: This signal shuts off power to all runtime system components that are not maintained during S3 (Suspend to Ram), S4 or S5 states. The signal SUS_S3# is necessary in order to support the optional S3 cold power state.
EC_PM_SLP_S4-	16	O CMOS	3.3V Suspend/3.3V			S5 State: This signal indicates S4 or S5 (Soft Off) state.
SLP_BTN-	21	I CMOS	3.3V Suspend/3.3V			Sleep button. Low active signal used by the ACPI operating system to transition the system into sleep state or to wake it up again. This signal is triggered on falling edge.
LID_BTN-	22	I CMOS	3.3V Suspend/3.3V			LID button. Low active signal used by the ACPI operating system to detect a LID switch and to bring system into sleep state or to wake it up again. Open/Close state may be software configurable.
Miscellaneous Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
WDTRIG#_C	70	I CMOS	3.3V/3.3V	PU 10K to 3.3V		Watchdog trigger signal. This signal restarts the watchdog timer of the Oseven module on the falling edge of a low active pulse.
WDOUT_C	72	O CMOS	3.3V/3.3V	PU 10K to 3.3V		Watchdog event indicator. High active output used for signaling a missing watchdog trigger. Will be deasserted by software, system reset or a system power down.
I2C_SCL1	66	I/O OD CMOS	3.3V/3.3V	PU 2.2K to 3.3V		General Purpose I2C bus #0 clock line.
I2C_SDA1	68	I/O OD CMOS	3.3V/3.3V	PU 2.2K to 3.3V		General Purpose I2C bus #0 data line.
SMBCK_BT8	60	I/O OD CMOS	3.3V Suspend/3.3V	PU 2.2K to 3.3V Suspend		Clock line of System Management Bus. Multiplexed with General Purpose I2C bus #1 clock line.
SMBDAT_BT8	62	I/O OD CMOS	3.3V Suspend/3.3V	PU 2.2K to 3.3V Suspend		Data line of System Management Bus. Multiplexed with General Purpose I2C bus #1 data line.
SMB_ALERT-EC_BT8	64	I/O OD CMOS	3.3V Suspend/3.3V	PU 10K to 3.3V Suspend		System Management Bus Alert input. This signal may be driven low by SMB devices to signal an event on the SM Bus.
HDA_SPKR_3V3	194	O CMOS	3.3V/3.3V			Primary functionality is output for audio enunciator, the "speaker" in PC AT systems. When not in use for this primary purpose it can be used as General Purpose PWM Output.
BIOS_DIS0-	41	I CMOS	3.3V/3.3V	PU 10K to 3.3V		Module BIOS disable input signal. Pull low to disable module's on-board BIOS. Allows off-module BIOS implementations. This signal can also be used to disable standard boot firmware flash device and enable an alternative boot firmware source, for example a boot loader.
RSVD	52,53,54,55	NC		NC		Do not connect
GP_1-Wire_Bus	124	I/O CMOS	3.3V/3.3V			General Purpose 1-Wire bus interface. Can be used for consumer electronics control bus (CEC) of HDMI
GP100_C	19	O CMOS	CMOS 3.3V			General Purpose Output 0
Manufacturing Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
NC	207	N.A	N.A	NC		This pin is reserved for manufacturing and debugging purposes. May be used as JTAG_TCK signal for boundary scan purposes during production or as a vendor specific control signal. When used as a vendor specific control signal the multiplexer must be controlled by the MFG_NC4 signal.
NC	209	N.A	N.A	NC		This pin is reserved for manufacturing and debugging purposes. May be used as JTAG_TDO signal for boundary scan purposes during production. May also be used, via a multiplexer, as a UART_TX signal to connect a simple UART for firmware and boot loader implementations. In this case the multiplexer must be controlled by the MFG_NC4 signal.
NC	208	N.A	N.A	NC		This pin is reserved for manufacturing and debugging purposes. May be used as JTAG_TDI signal for boundary scan purposes during production. May also be used, via a multiplexer, as a UART_RX signal to connect a simple UART for firmware and boot loader implementations. In this case the multiplexer must be controlled by the MFG_NC4 signal.
NC	210	N.A	N.A	NC		This pin is reserved for manufacturing and debugging purposes. May be used as JTAG_TMS signal for boundary scan purposes during production. May also be used, via a multiplexer, as vendor specific BOOT signal for firmware and boot loader implementations. In this case the multiplexer must be controlled by the MFG_NC4 signal.
NC	204	N.A	N.A	NC		This pin is reserved for manufacturing and debugging purposes. May be used as JTAG_TRST# signal for boundary scan purposes during production. May also be used as control signal for a multiplexer circuit on the module enabling secondary function for MFG_NC0,3 (JTAG / UART). When MFG_NC4 is high active it is being used for JTAG purposes. When MFG_NC4 is low active it is being used for UART purposes.

Thermal Management Signals						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
THRM-	69	I CMOS	3.3V/3.3V	PU 10K to 3.3V		Thermal Alarm active low signal generated by the external hardware to indicate an over temperature situation. This signal can be used to initiate thermal throttling.
THERMTRIP-	71	O CMOS	3.3V/3.3V	PU 10K to 3.3V		Thermal Trip indicates an overheating condition of the processor. If 'THERMTRIP#' goes active the system immediately transitions to the S5 State (Soft Off).
Fan Control Implementation						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
PWMOUT	196	O OC CMOS	3.3V/3.3V			Primary functionality is fan speed control. Uses the Pulse Width Modulation (PWM) technique to control the Fan's RPM based on the CPU's die temperature. When not in use for this primary purpose It can be used as General Purpose PWM Output.
SYSFAN	195	I CMOS	3.3V/3.3V			Primary functionality is fan tachometer input. When not in use for this primary purpose it can be used as General Purpose Timer Input.
Input Power Pins						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL700	Carrier Board	Description
CB_VIN	219-230	Power				Power Supply +5VDC $\pm 5\%$
VCC_5V_SB	205-206	Power				Standby Power Supply +5VDC $\pm 5\%$
V_3PO_BAT	193	Power				3 V backup cell input. VCC_RTC should be connected to a 3V backup cell for RTC operation and storage register non-volatility in the absence of system power. (VCC_RTC = 2.4 - 3.3 V).
GND	1-2, 23-25, 34, 39-40, 57-58, 73-74, 97-98, 117-118, 135-136, 141-142, 147-148, 159-160, 165-166, 183-184, 197-198	Power Ground				Power Ground.
NC	211-218	NC				NC

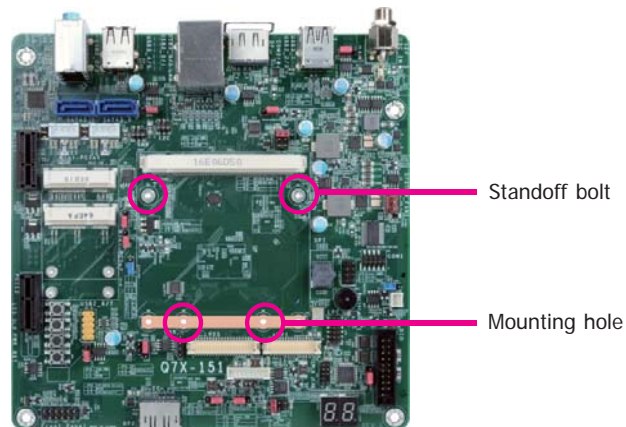
Installing AL700 onto a Carrier Board



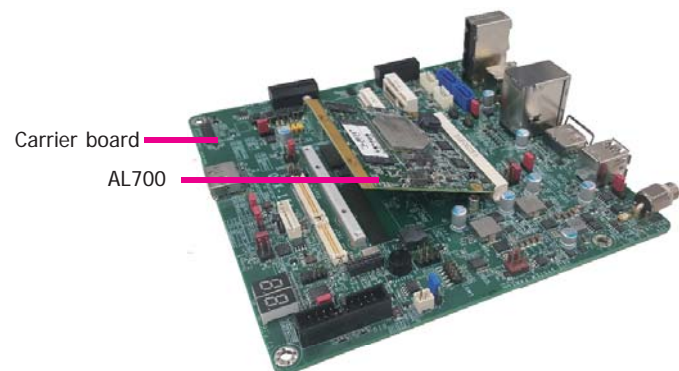
Important:

The carrier board used in this section is for reference purpose only and may not resemble your carrier board. These illustrations are mainly to guide you on how to install AL700 onto the carrier board of your choice.

