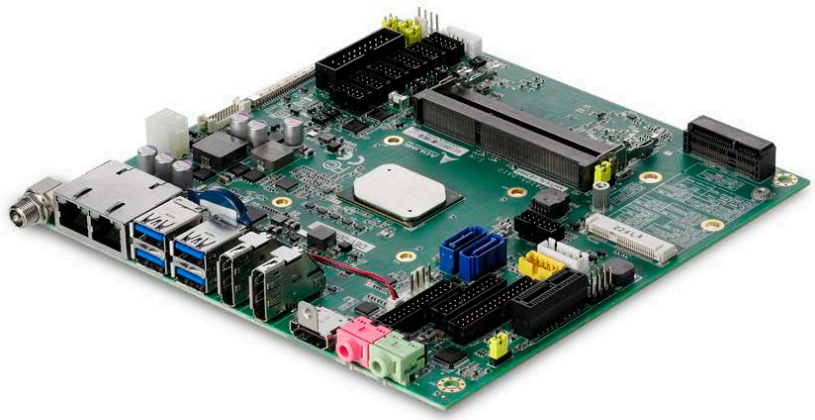
AmITX-AL-I

User's Manual

Thin Mini-ITX Embedded Motherboard with
Intel® Atom™, Pentium®, and Celeron® SoCs



Manual Rev.:	1.0
Revision Date:	October 17, 2018
Part Number:	50-1J087-1000

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Leading EDGE COMPUTING

Preface

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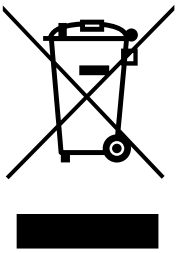
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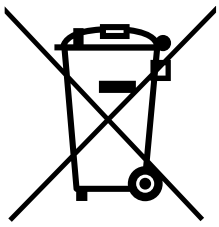
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WARNING: This product can expose you to chemicals including acrylamide, arsenic, benzene, cadmium, Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 1,4-Dioxane, formaldehyde, lead, DEHP, styrene, DINP, BBP, PVC, and vinyl materials, which are known to the State of California to cause cancer, and acrylamide, benzene, cadmium, lead, mercury, phthalates, toluene, DEHP, DIDP, DnHP, DBP, BBP, PVC, and vinyl materials, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Revision History

Revision	Description	Date	By
1.0	Initial Release	10-17-2018	DA

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1. Introduction

The AmITX-AL-I is a low-profile Thin Mini-ITX embedded motherboard supporting an Intel® Atom™ processor x7-E3900 series, Intel® Pentium® processor N4200, and Intel® Celeron® processor N3350 system-on-chip (SoC). The AmITX-AL-I is specifically designed for customers who need optimized processing and graphics performance with low power consumption in a long product life solution.

The Intel® Atom™ processor, Intel® Pentium® processor, and Intel® Celeron® processor support non-ECC type DDR3L dual-channel memory at 1600/1866 MHz to provide excellent overall performance. Integrated Intel® Gen9 LP Graphics includes features such as OpenGL 4.3, DirectX 12, OpenCL 2.0; and support for H.265/HEVC, H.264, MPEG2, VC1, VP9, MVC, JPEG/MJPEG hardware decode. Up to three independent displays are available from DDI ports supporting HDMI/DisplayPort, optional single/dual-channel 18/24-bit LVDS, and optional eDP.

The AmITX-AL-I supports dual stacked SODIMM sockets for up to 16 GB non-ECC type DDR3L memory, and graphics outputs include DisplayPort, HDMI, and optional eDP and optional dual-channel 18/24-bit LVDS. I/O features include HD Audio, dual Gigabit Ethernet port, 4x USB 3.0 ports and 3x USB 2.0 ports, 6x COM ports, PCIe x1 slot, Mini PCIe slot, mSATA slot, and 2x SATA 6 Gb/s ports. A feature connector provides 10 GPIOs, SMBus, and I^2C, and optional SIM card slot and microSD card slot are available. The AmITX-AL-I is equipped with SPI AMI EFI BIOS, supporting embedded features such as hardware monitor and watchdog timer.

The Thin Mini-ITX form factor is the “premier standard for designing and assembling all-in-one PCs,” according to Intel. Measuring 170 mm square and less than 25 mm thick, Thin Mini-ITX fulfills requirements for applications in digital signage, infotainment, medical, and industrial automation that are running in limited-space environments. ADLINK’s thin Mini-ITX board also follows the Form, Fit, Function design principle to offer standardized pinout locations and is compatible with the Micro-ATX and regular ATX chassis. The AmITX-AL-I provides an easy and fast path to creating industrial computing solutions.

Table 1: AmITX-AL-I Processors

Model	Intel “Braswell” SoC	Core Speed (HFM/Burst)	Thermal Design Power (TDP)	Scenario Design Power (SDP)
AmITX-AL-I-E3950	Atom™ x7-E3950 (4 cores)	1.60/2.00 GHz	12W	
AmITX-AL-I-E3940	Atom™ x5-E3940 (4 cores)	1.60/1.80 GHz	9.5W	
AmITX-AL-I-E3930	Atom™ x5-E3930 (2 cores)	1.30/1.80 GHz	6.5W	
AmITX-AL-I-N4200	Pentium® N4200 (4 cores)	1.10/2.50 GHz	6W	4W
AmITX-AL-I-N3350	Celeron® N3350 (2 cores)	1.10/2.40 GHz	6W	4W

Latest revision of the datasheet, user’s manual, BIOS, drivers, and board support packages, can be downloaded from the product webpage: http://www.adlinktech.com/PD/web/PD_detail.php?cKind=&pid=1667#

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1.1. Packing List

- AmITX-AL-I Thin Mini-ITX Embedded Board
- SATA dual power cable (P/N: 30-20875-0000)
- SATA cable (P/N: 30-10057-0600)
- Standard rear I/O shield (PN:34-25318-2000)

1.2. Optional Accessories

- COM port cable, 1 port (P/N: 30-20876-0000)
- PS/2 KB/MS cable (P/N: 30-20873-0000)
- USB 2.0 cable, 2 ports (P/N: 30-20874-1000)

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2. Specifications

2.1. Core System

CPU	Dual or quad-core Intel® Atom™, Pentium®, and Celeron® Processor SoC AtomTM x7-E3950 1.60/2.00 (Burst) GHz 12W (4C/1866) AtomTM x5-E3940 1.60/1.80 (Burst) GHz 9.5W (4C/1866) AtomTM x5-E3930 1.30/1.80 (Burst) GHz 6.5W (2C/1866) Pentium® N4200 1.10/2.50 (Burst) GHz 6W (4W SDP) (4C/1866) Celeron® N3350 1.10/2.40 (Burst) GHz, 6W (4W SDP) (2C/1866) Supportboth Intel® Virtualization Technology (Intel® VT) for IA-32, Intel® 64 and Intel® Architecture (Intel® VT-x)/Intel® Virtualization Technology (Intel® VT) for Directed I/O (Intel® VT-d) Notes: Availability of features may vary between processor SKUs and operating systems Only Atom™ SKUs can support extreme temperature operating range
Cache	2MB for all SKUs
Memory	Dual channel non-ECC 1600/1333 MHz DDR3L memory up to 16GB in dual stacked SODIMM sockets
Embedded BIOS	AMI EFI in 16MB SPI BIOS

2.2. Rear I/O Connectors

Display	1x DisplayPort (2x DisplayPort by build option, in place of HDMI), 1x HDMI (co-lay with DP)
LAN	Dual GbE RJ-45
USB	4x USB 3.0
Audio	Line-Out, Mic-In
Power	Screw Jack for 12V DC-in

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2.3. Internal Headers and Connectors

PCI Express Slots	1x PCIe x1 slot 2x Mini PCIe slots: one PCIe + USB; one mSATA (colay with SATA1)
USB	2x USB 2.0 via onboard header, 1x USB 2.0 via front panel connector
SATA	2x SATA 6Gb/s (SATA1, SATA2) SATA Power Connector
Serial	2x RS-232/422/485 headers with 0V/5V/12V power, 4x RS-232 headers
LVDS (optional)	Dual-channel 18/24-bit, switched from eDP (build option)
eDP (optional)	Build option, not available concurrently with LVDS
SIM Card Slot	Build option
microSD Card Slot	Build option
Other	Front Panel Header Audio Header Feature Connector Header PS/2 KB/MS Connector TPM Header SPI Header ATX Power Connector (4-pin)

