



AL701

Qseven (Q7) 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.

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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About this Manual

This manual can be downloaded from the website, or acquired as an electronic file included in the optional CD/DVD. The manual is subject to change and update without notice, and may be based on editions that do not resemble your actual products. Please visit our website or contact our sales representatives for the latest editions.

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.

- One AL701 board
- One Heatsink

Optional Items

- Qseven Carrier Board
- 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.

Before Using the System Board

When installing the system board in a new system, you will need at least the following internal components.

- Storage device such as hard disk drive, CD-ROM, etc.
- Power adaptor

External system peripherals may also be required for navigation and display, including at least a keyboard, a mouse and a video display monitor.

Chapter 1 - Introduction

► Specifications

SYSTEM	Processor	Intel® Processors, BGA 1296 Atom® x7-E3950 Processor, Quad Core, 2M Cache, 1.6GHz (2.0GHz), 12W Atom® x5-E3940 Processor, Quad Core, 2M Cache, 1.6GHz (1.8GHz), 9.5W Atom® x5-E3930 Processor, Dual Core, 2M Cache, 1.3GHz (1.8GHz), 6.5W Pentium® Processor N4200, Quad Core, 2M Cache, 1.1GHz (2.5GHz), 6W Celeron® Processor N3350, Dual Core, 2M Cache, 1.1GHz (2.4GHz), 6W
	Memory	4GB/8GB LPDDR4 Memory Down Dual Channel LPDDR4 3200MHz
	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 @ 30 Hz 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 I2C 1 x SMBus 1 x SPI 1 x UART (TX/RX)
AUDIO	Interface	HD Audio
ETHERNET	Controller	1 x Intel® I211AT (10/100/1000Mbps) (0~60°C) 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 (option)
	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
	CAN Bus	CAN Bus Function (only Linux support)
WATCHDOG TIMER	Output & Interval	System Reset, Programmable via Software from 1 to 255 Seconds
SECURITY	FTPM	Enables or Disables the BIOS support for the security device
POWER	Type	5V, 5VSB, VCC_RTC
OS SUPPORT (UEFI ONLY)		Windows 10 IoT Enterprise 64-bit Linux (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
MECHANICAL	Dimensions	Qseven form factor: 70mm (2.76") x 70mm (2.76")
	Compliance	Qseven specification revision 2.1
CERTIFICATIONS		CE, FCC Class B, RoHS



The specifications listed here may be based on editions that do not resemble your actual products. Please visit the download page at go.dfi.com/AL701, or via the QR code to the right for the latest datasheet.



The table below lists the Qseven standard specifications and the corresponding specifications supported by the AL701 module.

System I/O Interface	ARM/RISC Based Minimum	X86 Based Minimum	Maximum	AL701 Maximum
PCI Express lanes	0	1 (x1 Link)	4	4
Serial ATA channels	0	0	2	2
USB 2.0 ports	3	4	8	8 x USB 2.0 + 1 x USB 3.0, or 4 x USB 2.0 + 3 x USB 3.0 (optional)
USB 3.0 ports	0	0	3	Note: USB2.0 Port 4-7 shared with USB3.0 Port 0 and Port 2
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 10/100/1000	0	0	1 (GbE)	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
I2C 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

► Features

Qseven

Qseven (Q7) is a standardized form factor for a Computer-On-Module with all the core components integrated on the module. It is mounted on a carrier board designed for industry-specific applications and I/O ports. A high-speed MXM connector with standardized pinout is required to carry signals between a Qseven module and its carrier board.

LPDDR4

LPDDR is a type of DDR SDRAM that operates at a lower power voltage and is commonly used in mobile devices as opposed to traditional SDRAMs that are used in stationary devices and laptops. Each generation of LPDDR has doubled its prefetch size and increased its data transfer rate, with LPDDR4's prefetch size being 16 and data transfer rate at 3200MHz.

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

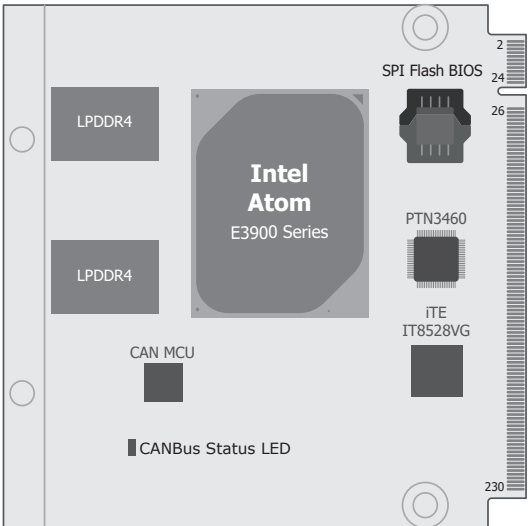
Intel® I211AT or I210IT Gigabit Ethernet controller supports up to 1Gbps data transmission.

Watchdog Timer

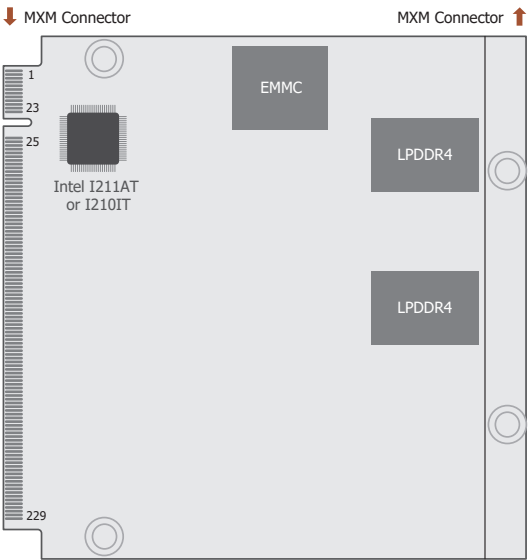
The Watchdog Timer function allows your application to regularly "clear" the system at the set time interval. If the system hangs or fails to function, it will reset at the set time interval so that your system will continue to operate.

Chapter 2 - Hardware Installation

► Board Layout



◀◀ Top View

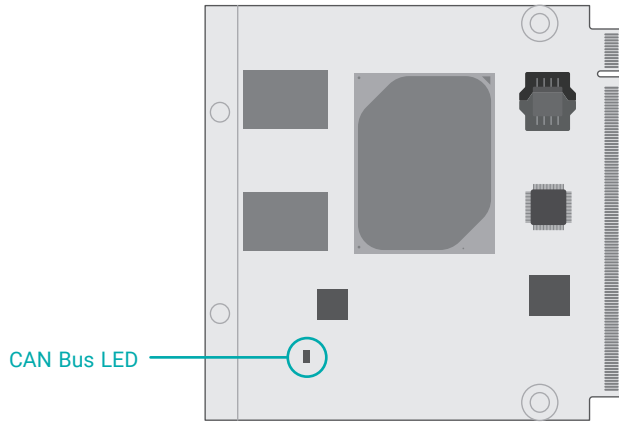


◀◀ Bottom View



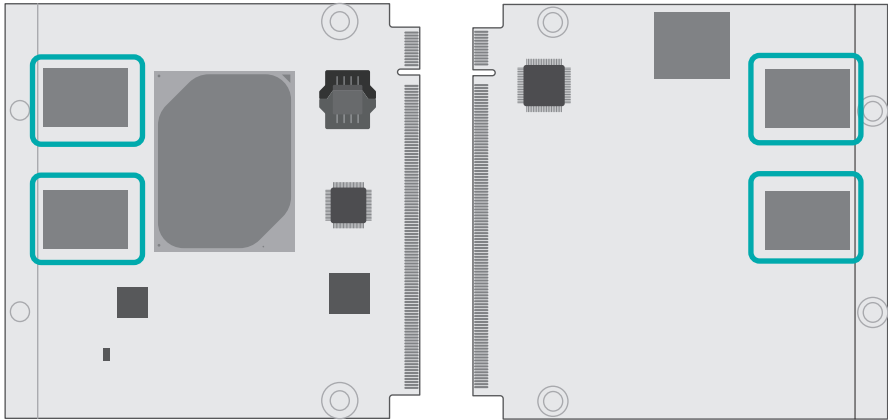
Important: Electrostatic discharge (ESD) can damage your board, processor, disk drives, add-in boards, and other components. Perform installation procedures at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching 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.

► LED



Important: When the Standby Power LED on the carrier board lights up, it indicates that there is power on the system board. Power-off the PC then unplug the power cord prior to installing any devices. Failure to do so will cause severe damage to the motherboard and components.

► System Memory



The system board supports the following memory interface.

Single Channel (SC)

Data will be accessed in chunks of 64 bits from the memory channels.

Dual Channel (DC)

Data will be accessed in chunks of 128 bits from the memory channels. Dual channel provides better system performance because it doubles the data transfer rate.

Single Channel

DIMMs are on the same channel. DIMMs in a channel can be identical or completely different. However, we highly recommend using identical DIMMs. Not all slots need to be populated.

Dual Channel

DIMMs of the same memory configuration are on different channels.

Features

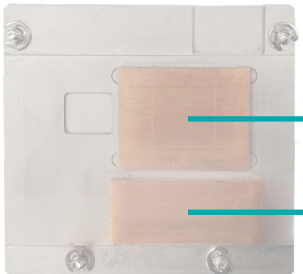
- LPDDR4 3200MHz Memory Down
- Up to 4G or 8G Memory Down
- Dual channel memory interface

► Heat Sink



■ Top View of Heat Sink

The metal interfaces at the bottom side of the heat sink are designed to directly contact the chipset and passively absorb heat from them into the heat sink for heat dissipation. Additional thermal adhesives can be applied to the metal interface to maximize contact area between the interface and the chipset.