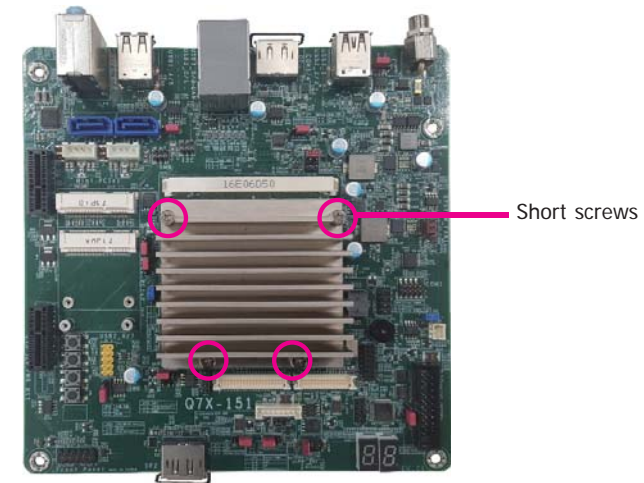
1. The photo below shows the locations of the mounting holes and the bolts already fixed in place.



2. Grasping AL700 by its edges, insert it into the carrier board, and you will hear a distinctive "click" indicating AL700 is correctly locked into position.



3. Press down AL700 and put on the heat sink on top of AL700 with its mounting holes and bolts aligned on the carrier board. Use the mounting screws to fix AL700 and heat sink in place.



Chapter 3 - BIOS Setup

Overview

The BIOS is a program that takes care of the basic level of communication between the CPU and peripherals. It contains codes for various advanced features found in this system board. The BIOS allows you to configure the system and save the configuration in a battery-backed CMOS so that the data retains even when the power is off. In general, the information stored in the CMOS RAM of the EEPROM will stay unchanged unless a configuration change has been made such as a hard drive replaced or a device added.

It is possible that the CMOS battery will fail causing CMOS data loss. If this happens, you need to install a new CMOS battery and reconfigure the BIOS settings.



Note:

The BIOS is constantly updated to improve the performance of the system board; therefore the BIOS screens in this chapter may not appear the same as the actual one. These screens are for reference purpose only.

Default Configuration

Most of the configuration settings are either predefined according to the Load Optimal Defaults settings which are stored in the BIOS or are automatically detected and configured without requiring any actions. There are a few settings that you may need to change depending on your system configuration.

Entering the BIOS Setup Utility

The BIOS Setup Utility can only be operated from the keyboard and all commands are keyboard commands. The commands are available at the right side of each setup screen.

The BIOS Setup Utility does not require an operating system to run. After you power up the system, the BIOS message appears on the screen and the memory count begins. After the memory test, the message "Press DEL to run setup" will appear on the screen. If the message disappears before you respond, restart the system or press the "Reset" button. You may also restart the system by pressing the <Ctrl> <Alt> and keys simultaneously.

Legends

KEYs	Function
Right and Left Arrows	Moves the highlight left or right to select a menu.
Up and Down Arrows	Moves the highlight up or down between submenus or fields.
<Enter>	Press <Enter> to enter the highlighted submenu
+ (plus key)	Scrolls forward through the values or options of the highlighted field.
- (minus key)	Scrolls backward through the values or options of the highlighted field.
<F1>	Displays general help
<F2>	Displays previous values
<F9>	Optimized defaults
<F10>	Saves and reset the setup program.
<Esc>	Exits to the BIOS setup utility

Scroll Bar

When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

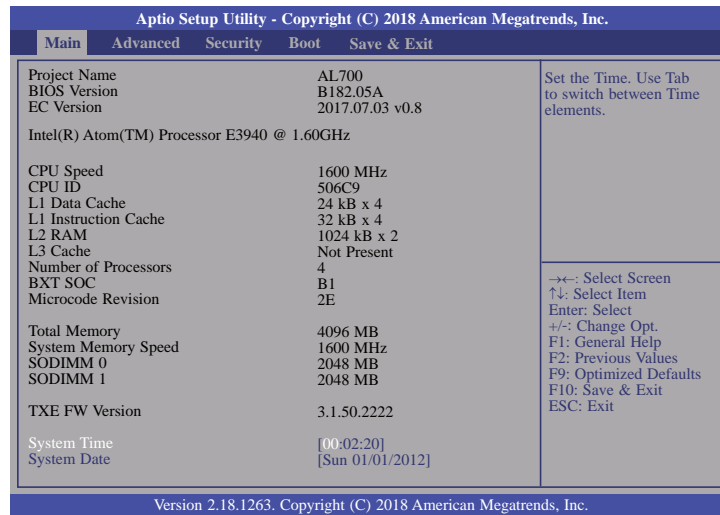
Submenu

When "►" appears on the left of a particular field, it indicates that a submenu which contains additional options are available for that field. To display the submenu, move the highlight to that field and press <Enter>.

AMI BIOS Setup Utility

Main

The Main menu is the first screen that you will see when you enter the BIOS Setup Utility.



System Time

The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

System Date

The date format is <day>, <month>, <date>, <year>. Day displays a day, from Sunday to Saturday. Month displays the month, from 01 to 12. Date displays the date, from 01 to 31. Year displays the year, from 2005 to 2099.

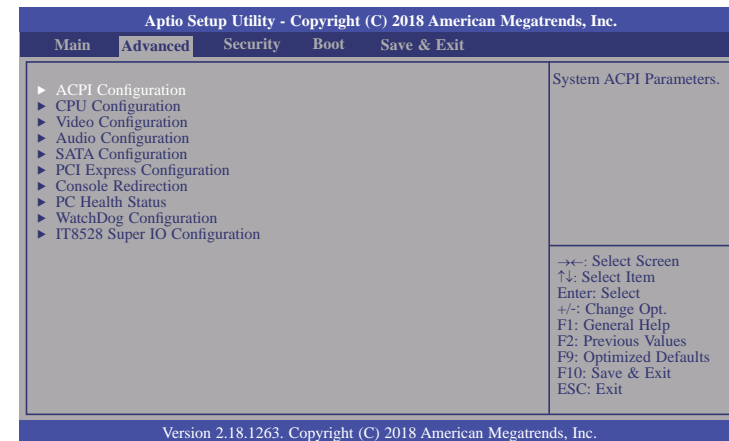
Advanced

The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.



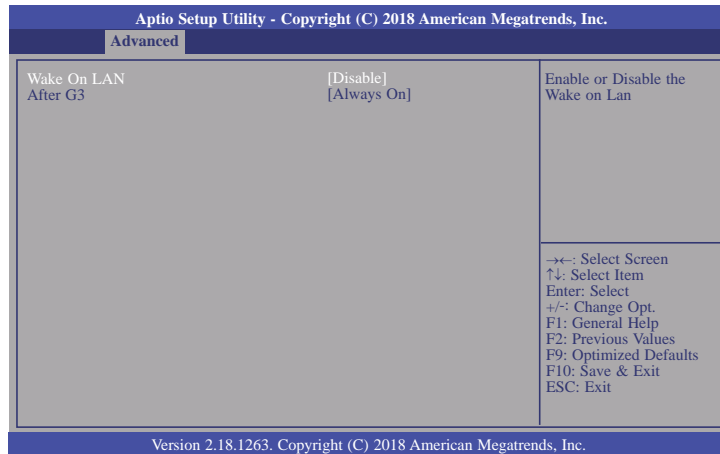
Important:

Setting incorrect field values may cause the system to malfunction.



ACPI Configuration

This section is used to configure ACPI settings.



Wake On LAN

Enable or Disable this field to use the LAN signal to wake up the system.

After G3

This field is to specify what state the system should be in when power is re-applied after a power failure (G3, the mechanical-off, state).

Always On The system is in working state.