2.4. Form Factor

Mini-ITX: 170mm x 170mm

2.5. SEMA Board Controller

ADLINK Smart Embedded Management Agent (SEMA)

- Voltage/Current monitoring
- Power sequence debug support
- AT/ATX mode control
- Logistics and Forensic information
- Flat Panel Control
- General Purpose I2C
- Failsafe BIOS (dual BIOS)
- Watchdog Timer and Fan Control

2.6. Debug Header

40-pin Multipurpose Flat Cable Connector: used in combination with DB-40 debug module providing BIOS POST code LED, BMC access, SPI BIOS flashing, Power Testpoints, Debug LEDs

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2.7. Video

GPU Feature Support	Intel® 9th generation LP graphics core architecture with up to 18 execution units supporting three independent displays • 3D graphics hardware acceleration • Support for DirectX12/11.3/10/9.3, OCL 2.0, OGL ES 3.0, OGL 4.3 • Video decode hardware acceleration including support for H.265 (HEVC), H.264, MVC, MPEG-2, VC-1, WMV9, VP8/VP9, JPEG/MJPEG formats • Video encode hardware acceleration including support for H.265 (HEVC), H.264, VP8/VP9, JPEG/MJPEG formats • Supports content protection using PAVP 2.0 and HDCP 1.4/2.0 **Note**: Availability of features dependent on processor SKU and may vary between operating systems.
Display Interface Support	• DisplayPort: Supports DP1.2, maximum resolution: 4096x2160 @ 24Hz (2x DisplayPort by build option, in place of HDMI) • HDMI: Supports HDMI 1.4b, maximum resolution: 3840x2160 @ 30Hz (co-lay with DP) • LVDS (optional): Supports single/dual channel 18/24-bit, up to 1920x1200 @ 60 Hz • eDP (optional): Supports eDP 1.3, maximum resolution: 3840x2160 @ 60Hz **Note**: The configuration of triple display support is DP + HDMI + LVDS/eDP (2x DP + LVDS/eDP by build option)

2.8. Audio

Audio Codec: ALC888S

2.9. LAN

Intel MAC/PHY	Intel® i211AT (MAC/PHY) Ethernet Controller (Intel® i210 by build option for extreme operating temperature range support)
Interface	10/100/1000 GbE connection

2.10. Power Specification

Power Modes	AT and ATX mode (AT mode start controlled by BMC)
Standard Voltage Input	12VDC ±5%
Power Management	ACPI 4.0 compliant
Power States	Supports C0, C1, C1E, C6C, C6, C7, S0, S1, S3, S4, S5 (Wake-on-USB S3/S4, WoL S3/S4/S5)

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2.10.1. Power Consumption

Processor	**Intel® Atom™ E3950 @ 1.60Ghz (4C 1.6GHz, 2x 1MB LK2)**	**Intel® Atom ™ E3940 @ 1.60GHz (4C 1.6GHz, 2x 1MB LK2)**	**Intel® Atom ™ E3930 @ 1.30GHz (4C 1.6GHz, 2x 1MB LK2)**
Memory	Transcend TS512MSK64W6H 4GB DDR3 SO-DIMM PC3-12800U DDR3-1600	Transcend TS512MSK64W6H 4GB DDR3 SO-DIMM PC3-12800U DDR3-1600	Transcend TS512MSK64W6H 4GB DDR3 SO-DIMM PC3-12800U DDR3-1600
Graphics	Intel® HD Graphics 505	Intel® HD Graphics 500	Intel® HD Graphics 500
HDD	Micron SSD 2.5" CT250MX200SSD1 250GB	Micron SSD 2.5" CT250MX200SSD1 250GB	Micron SSD 2.5" CT250MX200SSD1 250GB
OS	Window 10 Enterprise (10.0.15063) 64bit V1703	Window 10 Enterprise (10.0.15063) 64bit V1703	Window 10 Enterprise (10.0.15063) 64bit V1703
Windows Idle mode/Enable EIST			
3.3V(A)	0	0	0
5V(A)	0	0	0
12V(A)	0.33	0.33	0.33
5VSB(A)	0	0	0
Power consumption(W)	3.96	3.96	3.96
Windows Idle mode/Disable EIST			
3.3V(A)	0	0	0
5V(A)	0	0	0
12V(A)	0.34	0.34	0.34
5VSB(A)	0	0	0
Power consumption(W)	4.08	4.08	4.08
Windows typical mode/Enable EIST			
3.3V(A)	0	0	0
5V(A)	0	0	0
12V(A)	1.3	1.1	0.9
5VSB(A)	0	0	0
Power consumption(W)	15.6	13.2	10.8
Windows typical mode/Disable EIST			
3.3V(A)	0	0	0
5V(A)	0	0	0
12V(A)	1.2	1.05	0.8

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Processor	Intel® Atom™ E3950 @ 1.60Ghz (4C 1.6GHz, 2x 1MB LK2)	Intel® Atom ™ E3940 @ 1.60GHz (4C 1.6GHz, 2x 1MB LK2)	Intel® Atom ™ E3930 @ 1.30GHz (4C 1.6GHz, 2x 1MB LK2)
5VSB(A)	0	0	0
Power consumption(W)	14.4	12.84	9.6
Windows MAX mode/Enable EIST			
3.3V(A)	0	0	0
5V(A)	0	0	0
12V(A)	1.6	1.4	1.1
5VSB(A)	0	0	0
Power consumption(W)	19.2	16.8	13.2
Windows MAX mode/Disable EIST			
3.3V(A)	0	0	0
5V(A)	0	0	0
12V(A)	1.45	1.3	1.0
5VSB(A)	0	0	0
Power consumption(W)	17.4	15.6	12
System S1 mode			
3.3V(A)	No support	No support	No support
5V(A)	No support	No support	No support
12V(A)	No support	No support	No support
Power consumption(W)	Not Applicable	Not Applicable	Not Applicable
System S3 mode			
3.3V(A)	0	0	0
5V(A)	0	0	0
12V(A)	0.07	0.07	0.07
Power consumption(W)	0.84	0.84	0.84
System S4 mode			
3.3V(A)	0	0	0
5V(A)	0	0	0
12V(A)	0.05	0.05	0.05
Power consumption(W)	0.6	0.6	0.6
S5 Mode with ECO Disable			
3.3V(A)	0	0	0
5V(A)	0	0	0

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Processor	Intel® Atom™ E3950 @ 1.60Ghz (4C 1.6GHz, 2x 1MB LK2)	Intel® Atom ™ E3940 @ 1.60GHz (4C 1.6GHz, 2x 1MB LK2)	Intel® Atom ™ E3930 @ 1.30GHz (4C 1.6GHz, 2x 1MB LK2)
12V(A)	0.05	0.05	0.05
Power consumption(W)	0.6	0.6	0.6
S5 Mode with ECO Enable			
3.3V(A)	0	0	0
5V(A)	0	0	0
12V(A)	0.01	0.01	0.01
5VSB(A)	0	0	0
Power consumption(W)	0.12	0.12	0.12

2.11. Temperatures

Standard Operating Temperature	0°C to 60°C
Extreme Rugged Operating Temperature	-40°C to 85°C (build option, supported by Atom™ SKUs only)

2.12. Environmental

Humidity	10-90% RH operating, non-condensing
Shock and Vibration	MIL-STD-202G Method 214A, Table 214-I Condition D. MIL-STD-202G Method 213B, Table 213-I Condition A.
HALT	Thermal Stress, Vibration Stress, Thermal Shock and Combined Test

2.13. Operating Systems

Standard Support	Windows 10 Enterprise 64-bit, Linux 64-bit, (VxWorks 64-bit is TBD)
Extended Support (BSP)	Linux 64-bit, (VxWorks 64-bit is TBD)

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2.14. Functional Block Diagram