CPU metal interface

Memory metal interface

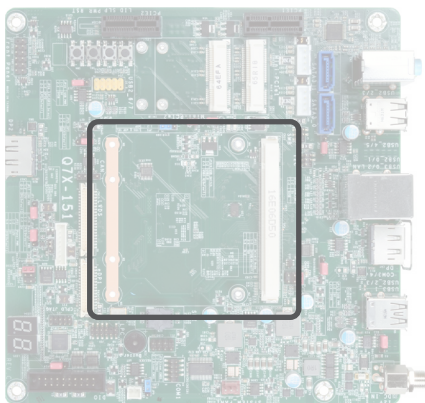
■ Bottom View of Heat Sink



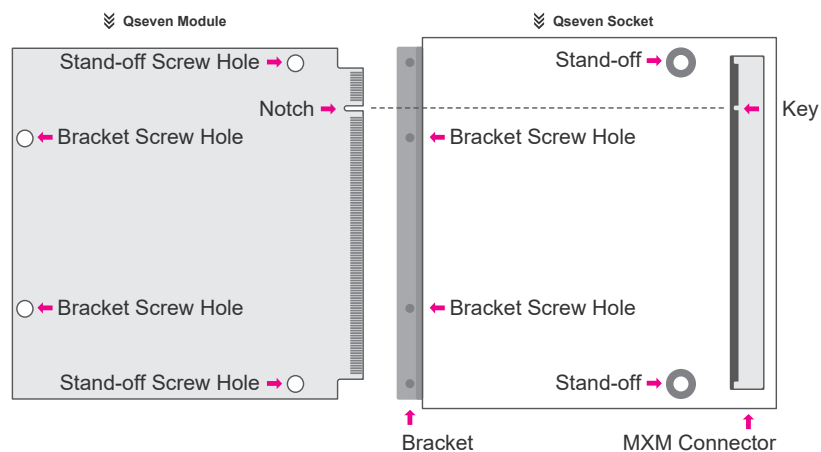
The heat sink is only included in certain standard package options. A heat spreader may be included instead.

► Assembly

1. Locat the Q7 socket on the carrier board. The photo below is an example of a Q7 carrier board with the Q7 socket encircled.



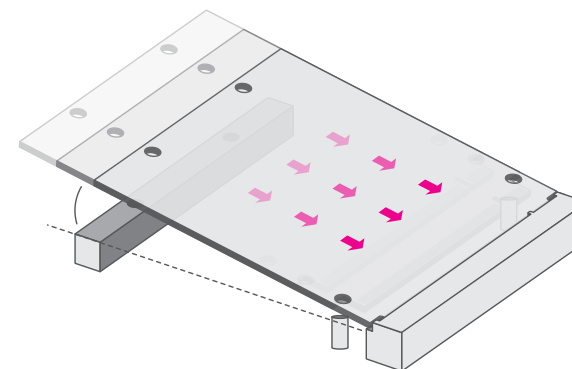
2. Locat the MXM connector, stand-offs, and the brack on the carrier board. Align the module to the MXM connector by matching the notch and the key. The screw holes on the module shall also align to the stand-offs and the screw holes on the carrier board.



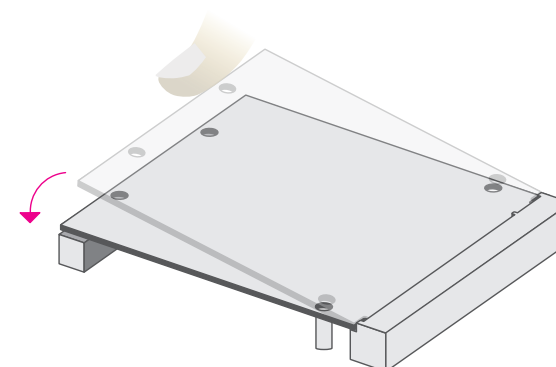
Note:

The carrier board is not included in the standard package and is typically customized.

3. Insert golden finger end of the Q7 module into the slot while making sure 1) the notch and the key are aligned, and 2) the other end rises away from the bracket as indicated by the dotted and solid lines. Press the card firmly into the socket while applying and maintaining even pressure on both ends until a distinctive click sounds.

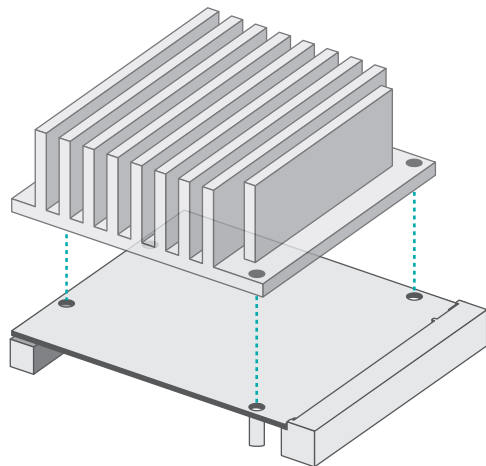


4. Press down the end of the module that is close to the bracket and away from the connector.

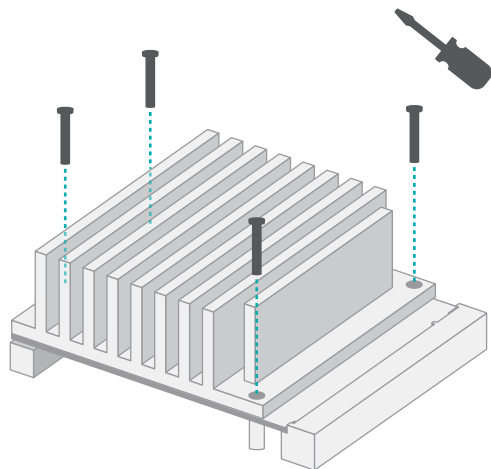


► Assembly

5. Place the cooler, i.e. heatsink or heat spreader, onto the module while making sure the screw holes on the cooler align with the screw holes on the module. The thermal interface metals underneath the cooler should also sit directly on top of the CPU and the memory chipsets. Thermal paste shall be applied to the interfaces at this moment if it is required.

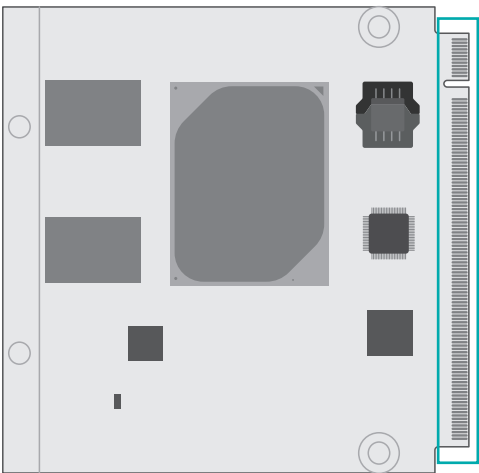


6. Use a screw driver to fasten the screws into the screw holes. The mounting screws may be attached to the heatsink with springs in the case of a standard package. In other cases, you may need to insert the screws that are packed separately from the cooler.



► I/O Connectors

MXM Connector



The 230-pin MXM connector (golden fingers) is used to interface with the carrier board. The pin assignments are listed in the table below.

Pin	Assignment	Pin	Assignment
1	GND	2	GND
3	GBE_MDI3-	4	GBE_MDI2-
5	GBE_MDI3+	6	GBE_MDI2+
7	GBE_LED_100-	8	GBE_LED_1000-
9	GBE_MDI1-	10	GBE_MDI0-
11	GBE_MDI1+	12	GBE_MDI0+
13	GBE_LED_LINK-	14	GBE_LED_ACT-
15	NC	16	EC_PM_SLP_S4-
17	WAKE-	18	EC_PM_SLP_S3-
19	GPIO0_C	20	CB_PWRBTN-
21	SLP_BTN-	22	LID_BTN-
23	GND	24	GND
25	GND	26	CB_PWROK_C

► I/O Connectors ► Board-to-board Connector

27	GPI02_C	28	SYS_RST-
29	SATA_TX0P	30	SATA_TX1P
31	SATA_TX0N	32	SATA_TX1N
33	SATA_ACT-	34	GND
35	SATA_RX0P	36	SATA_RX1P
37	SATA_RX0N	38	SATA_RX1N
39	GND	40	GND
41	BIOS_DIS0-	42	SDIO_CLK
43	SDIO_CD-	44	SDIO_LED
45	SDIO_CMD	46	SDIO_WP
47	SDIO_PWR	48	SDIO_D1
49	SDIO_D0	50	SDIO_D3
51	SDIO_D2	52	NC
53	NC	54	NC
55	NC	56	USB_OTG_PEN
57	GND	58	GND
59	HDA_SYNC_3V3	60	SMBCK_BT
61	3V3_HDA_RST-	62	SMBDAT_BT
63	HDA_BITCLK_3V3	64	SMB_ALERT-EC_BT
65	HDA_SDIO_3V3	66	I2C_SCL1
67	HDA_SDO_3V3	68	I2C_SDA1
69	THRM-	70	WDTRIG#_C
71	THERMTRIP-	72	WDOUT_C
73	GND	74	GND
75	USB3_TXP0N (option USB_P7-)	76	USB3_RXP0N (option USB_P6-)
77	USB3_TXP0P (option USB_P7+)	78	USB3_RXP0P (option USB_P6+)
79	USB67_OC-	80	USB45_OC-
81	USB3_TXP2N (option USB_P5-)	82	USB3_RXP2N (option USB_P4-)
83	USB3_TXP2P (option USB_P5+)	84	USB3_RXP2P (option USB_P4+)
85	USB23_OC-	86	USB01_OC-
87	USB2_DN3	88	USB2_DN2
89	USB2_DP3	90	USB2_DP2
91	USB_VBUS_SUS_C	92	USB_OTG_ID_3V3
93	USB2_DN0	94	USB2_DN1