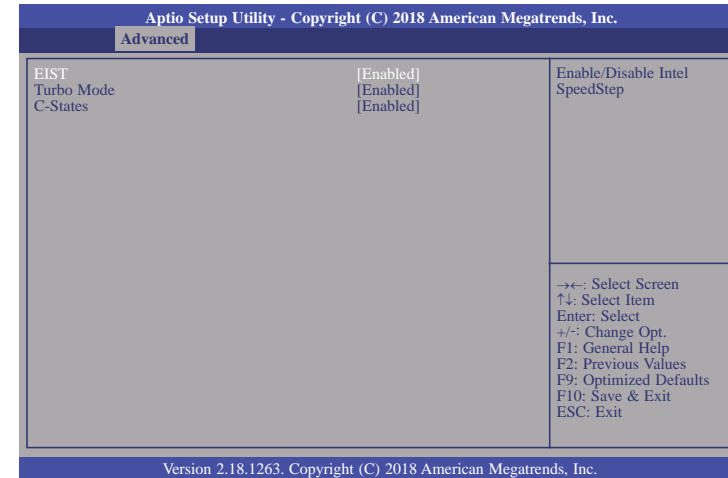
Always Off The system is in soft-off state, except for trickle current to devices such as the power button.

BGRT Logo

Enable or disable the display of an operating system logo or image during boot using the BGRT (Boot Graphics Resource Table) mechanism. This field only appears when Quiet Boot field of Boot menu is set to enabled.

CPU Configuration

This section is used to configure the CPU.



EIST

This field is used to enable or disable the Enhanced Intel SpeedStep® Technology, which helps optimize the balance between system's power consumption and performance. After it is enabled in the BIOS, you can enable the EIST feature using the operating system's power management.

Turbo Mode

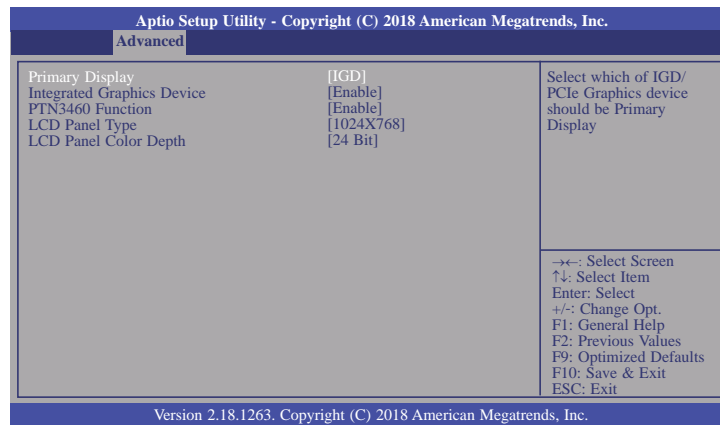
This field is used to enable or disable processor turbo mode (requires that EMTTM is enabled too), which allows the processor core to automatically run faster than the base frequency when the processor's power, temperature, and specification are within the limits of TDP.

C-States

Enable or disable CPU Power Management. It allows CPU to go to C-States when it's not 100% utilized.

Video Configuration

This section configures the video settings.



Primary Display

Select either IGD or PCIe Graphics device to be the primary display.

Integrated Graphics Device

Enable or disable the integrated graphics device (IGD). When enabled, the integrated graphics device is selected as the primary video adaptor.

PTN3460 Function

Enable or disable PTN3460 LCD features.

LCD Panel Type

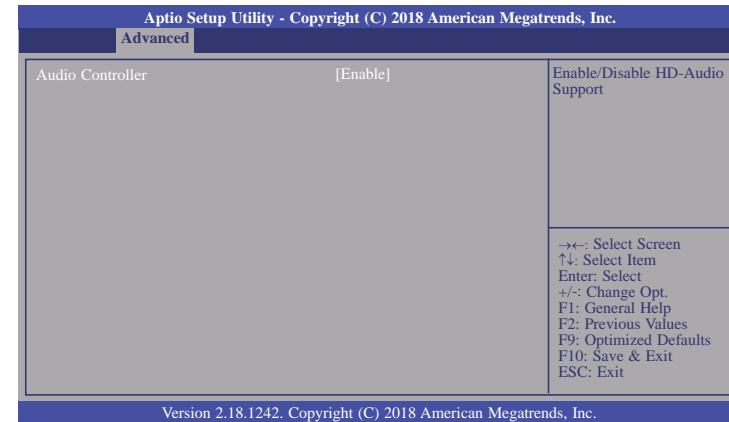
Select the type of LCD panel connected to the system's LCD connector: 800X480, 800X600, 1024X768, 1366X768, 1280x1024 or 1920x1080. Please check the specifications of your LCD monitor.

LCD Panel Color Depth

Select the LCD panel color depth: 18 Bit, 24 Bit, 36 Bit or 48 Bit.

Audio Configuration

This section configures the audio settings.



Audio Controller

Control the detection of the high-definition audio device.

Disable

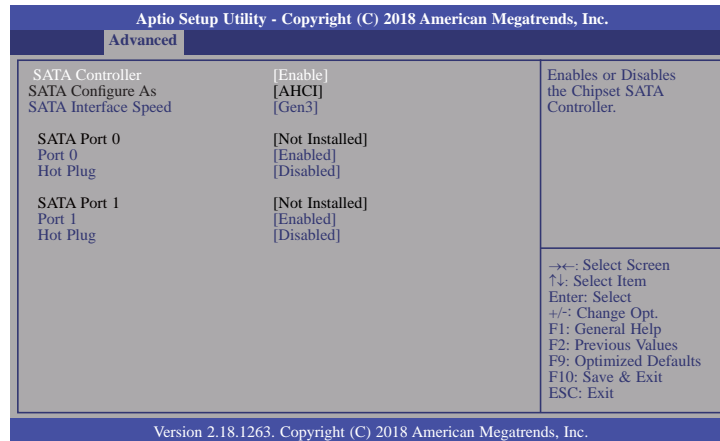
HD Audio will be disabled.

Enable

HD Audio will be enabled.

SATA Configuration

This section configures the SATA controller.



SATA Controller

This field is used to enable or disable the Serial ATA controller.

SATA Configure As

The mode selection determines how the SATA controller(s) operates.

AHCI Mode

This option allows the Serial ATA controller(s) to use AHCI (Advanced Host Controller Interface).

SATA Interface Speed

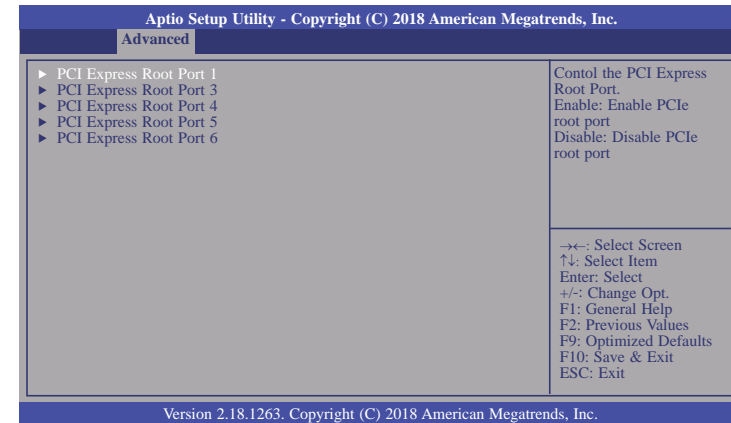
Select Serial ATA controller(s) speed from Gen1 (1.5 Gbit/s), Gen2 (3 Gbit/s), or Gen 3 (6 Gbit/s).

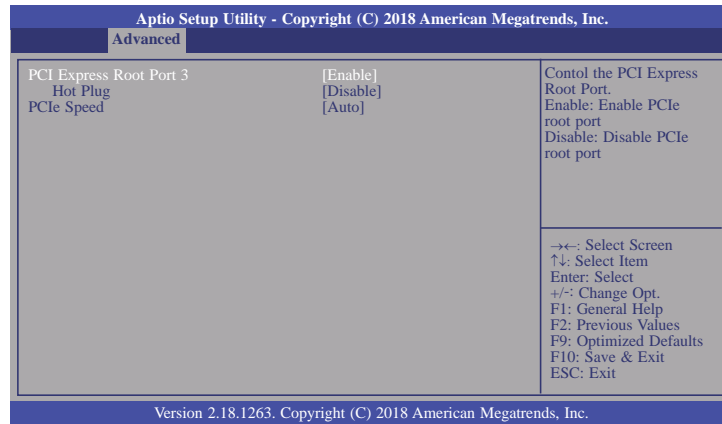
SATA Port 0 and 1/Hot Plug

Enable or disable the Serial ATA port and its hot plug function.

PCI Express Configuration

This section configures settings relevant to PCI Express devices.





PCI Express Root Port

This field is used to enable or disable the PCI express root port.