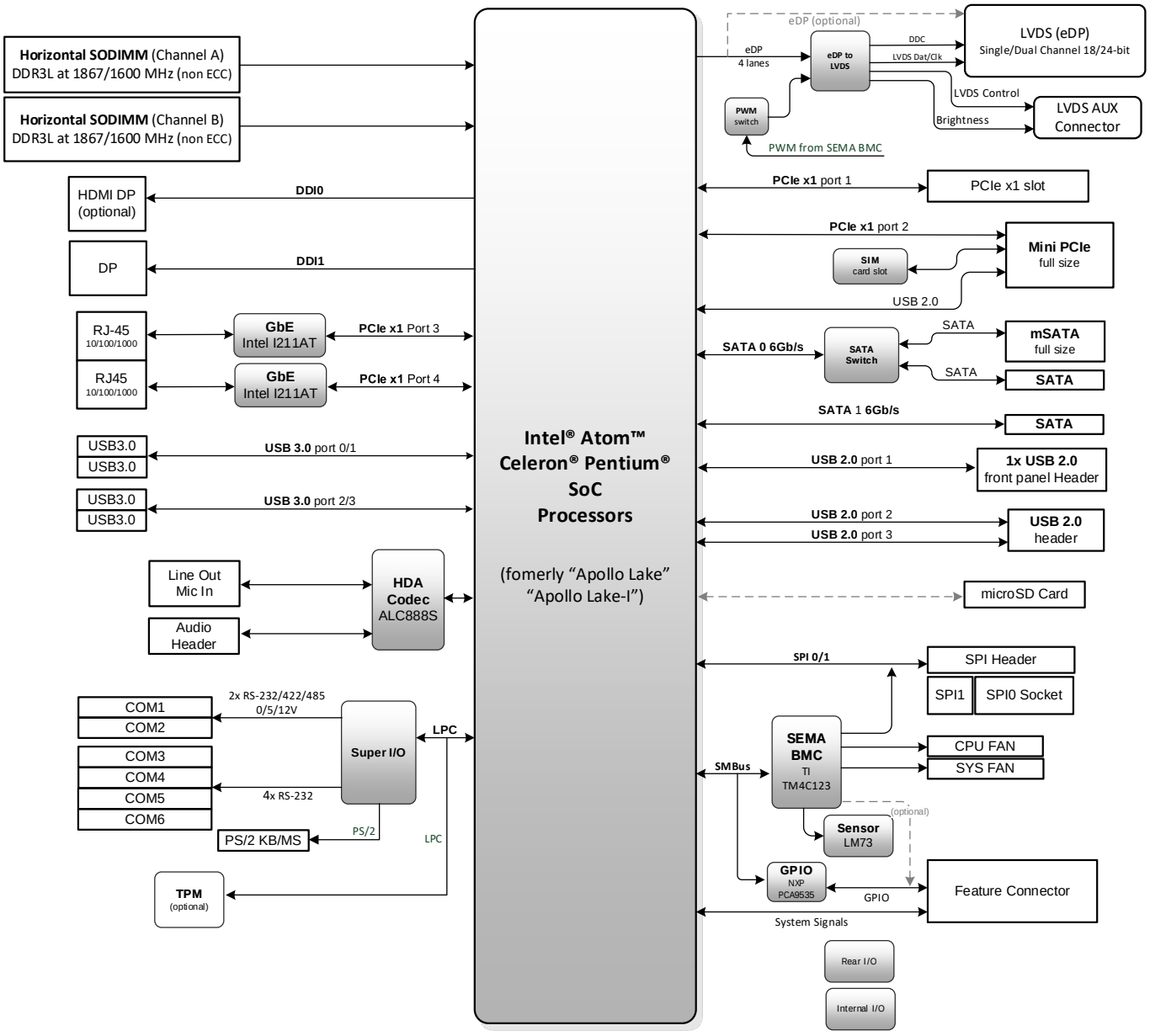


Figure 1: AmITX-AL-I Functional Block Diagram

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3. Mechanical Layout

3.1. Connector Locations

3.1.1. Rear I/O

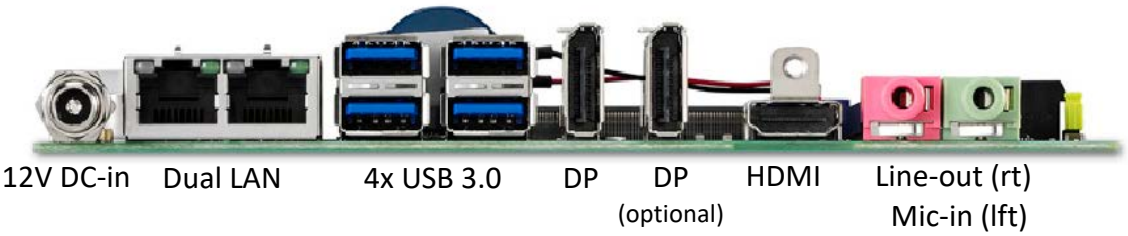


Figure 2: AmITX-AL-I Rear I/O

3.1.2. Component Side Connectors

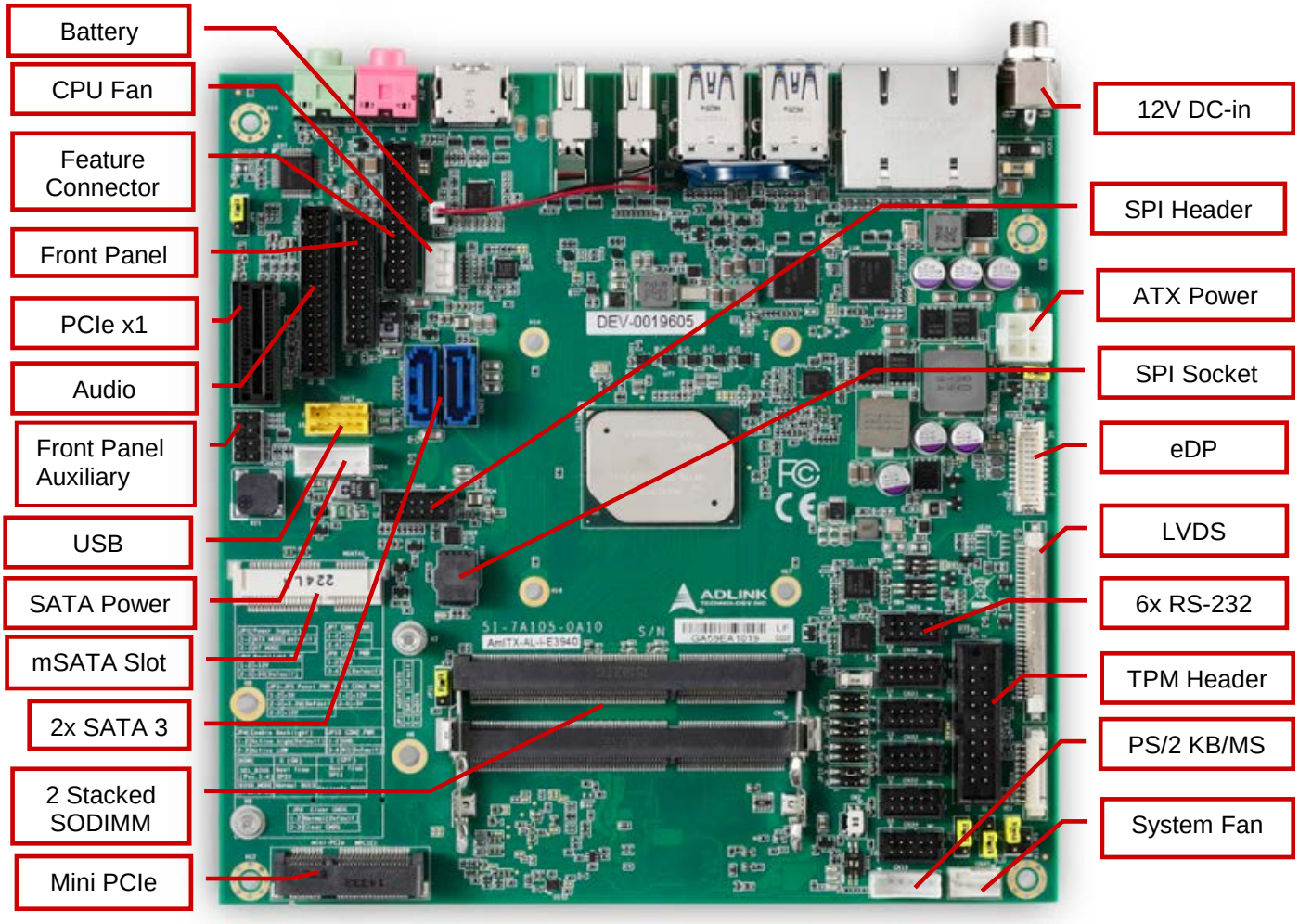


Figure 3: AmITX-AL-I Component Side Connectors

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3.1.3. Solder Side Connectors