95	USB2_DP0	96	USB2_DP1
97	GND	98	GND
99	LVDSA_0+_R (option eDP0_TX0+)	100	LVDS_B0+_R (option eDP1_TX0+)
101	LVDSA_0-_R (option eDP0_TX0-)	102	LVDS_B0-_R (option eDP1_TX0-)
103	LVDSA_1+_R (option eDP0_TX1+)	104	LVDS_B1+_R (option eDP1_TX1+)
105	LVDSA_1-_R (option eDP0_TX1-)	106	LVDS_B1-_R (option eDP1_TX1-)
107	LVDSA_2+_R (option eDP0_TX2+)	108	LVDS_B2+_R (option eDP1_TX2+)
109	LVDSA_2-_R (option eDP0_TX2-)	110	LVDS_B2-_R (option eDP1_TX2-)
111	LVDS_VDD_EN_R	112	LVDS_BKLT_EN_R
113	LVDSA_3+_R (option eDP0_TX3+)	114	LVDS_B3+_R (option eDP1_TX3+)
115	LVDSA_3-_R (option eDP0_TX3-)	116	LVDS_B3-_R (option eDP1_TX3-)
117	GND	118	GND
119	LVDS_A_CLK+ (option eDP0_AUX+)	120	LVDS_B_CLK+_R (option eDP1_AUX+)
121	LVDS_A_CLK- (option eDP0_AUX-)	122	LVDS_B_CLK-_R (option eDP1_AUX-)
123	LVDS_BKLT_CTRL_R	124	GP_1-Wire_Bus
125	LVDS_DDC_DATA_R (option eDP1_DDC_DAT)	126	eDP_HPD#_C
127	LVDS_DDC_CLK_R (option eDP1_DDC_CLK)	128	DDI1_HPD#_C
129	CAN1_TX	130	CAN1_RX
131	DDIO_3P	132	USB3_P1_TXN_C
133	DDIO_3N	134	USB3_P1_TXP_C
135	GND	136	GND
137	DDIO_1P	138	DPIO_AUX_C_P
139	DDIO_1N	140	DPIO_AUX_C_N
141	GND	142	GND
143	DDIO_2P	144	USB3_P1_RXN
145	DDIO_2N	146	USB3_P1_RXP
147	GND	148	GND
149	DDIO_0P	150	DDIO_DDC_SDA_C
151	DDIO_0N	152	DDIO_DDC_SCL_C
153	DDIO_HDMI_HPD	154	DDIO_DP_HPD
155	PCIE_CLK_REF+	156	PCIE_WAKE2-
157	PCIE_CLK_REF-	158	CB_PLTRST_BUFF
159	GND	160	GND
161	PCIE_P3_TXP_C	162	PCIE_P3_RXP

► I/O Connectors ► Board-to-board Connector

163	PCIE_P3_TXN_C	164	PCIE_P3_RXN
165	GND	166	GND
167	PCIE_P2_TXP_C	168	PCIE_P2_RXP
169	PCIE_P2_TXN_C	170	PCIE_P2_RXN
171	EC_SOUT1	172	EC_RTS1#
173	PCIE_P1_TXP_C	174	PCIE_P1_RXP
175	PCIE_P1_TXN_C	176	PCIE_P1_RXN
177	EC_SIN1	178	EC_CTS1#
179	PCIE_P0_TXP_C	180	PCIE_P0_RXP
181	PCIE_P0_TXN_C	182	PCIE_P0_RXN
183	GND	184	GND
185	LPC_AD0	186	LPC_AD1
187	LPC_AD2	188	LPC_AD3
189	CLK1_25M_CB	190	LPC_FRAME-
191	LPC_SERIRQ	192	NC
193	VCC_RTC_BT	194	HDA_SPKR_3V3
195	SYSFAN	196	PWMOUT
197	GND	198	GND
199	SPI_MOSI_D0_3VSB	200	SPI_CS0_CB
201	SPI_MISO_D1_3VSB	202	NC
203	SPI_CLK_3VSB	204	JTAG_TRST#
205	5VSB_P	206	VCC_5V_SB
207	EC_CTS0# / JTAG_TCK	208	EC_SIN0 / JTAG_TDI
209	EC_SOUT0 / JTAG_TDO	210	EC_RTS0# / JTAG_TMS
211	NC	212	NC
213	NC	214	NC
215	NC	216	NC
217	NC	218	NC
219	CB_VIN	220	CB_VIN
221	CB_VIN	222	CB_VIN
223	CB_VIN	224	CB_VIN
225	CB_VIN	226	CB_VIN
227	CB_VIN	228	CB_VIN
229	CB_VIN	230	CB_VIN

► Signal Descriptions

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	AL701	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					
PCIE_P0_TXP_C	179	O PCIE	PCIE	AC Coupling capacitor	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	AC Coupling capacitor	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	AC Coupling capacitor	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 Slot - Connect to PCIE Conn pin	PCI Express channel 3, Receive Input differential pair.
PCIE_P3_RXN	164					
PCIE_P3_TXP_C	161	O PCIE	PCIE	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express channel 3, Transmit Output differential pair.
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	AL701	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	AL701	Carrier Board	Description
GBE_MDI0+	12	I/O GB_LAN	GB_LAN		Connect to Magnetics Module MDI0+/-	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_MDI0-	10					
GBE_MDI1+	11	I/O GB_LAN	GB_LAN		Connect to Magnetics Module MDI1+/-	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_MDI1-	9					
GBE_MDI2+	6	I/O GB_LAN	GB_LAN		Connect to Magnetics Module MDI2+/-	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_MDI2-	4					
GBE_MDI3+	5	I/O GB_LAN	GB_LAN		Connect to Magnetics Module MDI3+/-	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_MDI3-	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 3.3V3.3V/3.3V PP				Ethernet controller 0 link indicator, active low.
GBE_LED_100-	7	O CMOS 3.3V3.3V/3.3V PP				Ethernet controller 0 100Mbit/sec link indicator, active low.
GBE_LED_1000-	8	O CMOS 3.3V3.3V/3.3V PP				Ethernet controller 0 1000Mbit/sec link indicator, active low.
GBE_LED_ACT-	14	O CMOS 3.3V3.3V/3.3V PP				Ethernet controller 0 activity indicator, active low.

Serial ATA Interface Signals

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL701	Carrier Board	Description
SATA_RX0P	35	I SATA	SATA	AC Coupling capacitor	Connect to SATA0 Conn RX pin	Serial ATA channel 0, Receive Input differential pair.
SATA_RX0N	37			AC Coupling capacitor		
SATA_TX0P	29	O SATA	SATA	AC Coupling capacitor	Connect to SATA0 Conn TX pin	Serial ATA channel 0, Transmit Output differential pair.
SATA_TX0N	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.
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USB Interface Signals

Signal	Pin#	Pin Type	Pwr Rail / Tolerance	AL701	Carrier Board	Description
USB3_P1_RXP	146	I USB	USB		Connect 90Ω @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 90Ω @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 90Ω @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 90Ω @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 90Ω @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 90Ω @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 90Ω @100MHz Common Choke in series and ESD suppressors to GND to USB connector	Universal Serial Bus Port 4 differential pair.
USB3_RXP2N (option USB_P4-)	82	I USB				Multiplexed with receive signal differential pairs for the Superspeed USB data path.
USB3_TXP2P (option USB_P5+)	83	I/O USB	USB	AC Coupling capacitor	Connect 90Ω @100MHz Common Choke in series and ESD suppressors to GND to USB connector	Universal Serial Bus Port 5 differential pair.
USB3_TXP2N (option USB_P5-)	81	O USB		AC Coupling capacitor		Multiplexed with transmit signal differential pairs for the Superspeed USB data path.
USB3_RXP0P (option USB_P6+)	78	I/O USB	USB		Connect Common Choke in series and ESD suppressors to GND to USB connector (This Port is BOM Option with USB_P6 / USB_P7)	Universal Serial Bus Port 6 differential pair.
USB3_RXP0N (option USB_P6-)	76	I USB				Multiplexed with receive signal differential pairs for the Superspeed USB data path.
USB3_TXP0P (option USB_P7+)	77	I/O USB	USB	AC Coupling capacitor		Universal Serial Bus Port 7 differential pair.
USB3_TXP0N (option USB_P7-)	75	O USB		AC Coupling capacitor		Multiplexed with transmit signal differential pairs for the Superspeed USB data path.
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	AL701	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	AL701	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	AL701	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_CK+ (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_CK- (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_B3-_R (option eDP1_TX3-)	116			eDP AC Coupling capacitor		
LVDS_BKLT_EN_R	112	O LVDS	3.3V/3.3V			Controls panel backlight enable

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 CMOS3.3V/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 CMOS3.3V/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 CMOS3.3V/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 CMOS3.3V/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	AL701	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	AL701	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	AL701	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	AL701	Carrier Board	Description
SPI_MOSI_D0_3VSB	199	O CMOS	3.3V/3.3V		Connect a series resistor to Carrier Board SPI Device pin	SI Master serial output/Slave serial input signal. SPI serial output data from Qseven 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 Qseven 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	AL701	Carrier Board	Description
CAN1_TX	129	O CMOS	3.3V/3.3V			CAN (Controller Area Network) TX output for CAN Bus channel 0. In order to connect a CAN controller device to the Qseven module's CAN bus it is necessary to add transceiver hardware to the carrier board.
CAN1_RX	130	I CMOS	3.3V/3.3V			RX input for CAN Bus channel 0. In order to connect a CAN controller device to the Qseven 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	AL701	Carrier Board	Description
CB_PWROK_C	26	I CMOS	CMOS/5V	PU 1K to 5V		High active input for the Qseven® 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	AL701	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 Qseven 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	AL701	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 Qseven 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 I ² C bus #0 clock line.
I2C_SDA1	68	I/O OD CMOS	3.3V/3.3V	PU 2.2K to 3.3V		General Purpose I ² C bus #0 data line.
SMBCK_BT B	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 I ² C bus #1 clock line.
SMBDAT_BT B	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 I ² C bus #1 data line.
SMB_ALERT_EC_BT B	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		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
GPIO0_C	19	O CMOS	CMOS 3.3V			General Purpose Output 0
SDIO_LED	44	O CMOS	3.3V Suspend			Use a GPIO programmed to indicate the state of the hostcontrol1. hostctrl1_ledcontrol register bit.

Manufacturing Signals

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL701	Carrier Board	Description
EC_CTS0# / JTAG_TCK	207	N.A	N.A			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. Or UART_CTS
EC_SOUT0 / JTAG_TDO	209	N.A	N.A			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.

HARDWARE INSTALLATION

EC_SIN0 / JTAG_TDI	208	N.A	N.A			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.
EC_RTS0# / JTAG_TMS	210	N.A	N.A			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. Or UART_RTS
JTAG_TRST#	204	N.A	N.A			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).