Hot Plug

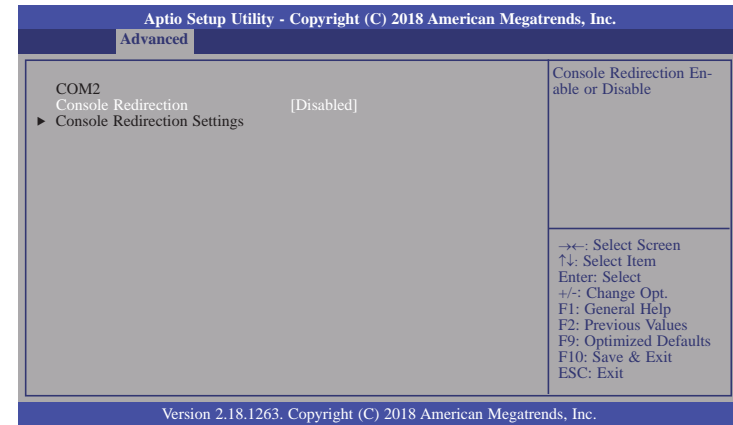
Enable or disable the hot plug function of the PCI Express root port.

PCIe Speed

Select the speed of the PCI Express root port: Auto, Gen1 or Gen2.

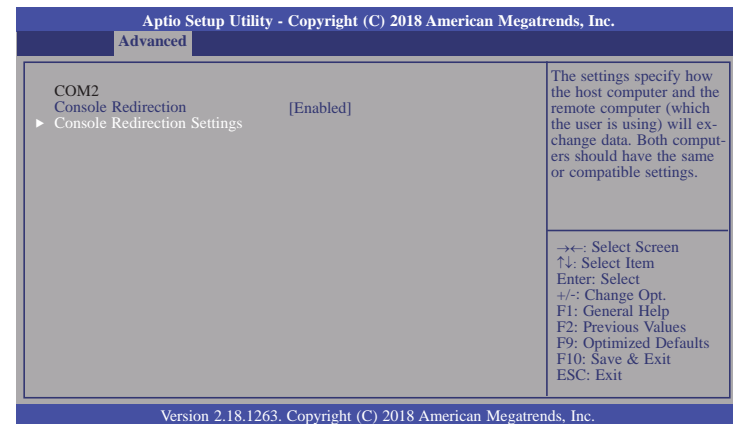
Console Redirection

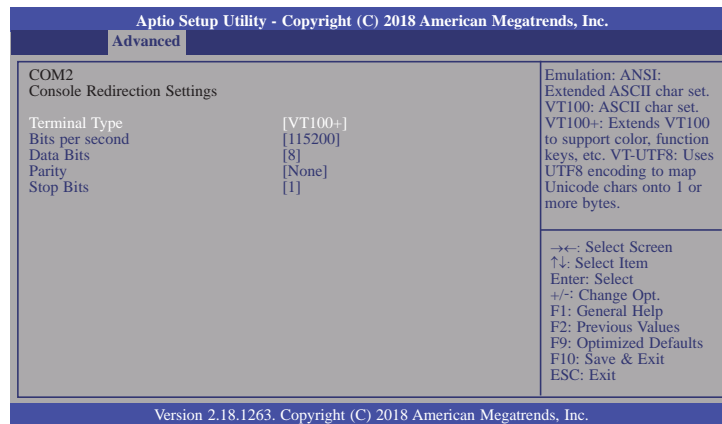
This section configures settings relevant to console redirection.



Console Redirection

This field is used to enable or disable the console redirection function. When console redirection is set to enabled, console redirection settings are available like below screen.





Terminal Type

Select terminal type: VT100, VT100+, VT-UTF8 or ANSI.

Bits per second

Select serial port transmission speed: 9600, 19200, 38400, 57600 or 115200.

Data Bits

Select data bits: 7 bits or 8 bits.

Parity

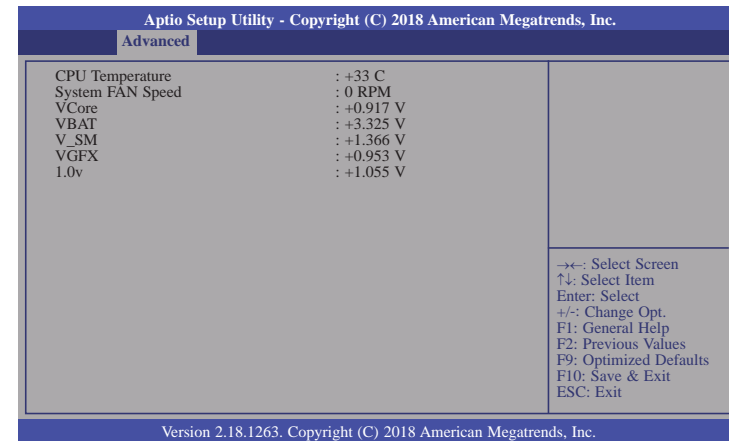
Select parity bits: none, even or odd.

Stop Bits

Select stop bits: 1 bit or 2 bits.

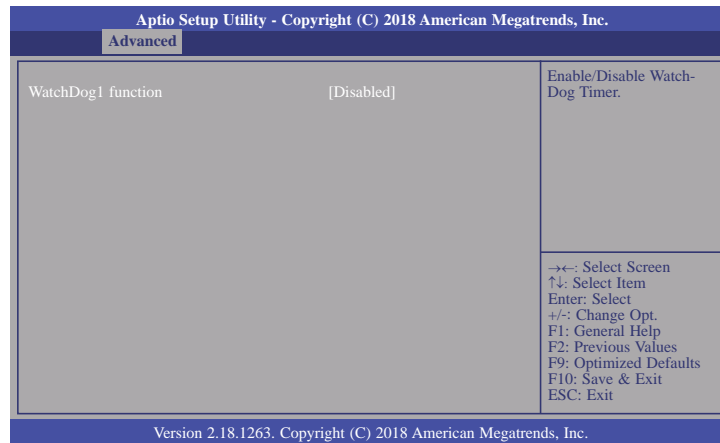
PC Health Status

This section displays the hardware health monitor.



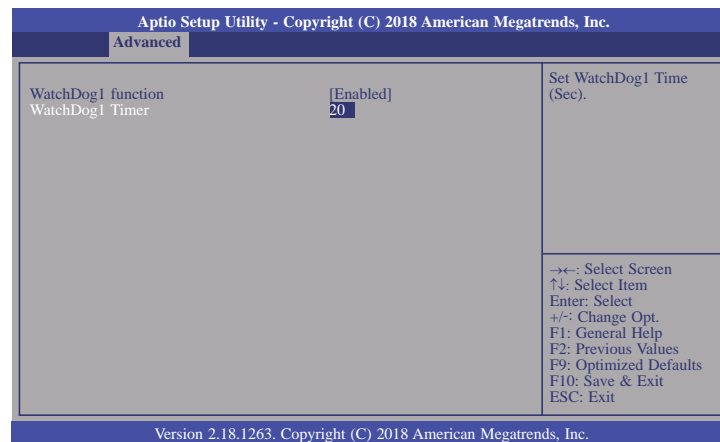
WatchDog Configuration

This section is used to configure WatchDog parameters.



WatchDog1 function

This field is used to enable or disable the Watchdog timer function. When enabled, WatchDog1 Timer is available for setting.