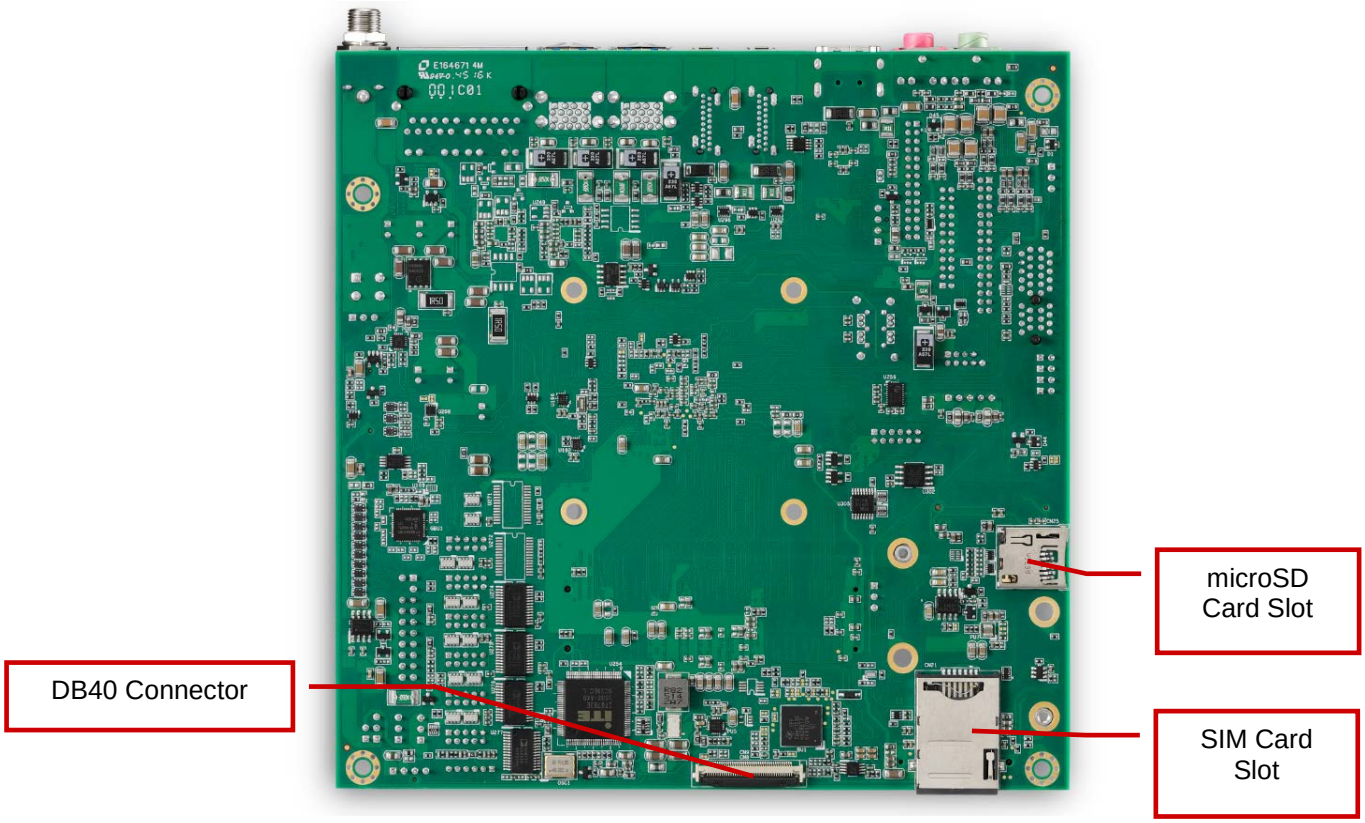
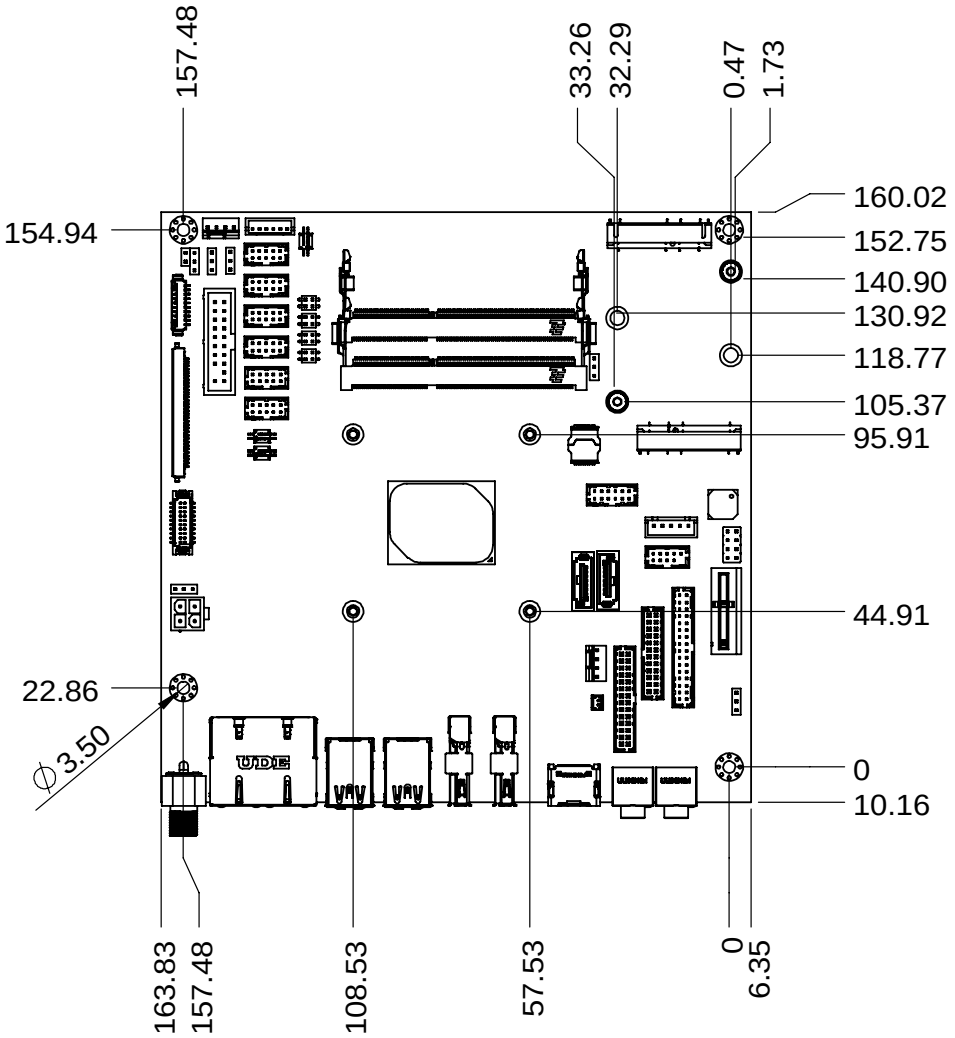


Figure 4: AmITX-AL-I Solder Side Connectors

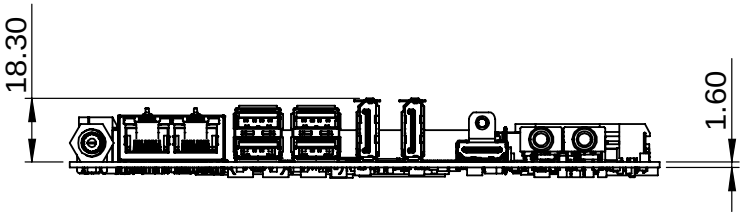
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3.2. Mechanical Dimensions

Top View
(W/O RTC battery)



Side View
(W/O RTC battery)



Dimensions: mm

Figure 5: AmITX-AL-I Mechanical Dimensions

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4. Connectors and Jumpers

See 3.1 Connector Locations on page 11 for connector locations.