Thermal Management Signals

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL701	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 'THRMTRIP#' goes active the system immediately transitions to the S5 State (Soft Off).

Fan Control Implementation

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL701	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

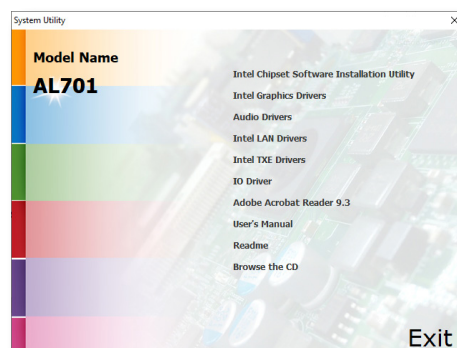
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	AL701	Carrier Board	Description
CB_VIN	219-230	Power				Power Supply +5VDC ±5%
VCC_5V_SB	205-206	Power				Standby Power Supply +5VDC ±5%
VCC_RTC_BT B	193	Power				3 V backup cell input. VCC_RTC should be connected to a 3V backup cell for RTC operation and storage 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.	Pin Type: Power Ground				
NC	211-218	NC				NC

Chapter 3 - Supported Software

Install drivers, utilities and software applications that are required to facilitate and enhance the performance of the system board. You may acquire the software from your sales representatives, from a DVD included in the shipment, or from the website download page at <https://www.dfi.com/DownloadCenter>.

► Auto-run Menu

After inserting your DVD-ROM into your optical drive or executing your DVD image, the System Utility auto-run menu may pop up. Click on the utility or driver that is to be installed on the system. Please refer to the following sections that correspond to your selection for more information.



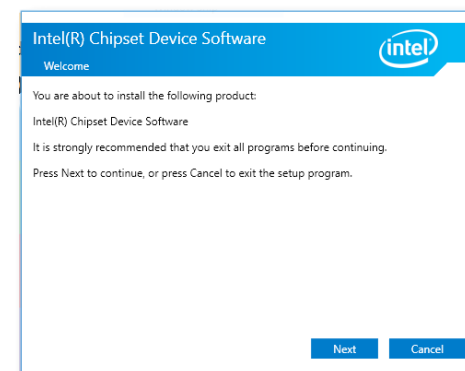
Note:

This step can be ignored if the applications are standalone files.

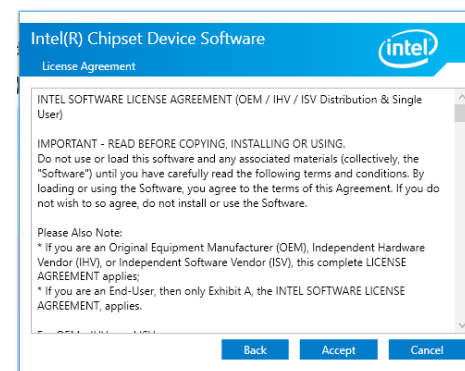
► Intel Chipset Software Installation Utility

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.

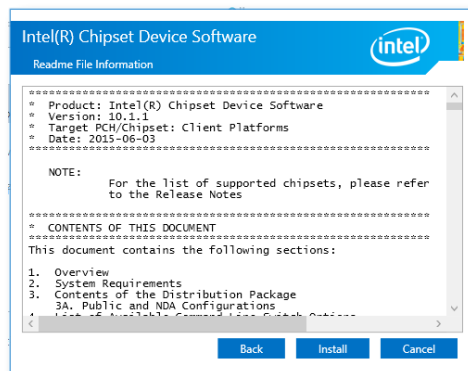
1. Setup is ready to install the utility. Click "Next".



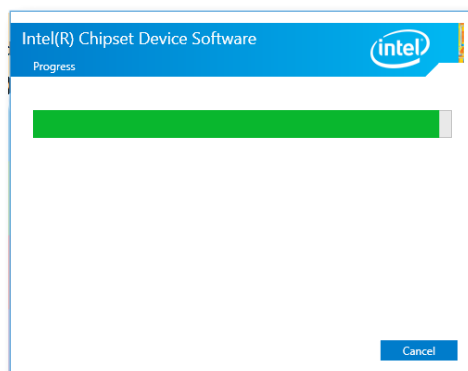
2. Read the license agreement then click "Accept".



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

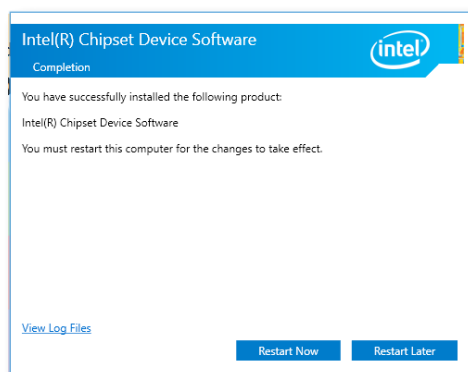


- The step displays the installing status in the progress.



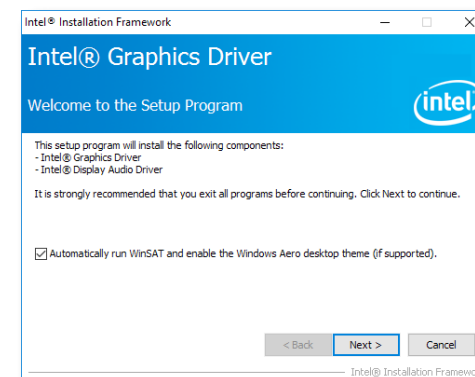
- After completing installation, click "Restart Now" to exit setup.

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



► Intel HD Graphics Drivers

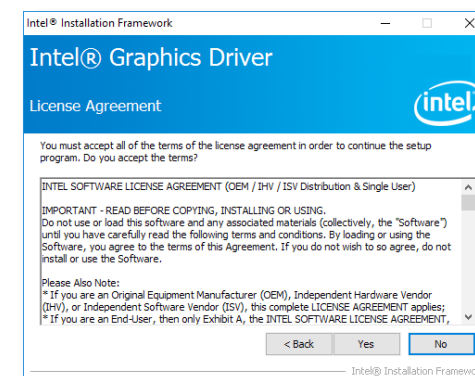
- Setup is now ready to install the graphics driver. Click "Next".



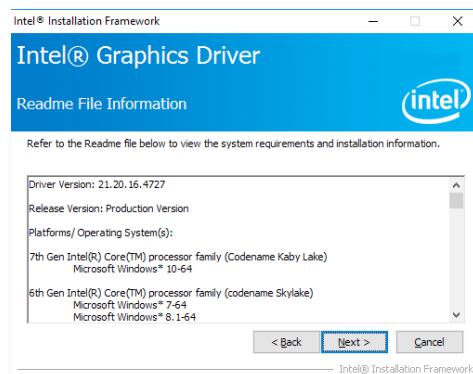
By default, the "Automatically run WinSAT and enable the Windows Aero desktop theme" is enabled. With this enabled, after installing the graphics driver and the system rebooted, the screen will turn blank for 1 to 2 minutes (while WinSAT is running) before the Windows 10 desktop appears. The "blank screen"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

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

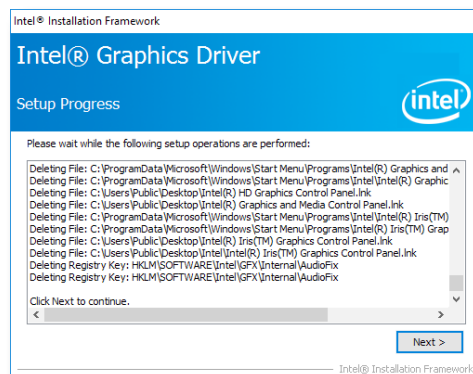
- Read the license agreement then click "Yes".



- Go through the readme document for system requirements and installation tips then click "Next".

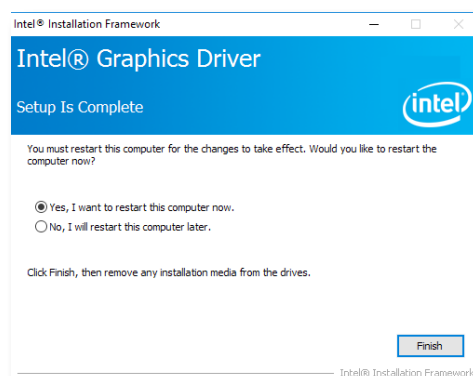


- Setup is now installing the driver. Click "Next" to continue.



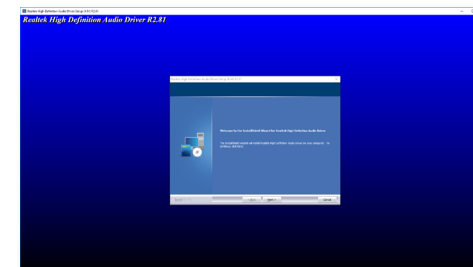
- Click "Yes, I want to restart this computer now" then click "Finish".

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



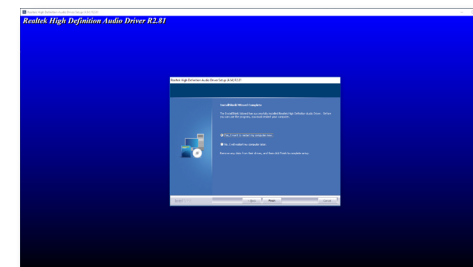
► Audio Drivers

- Setup is ready to install the driver. Click "Next".



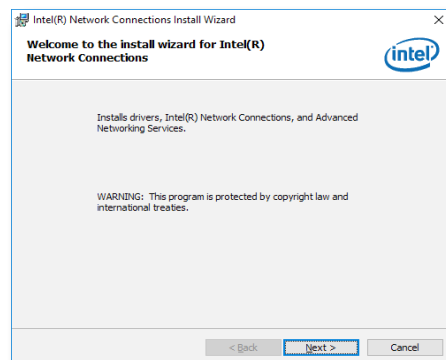
- Click "Yes, I want to restart my computer now" then click "Finish".