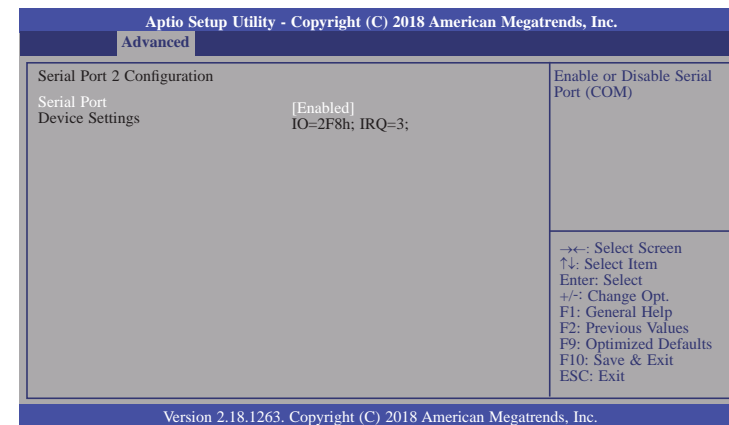
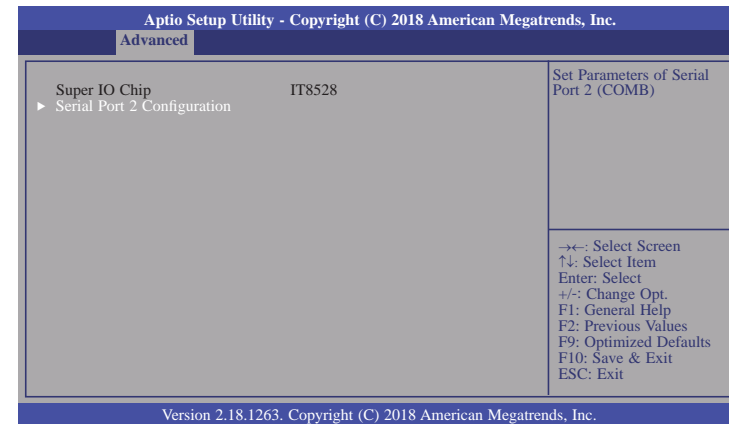


WatchDog1 Timer

This field is used to set WatchDog time in seconds.

IT8528 Super IO Configuration

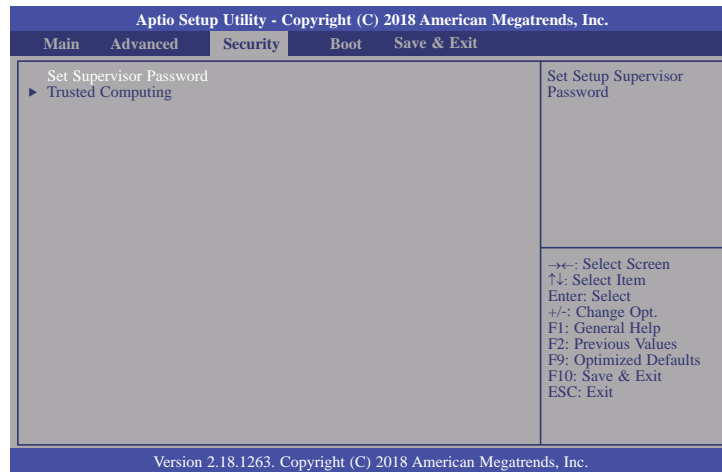
This section configures the system super I/O chip parameters.



Serial Port 2

This field is used to enable or disable the serial port (COM).

Security

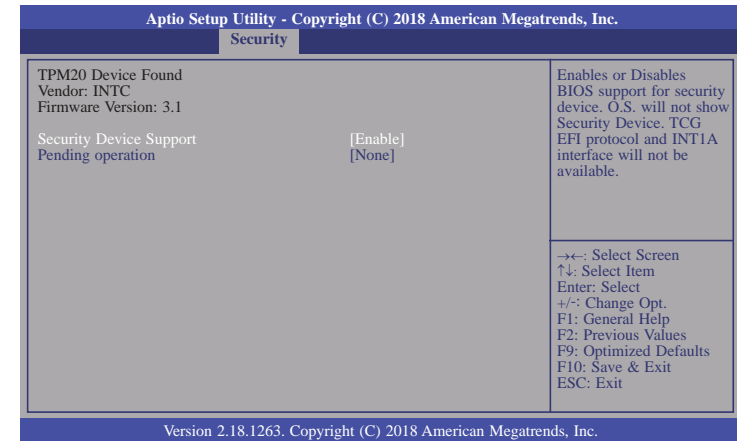


Set Supervisor Password

Set the supervisor password.

Trusted Computing

This section configures settings relevant to Trusted Computing innovations.



Security Device Support

Enables or Disables the BIOS support for the security device. O.S. will not show the security device. TCG EFI protocol and TNT1A interface will not be available.

Pending operation

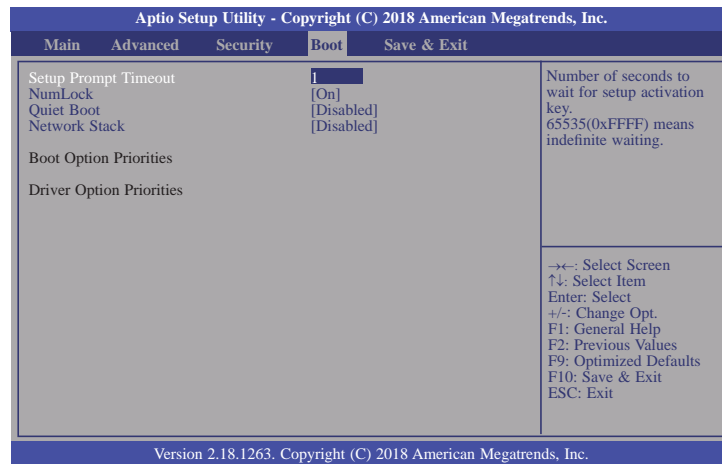
Schedule an operation for the security device.



Note:

Your computer will reboot during restarting in order to change the security device state.

Boot



Setup Prompt Timeout

Select the number of seconds to wait for the setup activation key. 65535 (0xFFFF) denotes indefinite waiting.

NumLock

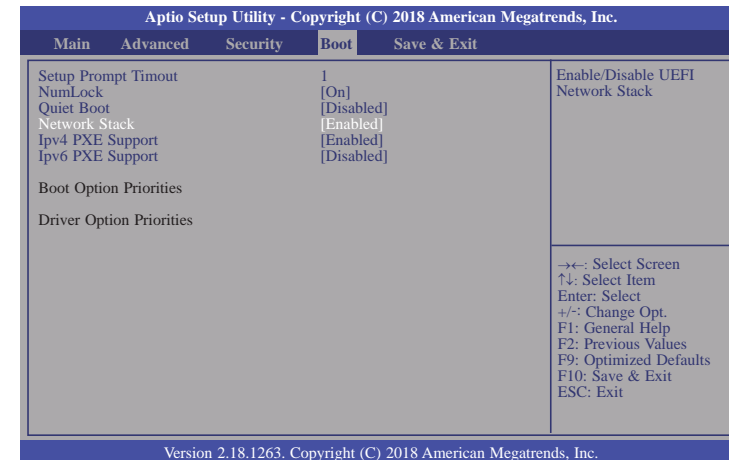
This allows you to determine the default state of the numeric keypad. By default, the system boots up with NumLock on wherein the function of the numeric keypad is the number keys. When set to Off, the function of the numeric keypad is the arrow keys.

Quiet Boot

This allows you to enable or disable quiet boot option. If Quiet Boot is set to enabled, BGRT Logo field will appear in the ACPI Configuration submenu of Advanced menu.

Network Stack

This section is used to enable or disable UEFI network stack. When Network Stack is set to enabled, it will display Ipv4 PXE Support and Ipv6 PXE Support.



Ipv4 PXE Support

When enabled, Ipv4 PXE boot supports. When disabled, Ipv4 PXE boot option will not be created.

Ipv6 PXE Support

When enabled, Ipv6 PXE boot supports. When disabled, Ipv6 PXE boot option will not be created.

Boot Option Priorities

Sets the system boot order.

Driver Option Priorities

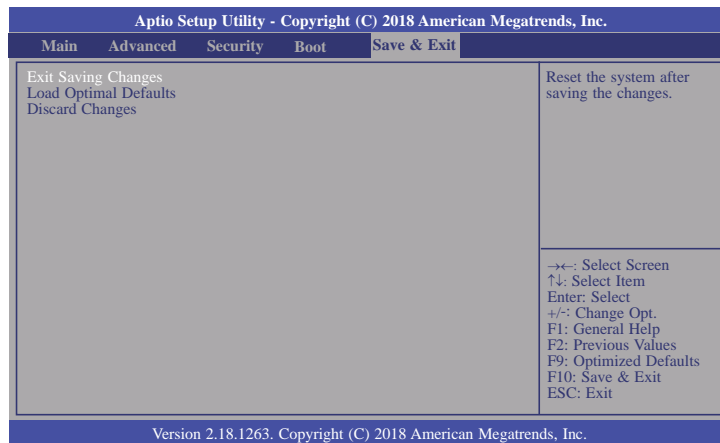
Sets the driver boot order.



Note:

AL700 only supports UEFI boot, no Legacy boot.

Save & Exit



Exit Saving Changes

Select this field and then press <Enter> to exit the system setup and save your changes.