4.1. Rear IO Connectors

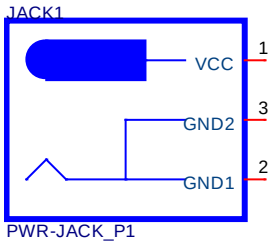
4.1.1. DC Power Inlet

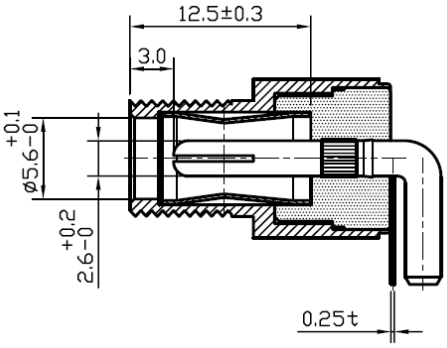
The AmITX-AL-I supports a screw-type external 12V DC-in power connector. Maximum current draw is 10A.

Note: Either the DC Power Inlet or the internal ATX Power Connector (ATX_PWR) must be used to supply the motherboard with +12V ±5%.











Caution:

Hot-plugging the power supply is not supported. Doing so may damage the board.

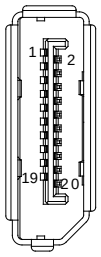
Only connect ONE power supply to the board. Connecting power to both the 12V DC inlet and the internal ATX Power Connector, may damage the board.

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4.1.2. DisplayPort

DisplayPort v1.2 specification ports up to 4096x2160 @ 24Hz (2x DisplayPort by build option, in place of HDMI)

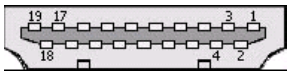
Pin #	Signal	Pin #	Signal
1	CN_DP0_P	2	Ground
3	CN_DP0_N	4	CN_DP1_P
5	Ground	6	CN_DP1_N
7	CN_DP2_P	8	Ground
9	CN_DP2_N	10	CN_DP3_P
11	Ground	12	CN_DP3_N
13	DDC_AUX_SEL	14	CN_CEC
15	CN_AUX_P	16	Ground
17	CN_AUX_N	18	DDP_HPD
19	Ground	20	P3V3



4.1.3. HDMI Connector

Supports HDMI 1.4b, maximum resolution: 3840x2160 @ 30Hz (co-lay with DP)

Pin #	Signal	Pin #	Signal
1	TMDS Data2+	2	TMDS Data2 Shield
3	TMDS Data2–	4	TMDS Data1+
5	TMDS Data1 Shield	6	TMDS Data1–
7	TMDS Data0+	8	TMDS Data0 Shield
9	TMDS Data0–	10	TMDS Clock+
11	TMDS Clock Shield	12	TMDS Clock–
13	NC	14	NC
15	SCL	16	SDA
17	GND	18	+5 V Power
19	Hot Plug Detect		

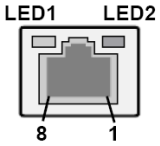


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4.1.4. Ethernet Connectors (LAN1, LAN2)

Intel® i211AT (MAC/PHY) Ethernet controller (Intel® i210 is build option for extreme temperature operating range support)

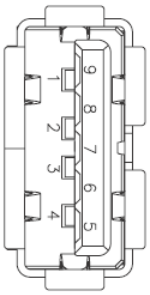
Pin #	10BASE-T/100BASE-TX	1000BASE-T
1	TX+	LAN_MDI0+
2	TX-	LAN_MDI0-
3	RX+	LAN_MDI1+
4	--	LAN_MDI1-
5	--	LAN_MDI2+
6	RX-	LAN_MDI2-
7	--	LAN_MDI3+
8	--	LAN_MDI3-



LED1 (Speed)		LED2 (Link/Activity)	
Status	Description	Status	Description
Off	10 Mb connection	Off	No Link
Green	100 Mb connection	Green	Linked
Orange	1 Gb connection	Blinking	Data Activity

4.1.5. USB 3.0 Connectors (USB1-4)

Pin #	Signal
1	USB3.0_P5VA
2	USB2_CMAN
3	USB2_CMAP
4	GND
5	USB3A_CMRXN
6	USB3A_CMRXP
7	GND
8	USB3A_CMTXN
9	USB3A_CMTXP



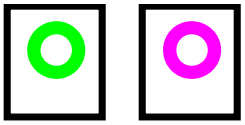
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4.1.6. Audio Connectors (Line-out [green], Mic-in [pink])

Audio Codec: Realtek ALC888S

Jack	Contact	Signal
Line-out	Tip	FRONT-OUT-L
	Ring	FRONT-OUT-R
	Sleeve	GND
Mic-in	Tip	MIC1-L
	Ring	MIC1-R
	Sleeve	GND

Line Out (JACK - D, Green)



MIC In (JACK - B, Pink)

Note: Shared with onboard Audio Header; un-amplified codec output.

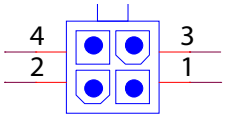
4.2. Internal Connectors

4.2.1. ATX Power Connector 4-pin (ATX_PWR1)

AmITX-AL-I supports a proprietary internal ATX Power Connector (4-pin).

Note: Either the DC Power Inlet or the internal ATX Power Connector (4-pin) must be used to supply the motherboard with +12V ±5%.

Pin #	Signal
1	GND
2	GND
3	+12V DC
4	+12V DC



CAUTION

Only connect ONE power supply to the board. Connecting power to both the 12V DC-inlet and the internal ATX Power Connector may damage the board.

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4.2.2. SATA Connectors (SATA1, SATA2, CN22-23)

Two SATA ports are available on the AmITX-AL-I and support SATA Gen3 (6.0/3.0/1.5Gb/s).

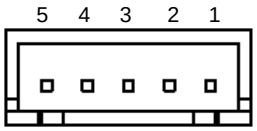
Note: If mSATA is installed, SATA1 is disabled. See 4.3.3 SATA1/mSATA Select (JP11).

Pin #	Signal
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

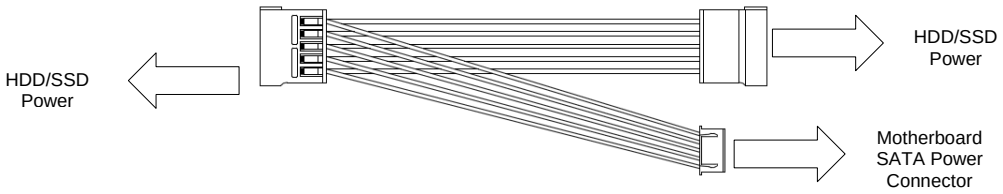


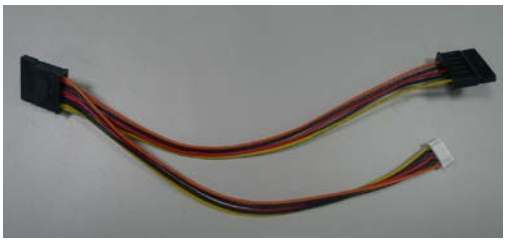
4.2.3. SATA Power Connector (ST_PWR, CN24)

Pin #	Signal
1	12V
2	GND
3	5V
4	GND
5	3.3V



SATA Power Cable: ADLINK Part. No.: 30-20875-0000 (length 200 mm)



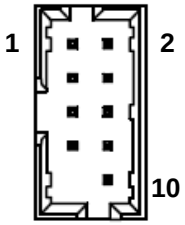


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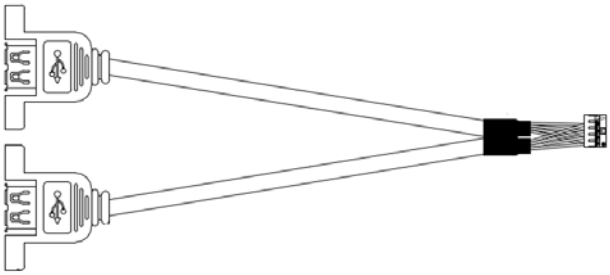
4.2.4. USB 2.0 Header (CN17)

5V/SB5V: 5V is supplied for external devices. SB5V is supplied during power down to allow wakeup on USB device activity during S3~S4 state.