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

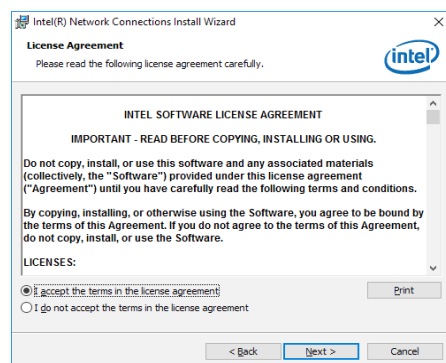


► Intel LAN Driver

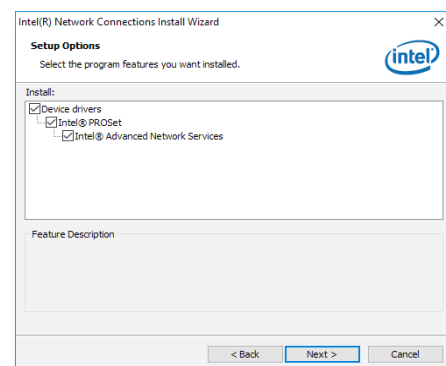
1. Setup is ready to install the driver. Click "Next".



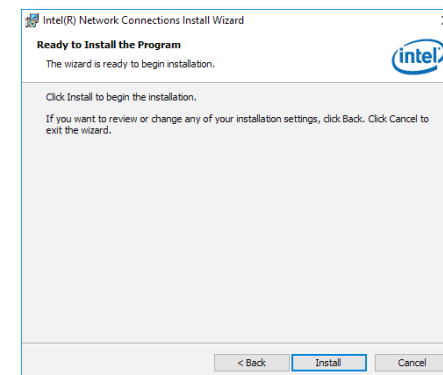
2. Click "I accept the terms in the license agreement" then click "Next".



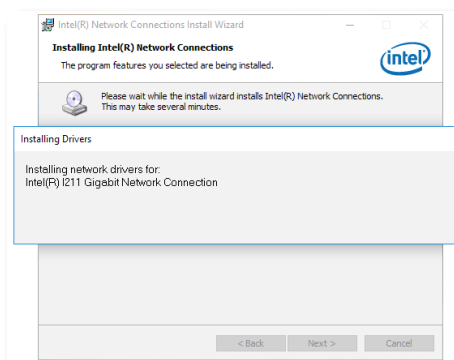
3. Select the program features you want installed then click "Next".



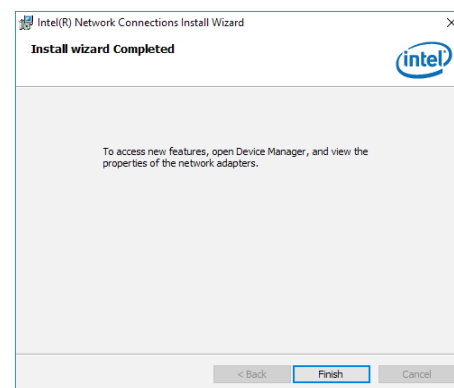
4. Click "Install" to begin the installation.



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

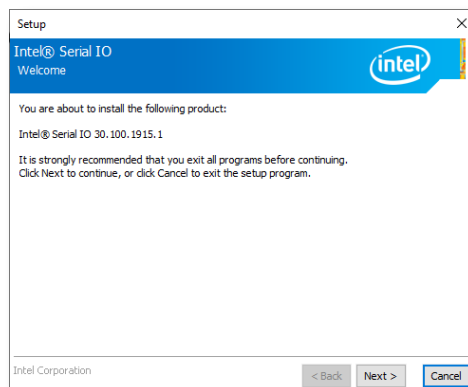


6. After completing installation, click "Finish".



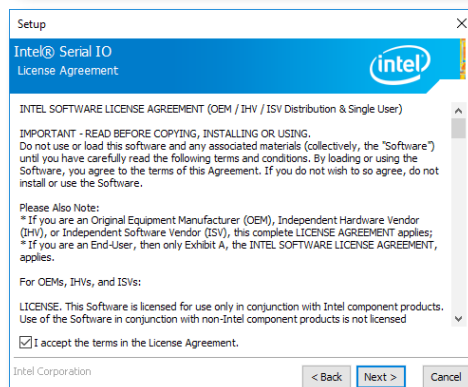
► Intel Serial IO Drivers

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

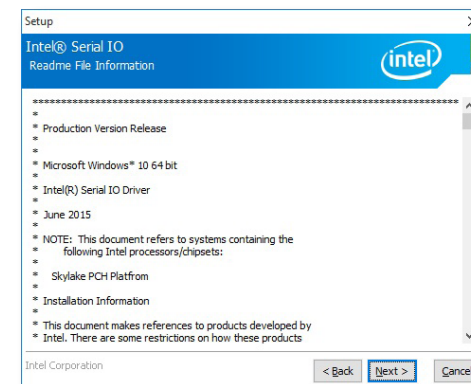


2. Read the license agreement carefully.

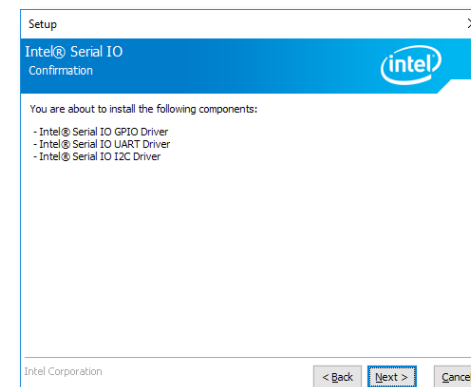
Tick "I accept the terms in the License Agreement" then click "Next".



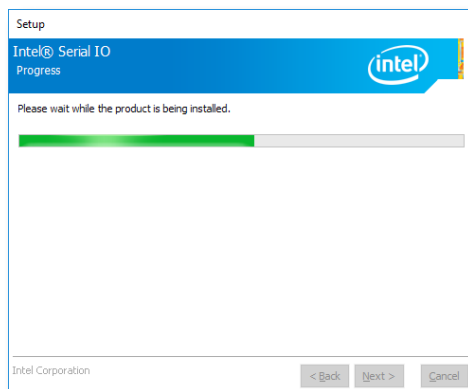
3. Go through the readme document for system requirements and installation tips then click "Next".



4. Setup is ready to install the driver. Click "Next".

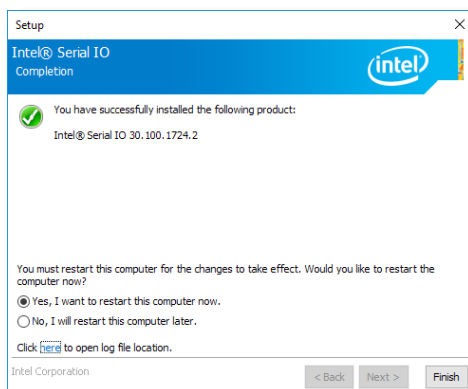


5. Setup is now installing the driver.



6. Click "Yes, I want to restart this computer now" then click "Finish".

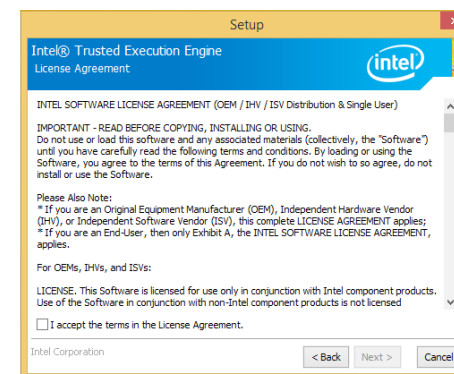
Restarting the system will allow the new software installation to take effect.



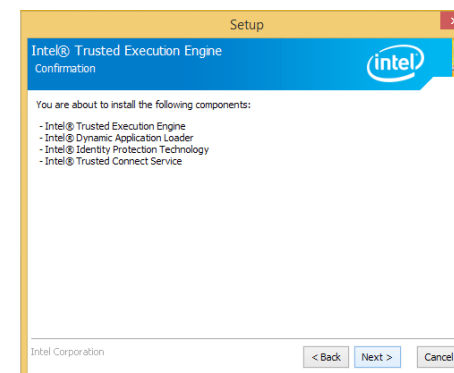
► Intel Trusted Execution Engine Drivers

The TXE protects your system from software-based attacks using TPM and cryptographic technologies.

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

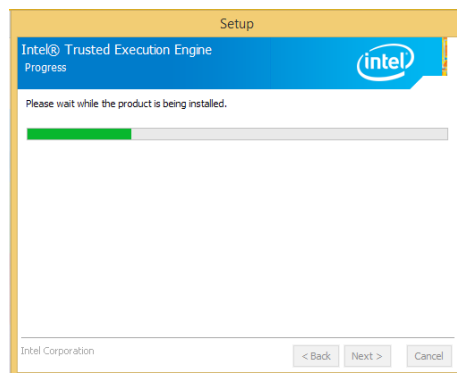


2. The step shows the components which will be installed. Then, Click Next.

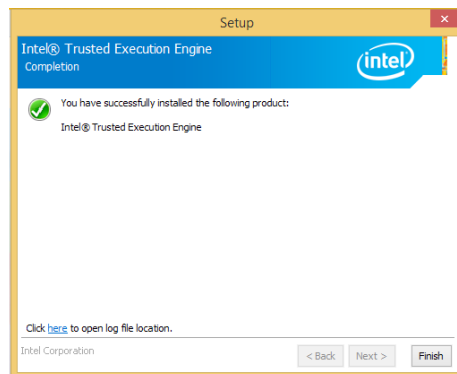


► Adobe Acrobat Reader 9.3

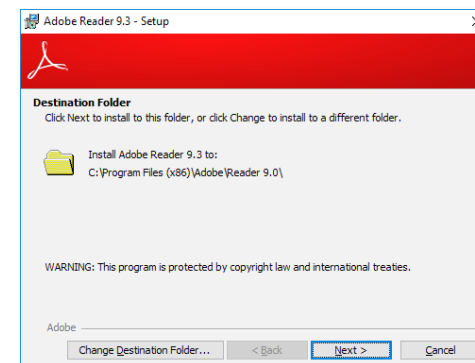
3. The step displays the installing status in the progress.