Load Optimal Defaults

Select this field and then press <Enter> to load optimal defaults.

Discard Changes

Select this field and then press <Enter> to exit the system setup without saving your changes.

Updating the BIOS

To update the BIOS, you will need the new BIOS file and a flash utility. Please contact technical support or your sales representative for the files. For updating AMI BIOS in UEFI mode, you may refer to the how-to-video at <https://www.dfi.com/Knowledge/Video/5>.

Notice: BIOS SPI ROM

1. The Intel® Management Engine has already been integrated into this system board. Due to the safety concerns, the BIOS (SPI ROM) chip cannot be removed from this system board and used on another system board of the same model.
2. The BIOS (SPI ROM) on this system board must be the original equipment from the factory and cannot be used to replace one which has been utilized on other system boards.
3. If you do not follow the methods above, the Intel® Management Engine will not be updated and will cease to be effective.

**Note:**

- a. You can take advantage of flash tools to update the default configuration of the BIOS (SPI ROM) to the latest version anytime.
- b. When the BIOS IC needs to be replaced, you have to populate it properly onto the system board after the EEPROM programmer has been burned and follow the technical person's instructions to confirm that the MAC address should be burned or not.

Chapter 4 - Supported Software

Please download drivers, utilities and software applications required to enhance the performance of the system board at <https://www.dfi.com/DownloadCenter>.

Intel Chipset Software Installation Utility

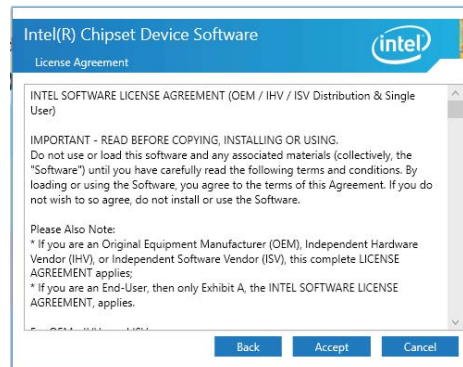
The Intel Chipset Software Installation Utility is used for updating Windows® INF files so that the Intel chipset can be recognized and configured properly in the system.

To install the utility, download "AL700 Chipset Driver" zip file at our website.

1. Setup is ready to install the utility. Click "Next".



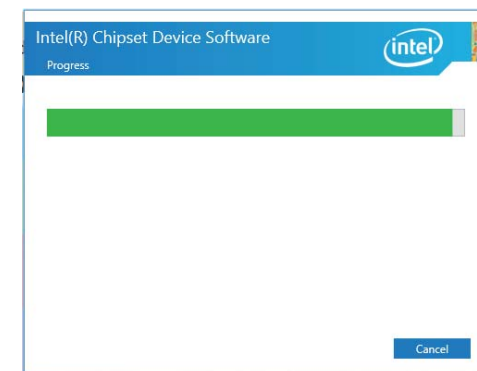
2. Read the license agreement then click "Accept".



3. Go through the readme document for more installation tips then click "Install".

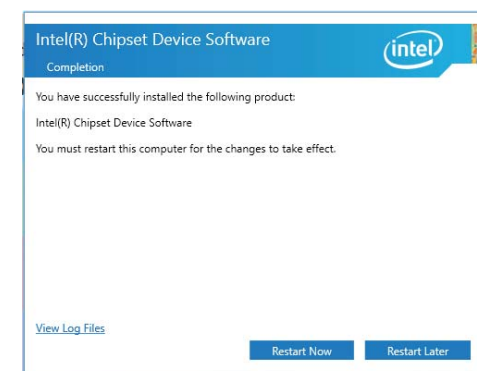


4. The step displays the installing status in the progress.



5. After completing installation, click "Restart Now" to exit setup.

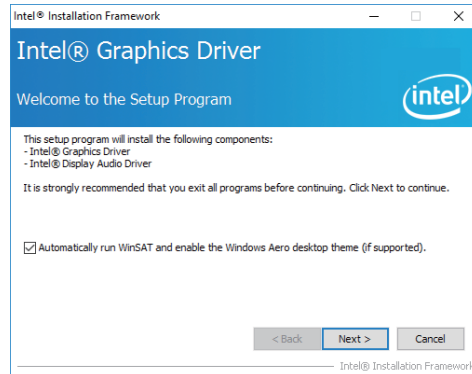
Restarting the system will allow the new software installation to take effect.



Intel Graphics Drivers

To install the driver, download “AL700 Graphics Driver” zip file at our website.

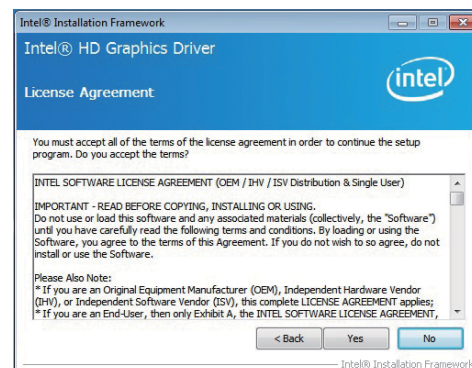
1. Setup is now ready to install the graphics driver. Click “Next”.



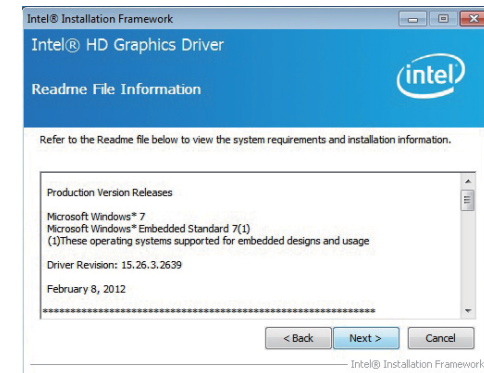
By default, the “Automatically run WinSAT and enable the Windows Aero desktop theme” is enabled. With this enabled, after installing the graphics driver and the system rebooted, the screen will turn blank for 1 to 2 minutes (while WinSAT is running) before the Windows 10 desktop appears. The “blank screen” period is the time Windows is testing the graphics performance.

We recommend that you skip this process by disabling this function then click “Next”.

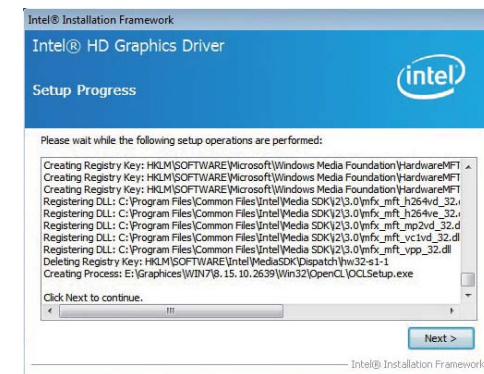
2. Read the license agreement then click “Yes”.



3. Go through the readme document for system requirements and installation tips then click “Next”.

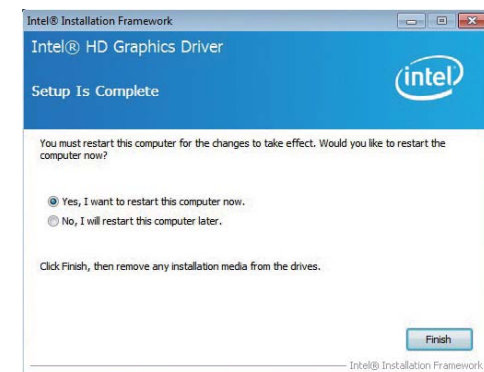


4. Setup is now installing the driver. Click “Next” to continue.



5. Click “Yes, I want to restart this computer now” then click “Finish”.

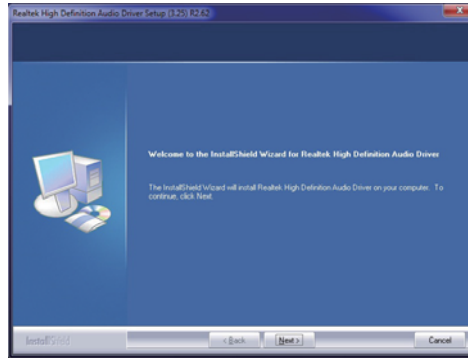
Restarting the system will allow the new software installation to take effect.