Pin #	Signal	Pin #	Signal
1	P5V_USB2_4	2	P5V_USB2_5
3	USB2_HUB4_N	4	USB2_HUB5_N
5	USB2_HUB4_P	6	USB2_HUB5_P
7	GND	8	GND
9	KEY	10	GND



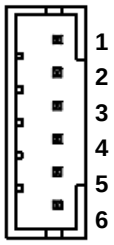
USB Cable (optional):
USB 2.0 Header to 2x Female Type-A Cable (length 200mm), P/N: 30-20874-1000



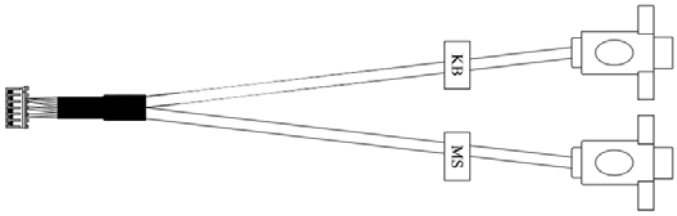
4.2.5. PS/2 Keyboard and Mouse Connector (CN19)

6 pin 2.0 pitch standard wafer connector. No support for PS/2 KB/MS wake function

Pin #	Signal
1	MSCLK
2	V5S_S3
3	MSDATA
4	GND
5	KBDATA
6	KBCLK



KB/MS Cable (optional):
PS/2 KB/MS Cable (length 400mm), P/N: 30-20873-0000



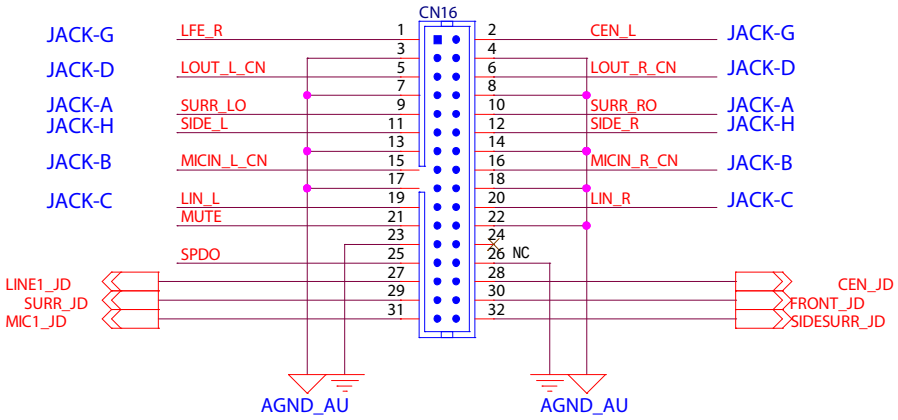
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4.2.6. Internal Audio Connector (CN16)

2x16-pin 2.0 pitch standard wafer connector.

Note: Signals shared with Audio Connector on Rear I/O.

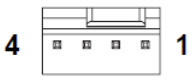
Signal	Pin #	Pin #	Signal
LFE_R	1	2	CEN_L
AGND_AU	3	4	AGND_AU
LOUT_L_CN	5	6	LOUT_R_CN
AGND_AU	7	8	AGND_AU
SURR_LO	9	10	SURR_RO
SIDE_L	11	12	SIDE_R
AGND_AU	13	14	AGND_AU
MICIN_L_CN	15	16	MICIN_R_CN
AGND_AU	17	18	AGND_AU
LIN_L	19	20	LIN_R
MUTE	21	22	AGND_AU
GND	23	24	NC
SPDO	25	26	GND
LINE1_JD	27	28	CEN_JD
SURR_JD	29	30	FRONT_JD
MIC1_JD	31	32	SIDESURR_JD



4.2.7. CPU Fan and System Fan Connectors (CPU: CN36, SYS: CN37)

Pin 3 and 4 are connected (monitored and managed) by SEMA controller.

Pin #	Signal
1	GND
2	Fan Power (+12V)
3	Fan Sense
4	Fan Speed Control

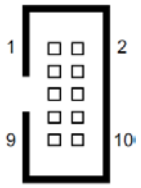


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4.2.8. Serial COM Port Connectors (CN29-CN34)

Four internal Serial Ports (COM1-6)

Serial Port	Functions
COM1	Supports RS-232/422/485, 0V5V/12V power support by jumper selection SWS1M: Switch for mode selection of COM1 (default RS-232).
COM2	Supports RS-232/422/485, 0V/5V/12V power support by jumper selection SWS2M: Switch for mode selection of COM2 (default RS-232).
COM3	Supports RS-232
COM4	Supports RS-232
COM5	Supports RS-232
COM6	Supports RS-232



RS-232 (COM1-6)

Pin #	Signal	Pin #	Signal
1	DCD	2	DSR
3	RxD	4	RTS
5	TxD	6	CTS
7	DTR	8	RI
9	GND	10	NC

RS-422 (COM1-2 only)

Pin #	Signal	Pin #	Signal
1	Tx-	2	—
3	Tx+	4	—
5	Rx+	6	—
7	Rx-	8	—
9	GND	10	NC

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RS-485 (COM1-2 only)

Pin #	Signal	Pin #	Signal
1	Tx/Rx-	2	
3	Tx/Rx+	4	—
5	—	6	—
7	—	8	—
9	GND	10	NC

RS-232/422/485 Selection (COM1-2 only)

SWS1M/SWS2M (RS-232/422/485 Mode Select)			
	RS-232 (default)	RS-422	RS-485
1	ON	ON	OFF
2	OFF	ON	ON

COM1 Power Selection (JP7, JP8)

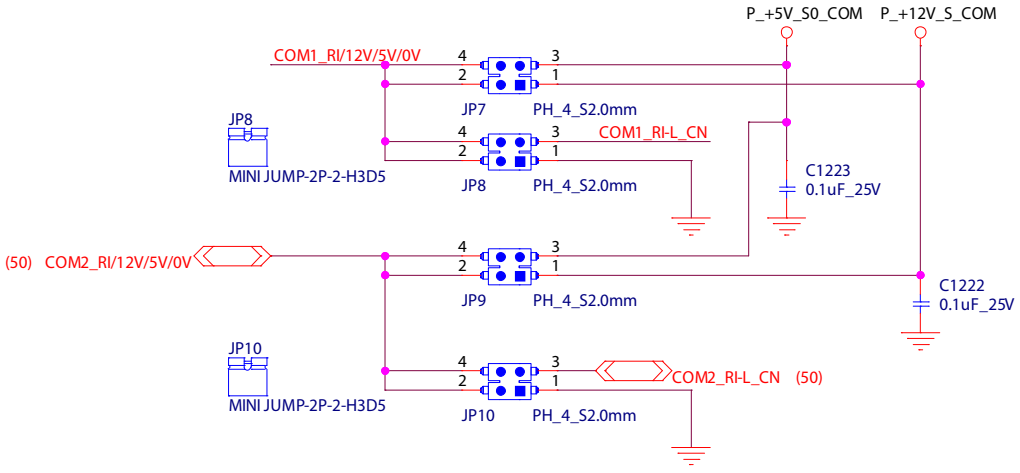
JP7 COM1 PWR	
1-2	+12V
3-4	+5V

JP8 COM1 PWR	
1-2	GND
3-4	RI (default)

COM2 Power Selection (JP9, JP10)

JP9 COM2 PWR	
1-2	+12V
3-4	+5V

JP10 COM2 PWR	
1-2	GND
3-4	RI (default)



COM Cable (optional):
COM Port Cable (length 250mm), P/N: 30-20876-0000

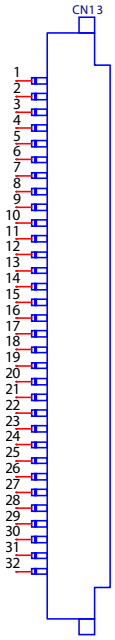


4.2.9. LVDS Connector (CN13)

FFC Connector: Female, 30pin, 1mm pitch. (JAE, FI-X30SSLA-HF)
Supports non-EDID type LCD panels.