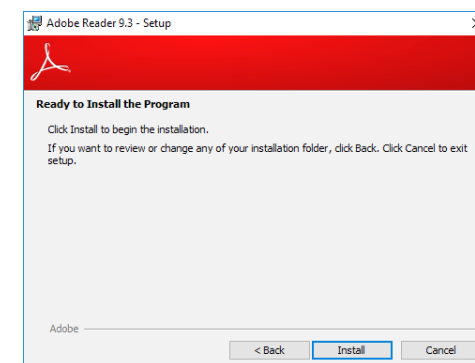
4. Click "Finish" when the installation is complete.



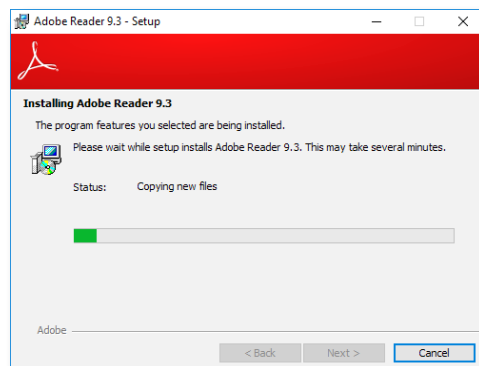
1. Click "Next" to install or click "Change Destination Folder" to select another folder.



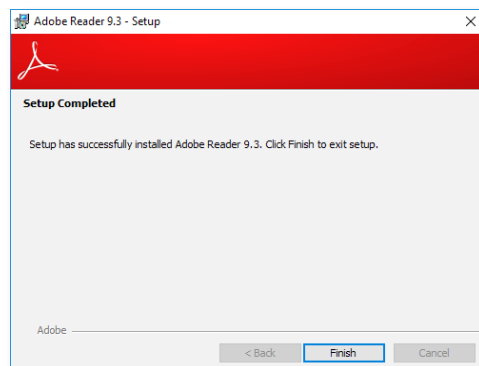
2. Click "Install" to begin installation.



3. Setup is now installing the driver.



4. Click "Finish" to exit installation.



Chapter 3 - BIOS Settings

► 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 / Left arrow	Move the highlight left or right to select a menu
Up / Down arrow	Move the highlight up or down between submenus or fields
<Enter>	Enter the highlighted submenu
+ (plus key)/F6	Scroll forward through the values or options of the highlighted field
- (minus key)/F5	Scroll backward through the values or options of the highlighted field
<F1>	Display general help
<F2>	Display previous values
<F9>	Optimized defaults
<F10>	Save and Exit
<Esc>	Return to previous menu

Scroll Bar

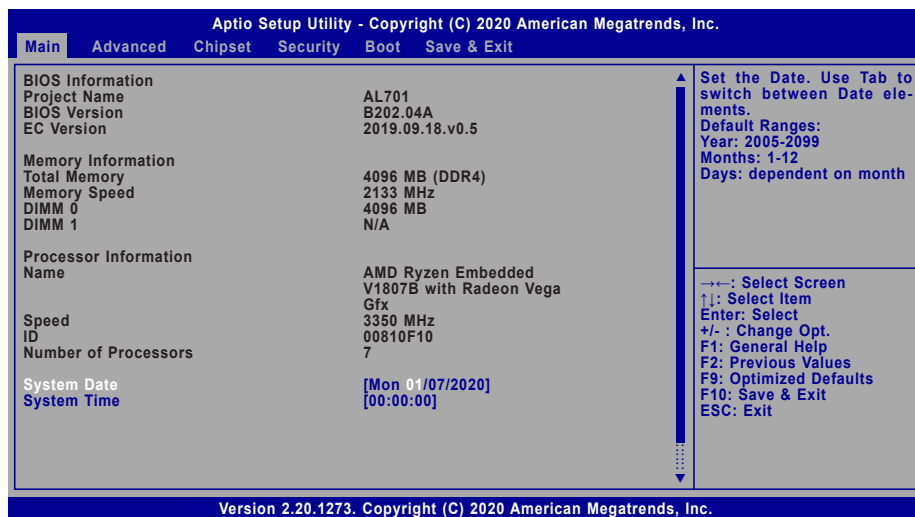
When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

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>.

► Main

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

**System Date**

The date format is <month>, <date>, <year>. Press "Tab" to switch to the next field and press "-" or "+" to modify the value.

System Time

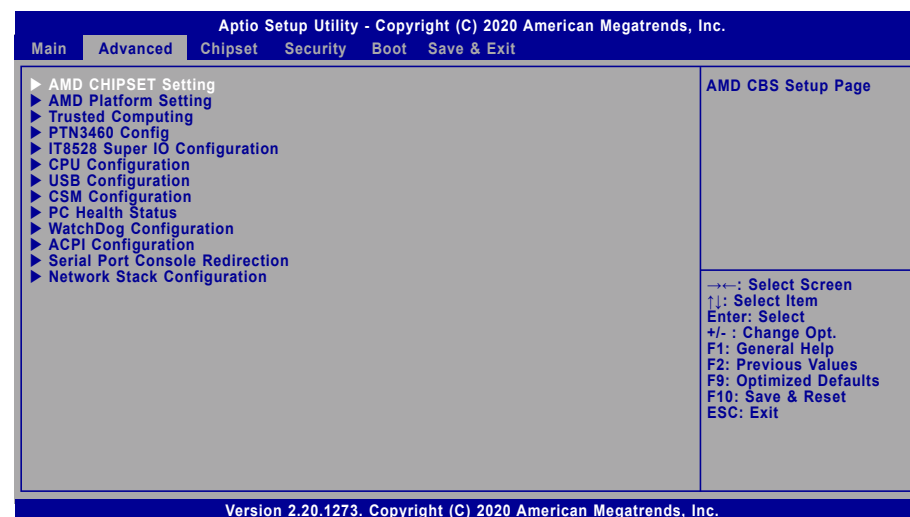
The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

► 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.

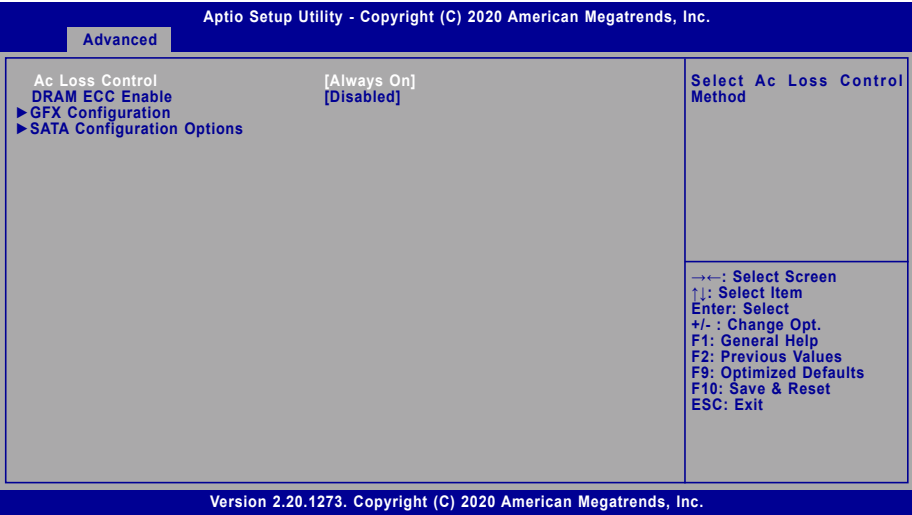
**Important:**

Setting incorrect field values may cause the system to malfunction.



► Advanced

AMD CHIPSET Setting



Ac Loss Control

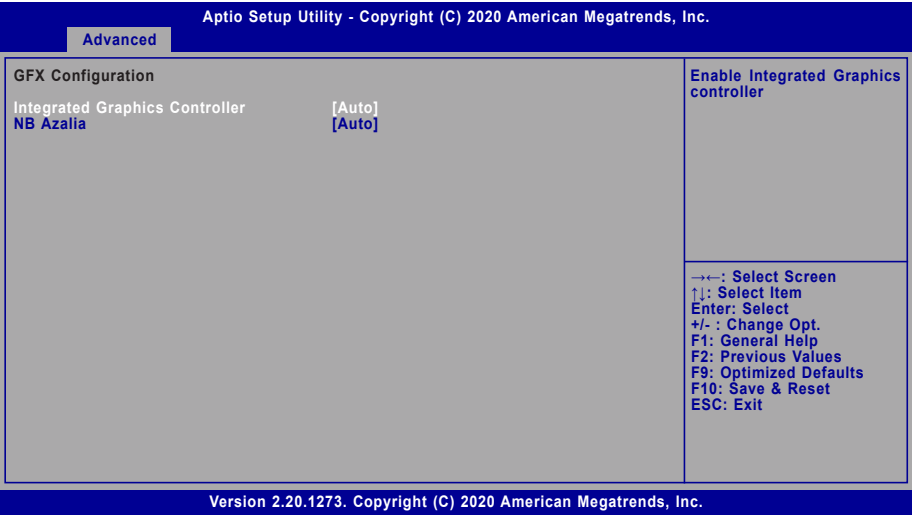
Select among Always On, Always Off, and Last State. This field is used to specify what state the system is set to return to when power is re-applied after AC power failure or loss (G3 state).

- Always On** The system automatically powers on after power failure.
- Always Off** The system enters soft-off state after power failure. Power-on signal input is required to power up the system.
- Last State** The system returns to the last state right before power failure.

DRAM ECC Enable

Enable or disable (Error-correcting code) ECC function of the memory.

► GFX Configuration



Integrated Graphics Controller

Enable or disable the integrated graphics controller, or select Auto for auto-detection.

NB Azalia

Enable or disable the integrated HD Audio controller, or select Auto for auto-detection.

► Advanced ► AMD CHIPSET Setting

► SATA Configuration Options

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.		
Advanced		
SATA Configuration Options		Disable or enable OnChip SATA controller
SATA Controller	[Auto]	
SATA Port 0	Not Present	
SATA Port 1	Not Present	
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
Version 2.20.1273. Copyright (C) 2020 American Megatrends, Inc.		