Audio Drivers

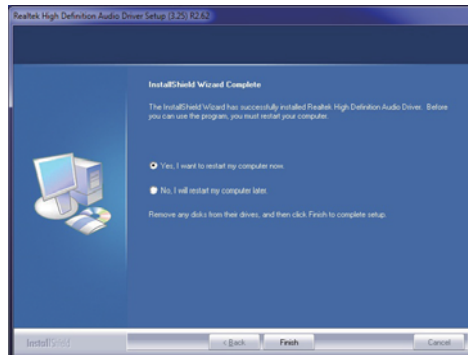
To install the driver, download “AL700 Audio Driver” zip file at our website.

1. Setup is ready to install the driver. Click “Next”.



2. Click “Yes, I want to restart my computer now” then click “Finish”.

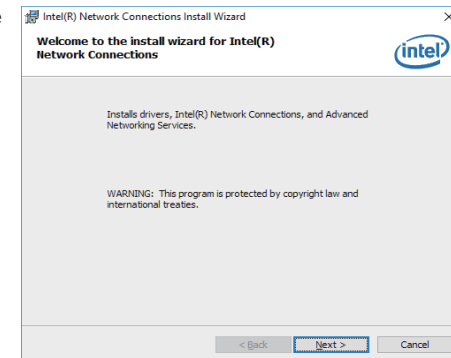
Restarting the system will allow the new software installation to take effect.



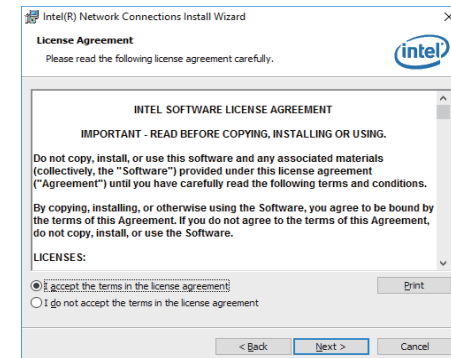
Intel LAN Drivers

To install the driver, download “AL700 LAN Driver” zip file at our website.

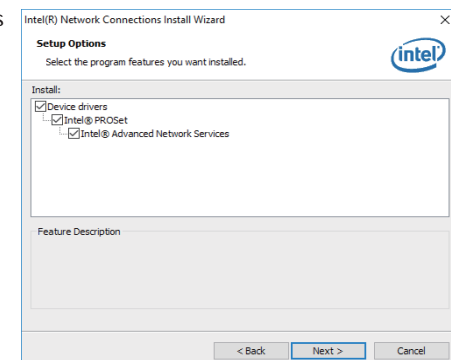
1. Setup is ready to install the driver. Click “Next”.



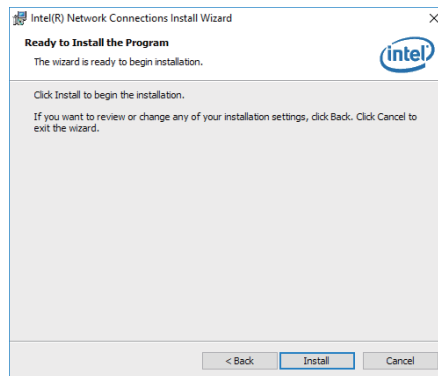
2. Click “I accept the terms in the license agreement” then click “Next”.



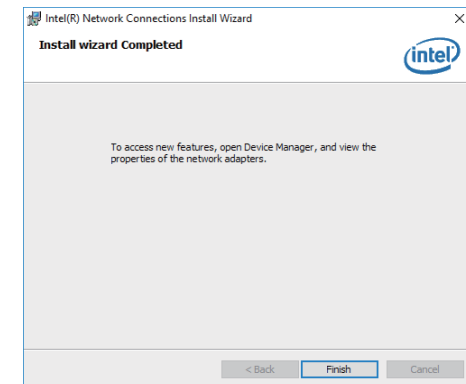
3. Select the program features you want installed then click “Next”.



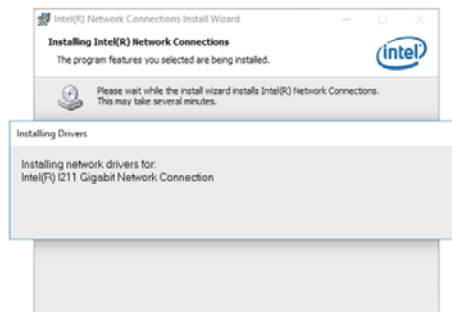
4. Click "Install" to begin the installation.



6. After completing installation, click "Finish".



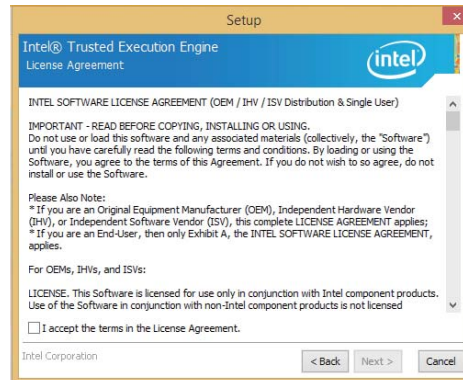
5. The step displays the installing status in the progress.



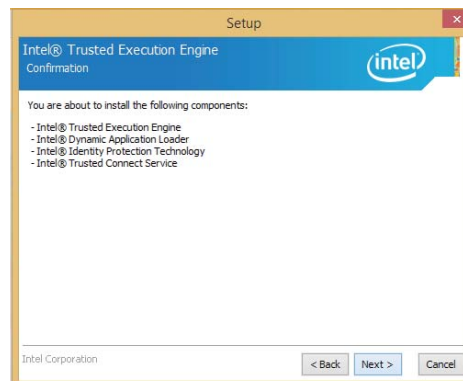
Intel Trusted Execution Engine Driver

To install the driver, download “AL700 TXE Driver” zip file at our website.

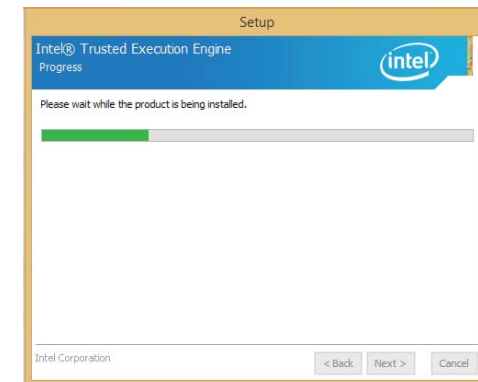
1. Tick “I accept the terms in the License Agreement” and then click “Next”.



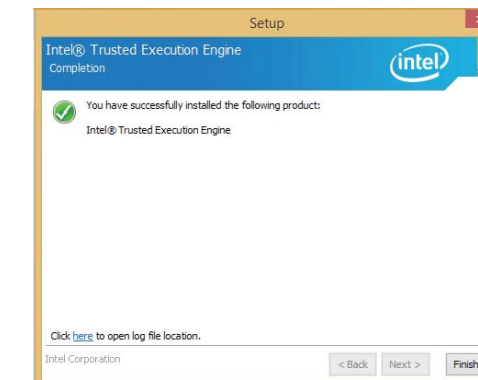
2. The step shows the components which will be installed. Then, Click “Next”.



3. The step displays the installing status in the progress.



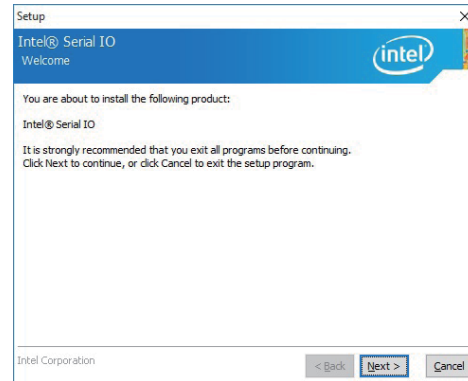
4. Click “Finish” when the installation is complete.



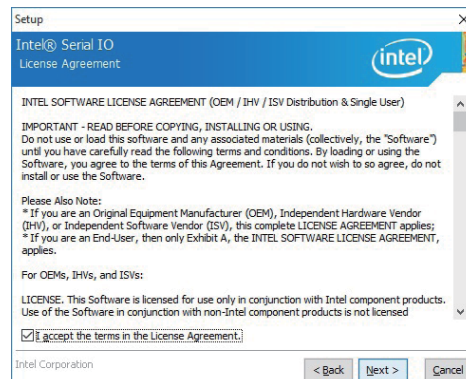
SIO Driver

To install the driver, download “AL700 SIO Driver” zip file at our website.