Signal	Description
LVDS A0..A3	LVDS A Channel data
LVDS ACLK	LVDS A Channel clock
LVDS B0..B3	LVDS B Channel data
LVDS BCLK	LVDS B Channel clock
VDD ENABLE	Output Display Enable.
LCDVCC	VCC supply to the display. Power-on/off sequencing depending on selected display type in the BIOS Setup. Switchable by jumper either 3.3V (default) ,5V or 12V Maximum load is 1A total for both voltages.
DDC CLK	DDC Channel Clock
DDC DAT	DDC Channel Data

Note	Type	Signal	Pin #	Pin #	Signal	Type	Note
Max. 0.5A	PWR	POWER GND	1	17	LVDS B1+	LVDS	
	LVDS	LVDS A0-	2	18	POWER GND	PWR	Max. 0.5A
	LVDS	LVDS A0+	3	19	LVDS B2-	LVDS	
	LVDS	LVDS A1-	4	20	LVDS B2+	LVDS	
	LVDS	LVDS A1+	5	21	LVDS BCLK-	LVDS	
	LVDS	LVDS A2-	6	22	LVDS BCLK+	LVDS	
	LVDS	LVDS A2+	7	23	LVDS B3-	LVDS	
Max. 0.5A	PWR	POWER GND	8	24	LVDS B3+	LVDS	
	LVDS	LVDS ACLK-	9	25	POWER GND	PWR	Max. 0.5A
	LVDS	LVDS ACLK+	10	26	DDC DATA	OT	PU 2K2Ω, 3.3V
	LVDS	LVDS A3-	11	27	VDD ENABLE	OT	3.3V level
	LVDS	LVDS A3+	12	28	DDC CLK	OT	PU 2K2Ω, 3.3V
	LVDS	LVDS B0-	13	29	EDID POWER	PWR	Max 0.5A



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Note	Type	Signal	Pin #	Pin #	Signal	Type	Note
	LVDS	LVDS B0+	14	30	PANEL POWER	PWR	Max 0.5A
Max. 0.5A	PWR	POWER GND	15	31	PANEL POWER	PWR	Max 0.5A
	LVDS	LVDS B1-	16	32	POWER GND	PWR	Max. 0.5A

4.2.10. LVDS Auxiliary Connector (CN14)

Wafer 1x10 pin: 1.25 mm pitch (MOLEX, 53261-1071)

Pin	Type	Signal	Note
1	OT	BKLT_EN#	3.3V level
2	PWR	GND	Max. 0.5A
3	PWR	GND	Max. 0.5A
4	PWR	BKLT_PWR	Max. 0.5A
5	PWR	BKLT_PWR	Max. 0.5A
6	PWR	BKLT_PWR	Max. 0.5A
7	PWR	BKLT_PWR	Max. 0.5A
8	PWR	GND	Max. 0.5A
9	PWR	GND	Max. 0.5A
10	OT	BKLT_CTL	3.3V level



Signal	Description
BKLT_EN#	Backlight Enable signal (active low) Optional to invert this signal to active high BKLT_EN (by jumper)
BKLT_PWR	Backlight Power switchable by jumper either 5V (default) or 12V. Maximum 1A per pin for both voltages
BKLT_CTL	Backlight control, PWM signal to implement voltage in the range 0-3.3V

See Section 4.3 Jumper and Switch Settings for Backlight Power Selection (JP2), Backlight Enable Selection (JP4), and Panel Power Selection (JP3, JP5) settings.

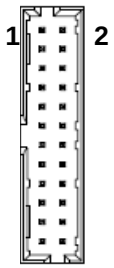
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4.2.11. Front Panel Header (CN27)

2x12-pin 2.0 pitch standard wafer header

The front panel header provides USB2.0, Audio MIC-In / Line-Out, ATX power switch, Reset, HDD LED, and SUS LED (System Power LED).

Pin #	Signal	Ioh/ Iol	Type	Note	Pin #	Signal	Type	Ioh/ Iol	Note
1	USB7_5V	-	PWR		2	USB7_5V	PWR	-	
3	USB7-	-	S		4	MIC2_JD	S	-	
5	USB7+	-	S		6	LINE2_JD	S	-	
7	GND	-	PWR		8	GND	PWR	-	
9	NC	-	NC		10	LINE2-L	S	-	
11	+5V	-	PWR		12	+5V	PWR	-	
13	SATA_LED#		O		14	SUS_LED	O		1
15	GND	-	PWR		16	PWRBTN_IN#	I		
17	RSTIN#	-	I		18	GND	PWR	-	
19	SB3V3	-	PWR		20	LINE2-R	S	-	
21	AGND	-	PWR		22	AGND	PWR	-	
23	MIC2-L	-	S		24	MIC2-R	S	-	



Note 1: Connect SUS_LED (System Power LED) to the power status indicator on the chassis front panel. The LED is on when the system is operating. The LED keeps blinking when the system is in S1/S3 sleep state. The LED is off when the system is in S4 sleep state or powered off (S5).

4.2.12. Front Panel Auxiliary Headers (CN6401-CN6404)

2-Pin, 2.54 pitch headers

CN6401			CN6402		
Pin #	Signal	Type	Pin #	Signal	Type
1	PWRBTN_IN#	I	1	RSTIN#	I
2	GND	PWR	2	GND	PWR

CN6403			
Pin #	Signal	Type	PU/PD
1	+3V	PWR	PU 330ohm
2	SATA_LED#	O	

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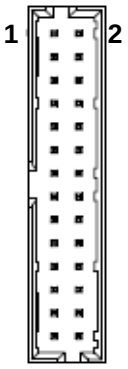
CN6404			
Pin #	Signal	Type	PU/PD
1	SB3V3	PWR	PU 330ohm
2	SUS_LED	O	

4.2.13. Feature Connector (CN28)

2x14-pin 2.0 pitch standard wafer connector

The feature connector of AmITX-AL-I provides Case Open, I2C, SMBus, and GPIO (10pin).

Signal	Description
TEMPS	Analogue temp sensor, connect to analog input of BMC
EXT_BAT	Connect to RTC power
CASE_OPEN#	Any time case open occurs, system will notice/show case open alert in POST during the next boot.
I2CC / I2CD	Connect to BMC (I2C Master)
I2C	SEMA



Pin #	Signal	Pull U/D	IOH/IOL	Type	Note	Pin #	Signal	Type	IOH/IOL	Pull U/D	Note
1	CASE_OPEN#	PU 2M	-	I		2	SMBC	OT	/4mA	PU 10K	1
3	GND	-	-	PWR		4	SMBD	OT	/4mA	PU 10K	1
5	N/A	-			2	6	I2CC	OT	-	PU 10K	1
7	EXT_BAT	-		PWR		8	I2CD	OT	-	PU 10K	1
9	SB3V3	-	-	PWR		10	SB5V	PWR	-	-	
11	GND	-	-	PWR		12	GND	PWR	-	-	
13	GPIO0	-	PU10K3V3	IOT		14	GPIO1	IOT		PU10K3V3	
15	GPIO2	-	PU10K3V3	IOT		16	GPIO3	IOT		PU10K3V3	
17	GPIO4	-	PU10K3V3	IOT		18	GPIO5	IOT		PU10K3V3	
19	GPIO6	-	PU10K3V3	IOT		20	GPIO7	IOT		PU10K3V3	
21	GPIO8		PU10K3V3	IOT		22	GPIO9	IOT		PU10K3V3	
23	GND	-		PWR		24	SUS_S3#	O	25/25mA	-	
25	12V	-	-	PWR		26	SUS_S4#	O	25/25mA	-	
27	PWR_OK	-	25/25mA	O		28	SUS_S5#	O	25/25mA	-	

Note 1: Pull-up to +3V3Dual (+3V3 or SB3V3).

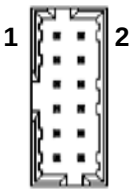
Note 2: Input to SEMA.

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4.2.14. SPI Header (CN40)

2x6-pin 2.0 pitch standard wafer connector

Type	Signal	Pin #	Pin #	Signal	Type
	CLK	1	2	SB3V3	PWR
I	CS0#	3	4	ADDIN	IO
I	CS1#	5	6	NC	-
I	MOSI	7	8	ISOLATE	IO
O	MISO	9	10	GND	PWR
IO	SPI_IO2_#WP	11	12	SPI_IO3_#HOLD	IO

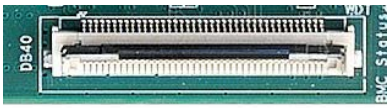


Signal	Description
CLK	Serial Clock
SB3V3	3.3V Standby Voltage power line. Normally output power, but when Motherboard is turned off then the on-board SPI Flash can be 3.3V power sourced via this pin.
CS0#	CS0# Chip Select 0, active low.
ADDIN	ADDIN input signal must be NC.
MOSI	Master Output, Slave Input
ISOLATE#	The ISOLATE# input, active low, is normally NC, but must be connected to GND when loading SPI flash. Power Supply to the Motherboard must be turned off when loading SPI flash. The pull up resistor is connected via diode to 5VSB.
MISO	Master Input, Slave Output
SPI_IO2_#WP	SPI Data I/O: A bidirectional signal used to support the new Dual IO Fast Read, Quad IO Fast Read and Quad Output Fast Read modes. This signal is not used in Dual Output Fast Read mode.
SPI_IO3_#HOLD	SPI Data I/O: A bidirectional signal used to support the new Dual IO Fast Read, Quad IO Fast Read and Quad Output Fast Read modes. This signal is not used in Dual Output Fast Read mode.