SATA Controller

Enable or disable the SATA controller, or select Auto for auto-detection.

The information of the SATA devices installed on the system is shown.

► Advanced

AMD Platform Setting

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.		
Advanced		
Primary Video Adaptor	[Int Graphics (IGD)]	Select Internal/External Graphics
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
Version 2.20.1273. Copyright (C) 2020 American Megatrends, Inc.		

Primary Video Adaptor

Select which graphics controller will be the primary video adaptor — Int Graphics (IGD) or Ext Graphics (PEG).

► Advanced

Trusted Computing

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.		
Advanced		
TPM20 Device Found	3.34	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.
Firmware Version	AMD	
Vendor:		
Security Device Support	[Enable]	
Pending operation	[None]	
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
Version 2.20.1273. Copyright (C) 2020 American Megatrends, Inc.		

Security Device Support

This field is used to enable or disable BIOS support for the security device such as an TPM 2.0 to achieve hardware-level security via cryptographic keys.

Pending operation

To clear the existing TPM encryption, select "TPM Clear" and restart the system. This field is not available when "Security Device Support" is disabled.

► Advanced

PTN3460 Config

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.		
Advanced		
PTN3460 Function	[Enable]	Enable or Disable PTN3460 LCD Features
LCD Panel Type	[1920x1080]	
LCD Panel Color Depth	[48 Bit]	
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
Version 2.20.1273. Copyright (C) 2020 American Megatrends, Inc.		

PTN3460 Function

Enable or Disable PTN3460 LCD Features. When this field is disabled, the following fields will remain hidden.

LCD Panel Type

Select the resolution of the LCD Panel — 800X480, 800X600, 1024X768, 1366X768, 1280X1024, 1920X1080, or 1920X1200.

LCD Panel Color Depth

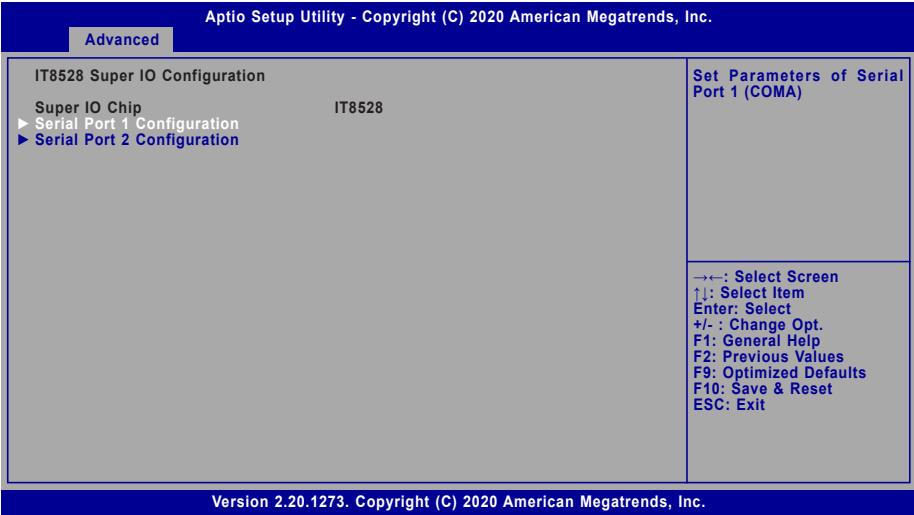
Select the color depth of the LCD Panel — 18 Bit, 24 Bit, 36 Bit, 48 Bit.

**Note:**

The configuration must match the specifications of your LCD Panel in order for the LCD Panel to display properly.

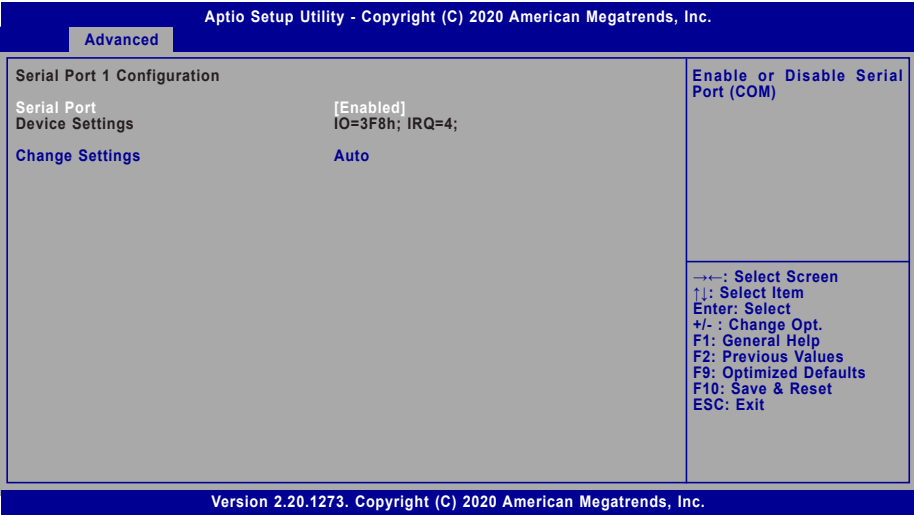
► Advanced

IT8528 Super IO Configuration



The Super IO Chip information is displayed. Select a submenu for more settings.

► Serial Port 1/2 Configuration



Serial Port

Enable or disable the current serial COM port.

Change Settings

Select an I/O Address and IRQ for the current serial Port, or select Auto to assign automatically.

► Advanced

CPU Configuration

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.		
Advanced		
PSS Support	[Enable]	Enable/disable the generation of ACPI _PPC, _PSS, and _PCT objects.
NX Mode	[Enable]	
SVM Mode	[Enable]	
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
Version 2.20.1273. Copyright (C) 2020 American Megatrends, Inc.		

PSS Support

Enable or disable the power, performance, and speed related ACPI functions of the CPU.

NX Mode

Enable or disable the protection function that keeps no-execute codes from being executed by the CPU.

SVM Mode

Enable or disable Secure Virtual Machine (SVM) for CPU virtualization.

► Advanced

USB Configuration

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.		
Advanced		
USB Configuration		Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
Legacy USB Support	[Enabled]	
XHCI Hand-off	[Enabled]	
USB Mass Storage Driver Support	[Enabled]	
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
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Legacy USB Support

- | | |
|-----------------|---|
| Enabled | Enable Legacy USB support. |
| Disabled | Keep USB devices available only for EFI applications. |
| Auto | Disable Legacy support if no USB devices are connected. |

XHCI Hand-off

Enable or disable XHCI Hand-off.

USB Mass Storage Driver Support

Enable or disable USB Mass Storage Driver Support.

► Advanced

CSM Configuration

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.		
Advanced		
CSM Configuration		Enable/Disable CSM Support.
CSM Support	[Enabled]	
CSM16 Module Version	C8.BB	
Boot option filter	[UEFI only]	
Option ROM execution		
Network	[Do not launch]	
Storage	[UEFI]	
Video	[UEFI]	
Other PCI devices	[UEFI]	
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
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CSM Support

This section is used to enable or disable CSM Support. The following fields are only available when "CSM Support" is enabled.

Boot option filter

This field controls Legacy/UEFI ROMs priority — UEFI and Legacy, Legacy only, UEFI only.

Network

This field controls the execution of UEFI and Legacy Network OpROM.

Storage

This field controls the execution of UEFI and Legacy Storage OpROM.

Video

This field controls the execution of UEFI and Legacy Video OpROM.

Other PCI devices

This field determines OpROM execution policy for devices other than Network, Storage or Video.

► Advanced

PC Health Status

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Advanced		
Voltage		Enable/Disable CPU Smart-Fan
VCore	: +1.334 V	
VBAT	: +3.272 V	
VDDQ	: +1.202 V	
+5V	: +5.005 V	
+12V	: +12.000 V	
Temperature		
CPU (°C/°F)	: +55 C / +131F	
Fan Speed		
CPU SmartFan	[Enabled]	
CPU FAN	: 5324 RPM	
SYS FAN	: 0 RPM	
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
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This section displays the system's health information, i.e. voltage readings, CPU and system temperatures, and fan speed readings.

CPU SmartFan

Enable or disable CPU Smart Fan. Once enabled, the fan speed will be moderated according to the current CPU temperature.

► Advanced

WatchDog Configuration

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.		
Advanced		
WatchDog1 function	[Enabled]	Enable/Disable WatchDog Timer.
WatchDog1 Timer	20	
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
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WatchDog1 function

Enable or disable WatchDog function. Once it is enabled, please configure the following field.

SuperIO WatchDog Timer

Set the WatchDog Timer timeout value, ranging from 1 to 255 (second).

► Advanced

ACPI Configuration

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.		
Advanced		
Wake On PCIE	[Disabled]	Enable/Disable integrated LAN to wake the system.
Wake on RTC from S5	[Enabled]	
Wake up hour	0	
Wake up minute	0	
Wake up second	0	
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
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Wake On PCIE

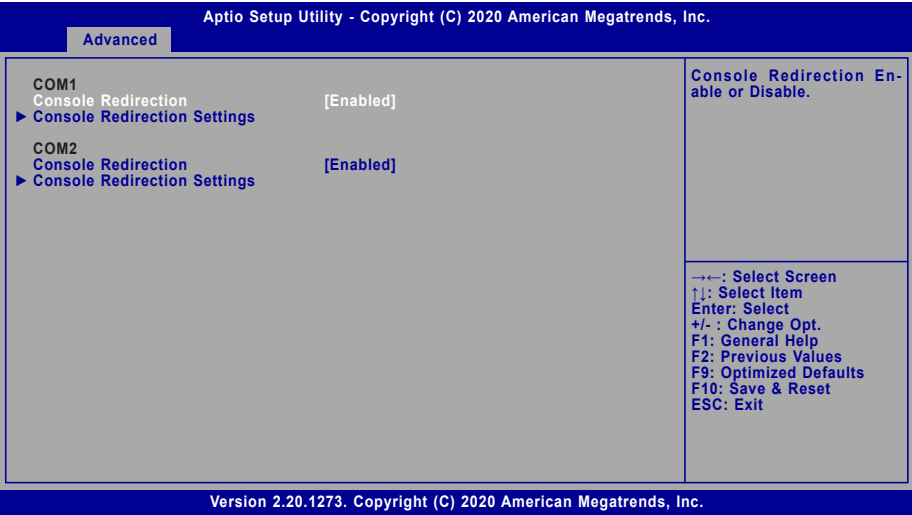
Enable or disable Wake-on-LAN function for the integrated LAN to wake up the system.