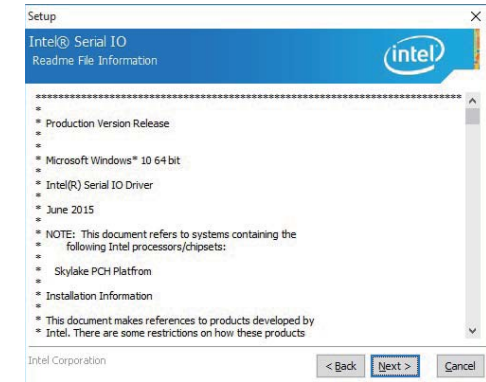
1. Setup is ready to install the driver.
Click “Next”.



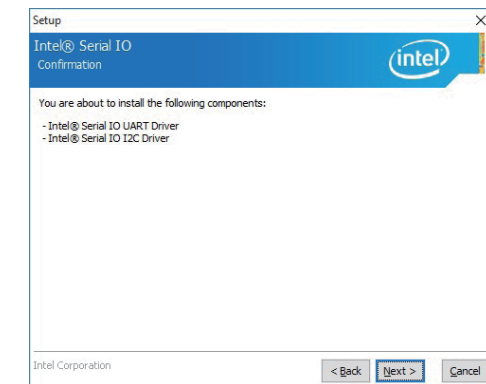
2. Read the license agreement carefully.
Click “I accept the terms in the License Agreement” then click “Next”.



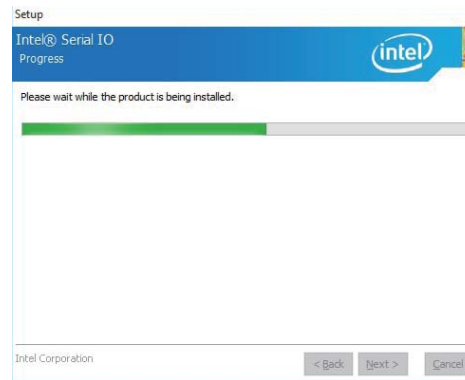
3. Read the file information then click “Next”.



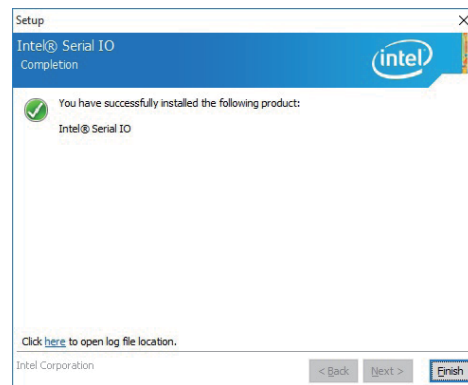
4. Setup is ready to install the driver.
Click “Next”.



5. Setup is now installing the driver.



6. Click "Finish".



Appendix A - System Error Message

Standard Status Codes

PEI Status Codes

0x11	Pre-memory CPU initialization is started
0x15	Pre-memory North Bridge initialization is started
0x19	Pre-memory South Bridge initialization is started
0x2A	OEM pre-memory initialization codes
0x2B	Memory initialization. Serial Presence Detect (SPD) data reading
0x2C	Memory initialization. Memory presence detection
0x2D	Memory initialization. Programming memory timing information
0x2E	Memory initialization. Configuring memory
0x2F	Memory initialization (other).

PEI Error Codes

0x50	Memory initialization error. Invalid memory type or incompatible memory speed
0x51	Memory initialization error. SPD reading has failed
0x52	Memory initialization error. Invalid memory size or memory modules do not match.
0x53	Memory initialization error. No usable memory detected

DXE Phase Codes

0x92	PCI Bus initialization is started
0x93	PCI Bus Hot Plug Controller Initialization
0x94	PCI Bus Enumeration
0x95	PCI Bus Request Resources
0x96	PCI Bus Assign Resources
0x99	Super IO Initialization
0x9A	USB initialization is started
0x9B	USB Reset
0x9C	USB Detect
0x9D	USB Enable
0xA0	IDE initialization is started
0xA1	IDE Reset
0xA2	IDE Detect
0xA3	IDE Enable
0xAE	Legacy Boot event
0xB4	USB hot plug
0xB6	Clean-up of NVRAM
0xB7	Configuration Reset (reset of NVRAM settings)

DXE Error Codes

0xD6	No Console Output Devices are found
0xD7	No Console Input Devices are found
0xD8	Invalid password

ACPI Checkpoints

0x03	System is entering S3 sleep state
0x04	System is entering S4 sleep state
0x05	System is entering S5 sleep state
0x30	System is waking up from the S3 sleep state
0x40	System is waking up from the S4 sleep state
0xAC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
0xAA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

Beep Code

6 beeps	Flash update is failed
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Appendix B - Troubleshooting

Troubleshooting Checklist

This chapter of the manual is designed to help you with problems that you may encounter with your personal computer. To efficiently troubleshoot your system, treat each problem individually. This is to ensure an accurate diagnosis of the problem in case a problem has multiple causes.

Some of the most common things to check when you encounter problems while using your system are listed below.

1. The power switch of each peripheral device is turned on.
2. All cables and power cords are tightly connected.
3. The electrical outlet to which your peripheral devices connected is working. Test the outlet by plugging in a lamp or other electrical device.
4. The monitor is turned on.
5. The display's brightness and contrast controls are adjusted properly.
6. All add-in boards in the expansion slots are seated securely.
7. Any add-in board you have installed is designed for your system and is set up correctly.

Monitor/Display

If the display screen remains dark after the system is turned on:

1. Make sure that the monitor's power switch is on.
2. Check that one end of the monitor's power cord is properly attached to the monitor and the other end is plugged into a working AC outlet. If necessary, try another outlet.
3. Check that the video input cable is properly attached to the monitor and the system's display adapter.
4. Adjust the brightness of the display by turning the monitor's brightness control knob.

The picture seems to be constantly moving.

1. The monitor has lost its vertical sync. Adjust the monitor's vertical sync.
2. Move away any objects, such as another monitor or fan, that may be creating a magnetic field around the display.
3. Make sure your video card's output frequencies are supported by this monitor.

The screen seems to be constantly wavering.

1. If the monitor is close to another monitor, the adjacent monitor may need to be turned off. Fluorescent lights adjacent to the monitor may also cause screen wavering.

Power Supply

When the computer is turned on, nothing happens.

1. Check that one end of the AC power cord is plugged into a live outlet and the other end properly plugged into the back of the system.
2. Make sure that the voltage selection switch on the back panel is set for the correct type of voltage you are using.
3. The power cord may have a "short" or "open". Inspect the cord and install a new one if necessary.

Hard Drive

Hard disk failure.

1. Make sure the correct drive type for the hard disk drive has been entered in the BIOS.
2. If the system is configured with two hard drives, make sure the bootable (first) hard drive is configured as Master and the second hard drive is configured as Slave. The master hard drive must have an active/bootable partition.

Excessively long formatting period.

If your hard drive takes an excessively long period of time to format, it is likely a cable connection problem. However, if your hard drive has a large capacity, it will take a longer time to format.

Serial Port

The serial device (modem, printer) doesn't output anything or is outputting garbled characters.

1. Make sure that the serial device's power is turned on and that the device is on-line.
2. Verify that the device is plugged into the correct serial port on the rear of the computer.
3. Verify that the attached serial device works by attaching it to a serial port that is working and configured correctly. If the serial device does not work, either the cable or the serial device has a problem. If the serial device works, the problem may be due to the onboard I/O or the address setting.
4. Make sure the COM settings and I/O address are configured correctly.

Keyboard

Nothing happens when a key on the keyboard was pressed.

1. Make sure the keyboard is properly connected.
2. Make sure there are no objects resting on the keyboard and that no keys are pressed during the booting process.

System Board

1. Make sure the add-in card is seated securely in the expansion slot. If the add-in card is loose, power off the system, re-install the card and power up the system.
2. Check the jumper settings to ensure that the jumpers are properly set.
3. Verify that all memory modules are seated securely into the memory sockets.
4. Make sure the memory modules are in the correct locations.
5. If the board fails to function, place the board on a flat surface and seat all socketed components. Gently press each component into the socket.
6. If you made changes to the BIOS settings, re-enter setup and load the BIOS defaults.