Wake on RTC from S5

When Enabled, the system will automatically power up at a designated time every day. Once it's switched to [Enabled], please set up the time of day — hour, minute, and second — for the system to wake up.

► Advanced

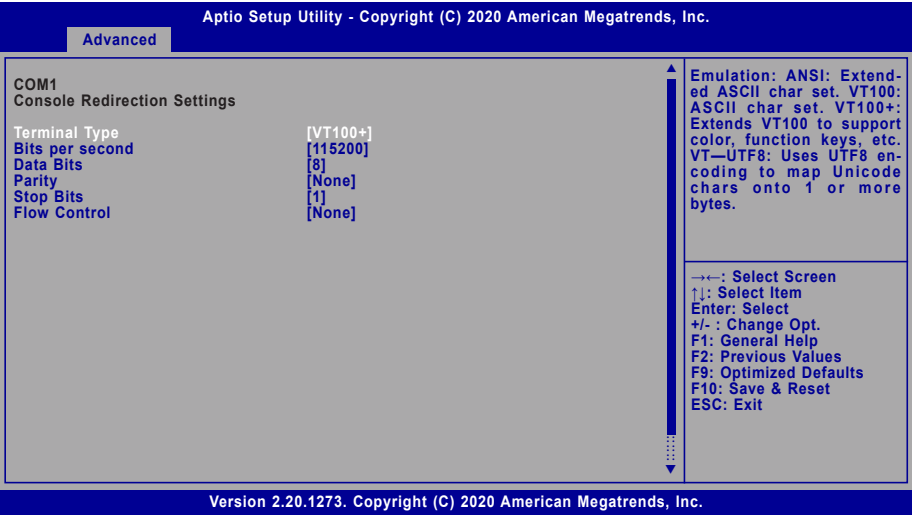
Serial Port Console Redirection



Console Redirection

By enabling Console Redirection of a COM port, the sub-menu of console redirection settings will become available for configuration as detailed in the following.

► Console Redirection Settings



Configure the serial settings of the current COM port.

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, Odd, Mark or Space.

Stop Bits

Select stop bits: 1 bit or 2 bits.

Flow Control

Select flow control type: None or Hardware RTS/CTS.

► Advanced

Network Stack Configuration

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Advanced		
Network Stack	[Enabled]	Enable/Disable UEFI Network Stack
Ipv4 PXE Support	[Disabled]	
Ipv6 PXE Support	[Disabled]	
PXE boot wait time	0	
Media detect count	1	
		→←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
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Network Stack

Enable or disable UEFI network stack. The following fields will appear when this field is enabled.

Ipv4 PXE Support

Enable or disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.

Ipv6 PXE Support

Enable or disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.

PXE boot wait time

Set the wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.

Media detect count

Set the number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

► Security

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Main	Advanced
Chipset	Security
Boot	Save & Exit

Password Description If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup. If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights. The password length must be in the following range: Minimum length 3 Maximum length 20 Administrator Password ► Secure Boot	Set Administrator Password →←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
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Administrator Password

Set the administrator password. To clear the password, input nothing and press enter when a new password is asked. Administrator Password will be required when entering the BIOS.

► Security

Secure Boot

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Security	

System Mode Secure Boot Secure Boot Mode ► Restore Factory Keys ► Reset To Setup Mode ► Key Management	Setup [Disabled] Not Active [Custom]	Secure Boot activated when: Secure Boot is enabled Platform Key(PK) is enrolled, System mode is User/Deployed, and CSM is disabled →←: Select Screen ↑↓: Select Item Enter: Select +/- : Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit
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Secure Boot

The Secure Boot store a database of certificates in the firmware and only allows the Oses with authorized signatures to boot on the system. To activate Secure Boot, please make sure that "Secure Boot" is "[Enabled]", Platform Key (PK) is enrolled, "System Mode" is "User", and CSM is disabled. After enabling/disabling Secure Boot, please save the configuration and restart the system. When configured and activated correctly, the Secure Boot status will be "Active".

Secure Boot Mode

Select the secure boot mode – Standard or Custom. When set to Custom, the following fields will be configurable for the user to manually modify the key database.

Restore Factory Keys

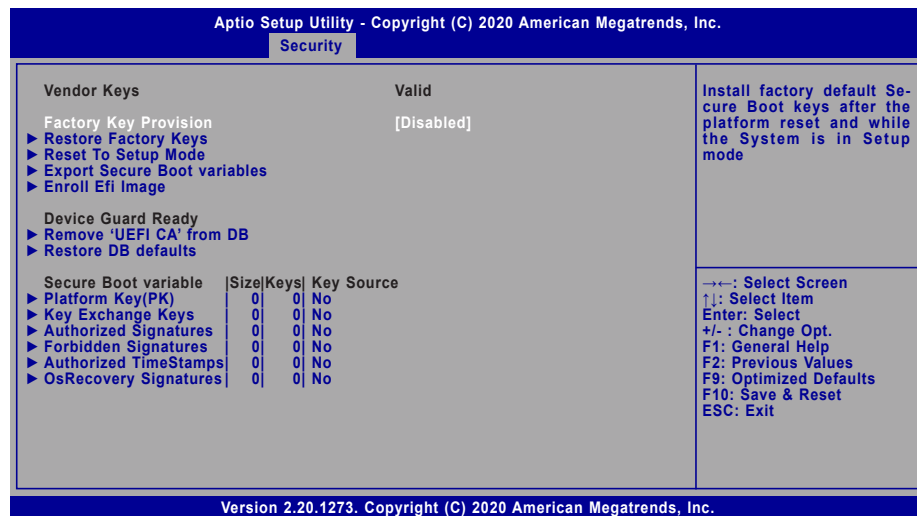
Force system to User Mode. Load OEM-defined factory defaults of keys and databases onto the Secure Boot. Press Enter and a prompt will show up for you to confirm.

Reset To Setup Mode

Clear the database from the NVRAM, including all the keys and signatures installed in the Key Management menu. Press Enter and a prompt will show up for you to confirm.

► Security ► Secure Boot

► Key Management

**Factory Key Provision**

Enable or disable the provision factory default keys on next re-start. This will only take place when the "System Mode" in the previous menu is in "Setup", which can be achieved by moving the cursor to the "Reset To Setup Mode" and press Enter.

Restore Factory Keys

Force system to User Mode. Configure NVRAM to contain OEM-defined factory default Secure Boot keys.

Reset To Setup Mode

Clear the database from the NVRAM, including all the keys and signatures installed in the Key Management menu. Press Enter and a prompt will show up for you to confirm.

Export Secure Boot variables

Export the Secure Boot settings (i.e. all keys and signatures) as files to the root directory of a file system device. Press Enter and select a storage device listed in the pop-up menu. The saved files will be named automatically according to the type of key/signature as listed below.

- "PK" for Platform Keys
- "KEK" for Key Exchange Keys
- "db" for Authorized Signatures
- "dbx" for Forbidden Signatures

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). Press Enter and select a storage device listed in the pop-up menu, select a directory, and then select the EFI Image document.

Remove 'UEFI CA' from DB

Remove Microsoft UEFI CA from the Authorized Signature database. For systems that support Device Guard, Microsoft UEFI CA must NOT be included in the Authorized Signature database.

Restore DB defaults

Press Enter to restore the database variable to factory defaults.

Manually configure the following keys and signatures. Move the cursor to the field and press Enter, and then a pop-up menu will show up.

Platform Key(PK), Key Exchange Keys, Authorized Signatures, Forbidden Signatures, Authorized TimeStamps, OsRecovery Signatures

Details	List the information of enrolled keys and signatures
Export	Save the key or signature as a file to the root directory of a file system. The saved files will be named automatically according to the type of key/signature as previously listed in the "Export Secure Boot Variables".
Update	Load factory default database
Append	Enroll keys and signatures from a file system
Delete	Delet keys and signatures

► Boot

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Main	Advanced	Chipset	Security	Boot	Save & Exit
Boot Configuration			The number of seconds that the firmware will wait before booting the original default boot selection.		
Setup Prompt Timeout			1		
Bootup NumLock State			[Off]		
Quiet Boot			[Enabled]		
Boot Option Priorities					
BGRT Logo			[Disabled]		
			→←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit		
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Setup Prompt Timeout

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

Bootup NumLock State

Select the keyboard NumLock state: On or Off.

Quiet Boot

This section is used to enable or disable quiet boot option.

Boot Option Priorities

Rearrange the system boot order of available boot devices. Please enable the devices that you wish to set as boot devices in the "Advanced > CSM Configuration" submenu.

BGRT Logo

It is used to enable or disable the support of display logo with ACPI BGRT table.

**Note:**

If "Boot option filter" of "CSM Configuration" is set to "UEFI and Legacy" or "UEFI only", and "Quiet Boot" is set to enabled, "BGRT Logo" will show up for configuration. Refer to the Advanced > CSM Configuration submenu for more information.

► Save & Exit

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.					
Main	Advanced	Chipset	Security	Boot	Save & Exit
Save Options			Reset the system after saving the changes		
Save Changes and Reset					
Discard Changes and Reset					
Default Options					
Restore Defaults					
			→←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Reset ESC: Exit		
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Save Changes and Reset

To save the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system after saving all changes made.

Discard Changes and Reset

To discard the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system setup without saving any changes.

Restore Defaults

To restore and load the optimized default values, select this field and then press <Enter>. A dialog box will appear. Select Yes to restore the default values of all the setup options.

► 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 and specific instructions about how to update BIOS with the flash utility. 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.