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4.2.15. DB40 Debug Board Connector

FPC Connector Type: FCI 59GF Flex 10042867



1 40

Pin	Interface	Signal	Remark	Pin	Interface	Signal	Remark
1	SPI Program interface	VCC_SPI_IN	SPI Power Input from flash tool to module. HW need add MOS FET to switch SPI power for SPI ROM	21	BMC Program interface (cont'd)	TXD6	
2		GND		22		RXD6	
3		SPI_BIOS_CS0#		23		FUMD0	
4		SPI_BIOS_CS1#		24		RESET_IN#	
5		SPI_BIOS_MISO		25		DATA	
6		SPI_BIOS_MOSI		26		CLK	
7		SPI_BIOS_CLK		27		OCD0A	Include a jumper to connect OCD0A via 1K0 pull-up to 3.3V_BMC
8	LPC Bus	3V3_LPC	System power 3.3V provide from COM module	28		OCD0B	Include a jumper to connect OCD0A via 1K0 pull-up to 3.3V_BMC
9		GND		29	Test points	PWRBTN#	
10		CB_RESET#	Platform Reset	30		SYS_RESET#	
11		RST#		31		CB_RESET#	
12		CLK33_LPC		32		CB_PWROK	
13		LPC_FRAME#		33		SUS_S3#	
14		LPC_AD3		34		SUS_S4#	
15		LPC_AD2		35		SUS_S5#	
16		LPC_AD1	always power 3.3V provide from COM module	36	BMC Debug signals	POSTWDT_DIS#	Connect to Jumper for Debug
17		LPC_AD0		37		SEL_BIOS	Connect to Jumper for Debug
18	BMC Program interface	3.3V_BMC	always power 3.3V provide from COM module	38		BIOS_MODE	Connect to Jumper for Debug
19		3.3V_BMC	always power 3.3V provide from COM module	39		BMC_STATUS	
20		GND		40	Reserved		

Note: The pin description on the Debug Module is the inverse of that on the motherboard.

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4.3. Jumper and Switch Settings

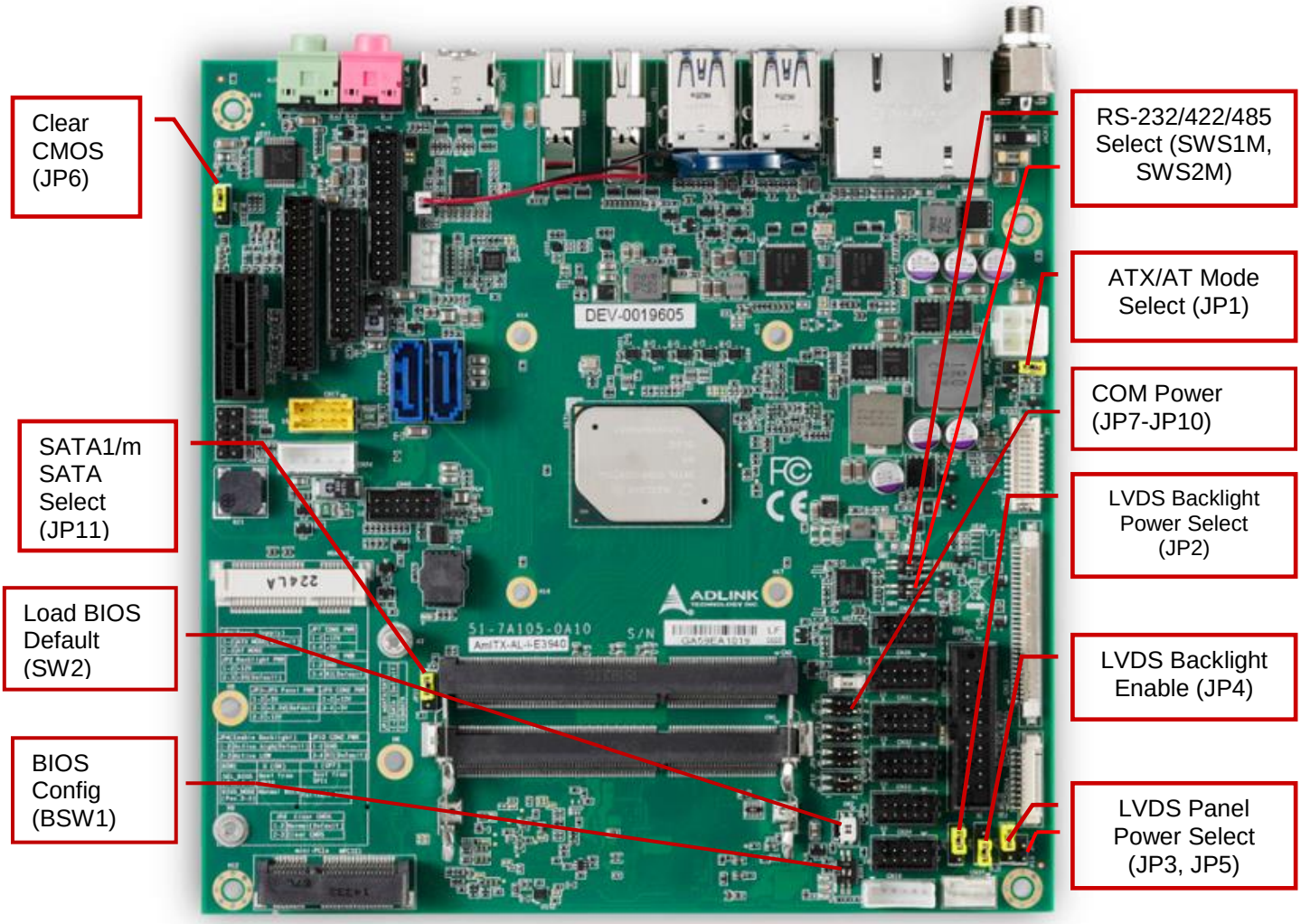


Figure 5: Jumper and Switch Locations

4.3.1. ATX/AT Mode Selection (JP1)

JP1	ATX/AT Mode
1-2	ATX (default)
2-3	AT

4.3.2. Clear CMOS (JP6)

JP6	Clear CMOS
1-2	Normal (default)
2-3	Clear CMOS

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4.3.3. SATA1/mSATA Selection (JP11)

JP1	SATA1/mSATA Select
1-2	SATA2 (default)
2-3	mSATA

4.3.4. LVDS Backlight Power Selection (JP2)

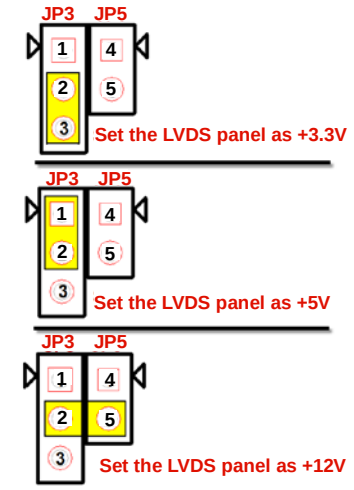
JP2	Backlight Power
1-2	12V
2-3	5V (default)

4.3.5. LVDS Panel Power Selection (JP3, JP5)

JP3/JP5	Panel Power
1-2	5V
2-3	3.3V (default)
2-5	12V

Panel Power control:

- JP3 & JP5 Jumper settings



4.3.6. LVDS Backlight Enable Jumper Selection (JP4)

JP4	Backlight Power
1-2	Active High /Convert (default)
2-3	Active LowNormal

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4.3.7. Serial Port Mode Switch Setting (SWS1M, SWS2M)

RS-232/422/485 Selection (COM1-2 only)

SWS1M (SER1 MODE SEL)			
	RS-232 (default)	RS-422	RS-485
1	ON	ON	OFF
2	OFF	ON	ON

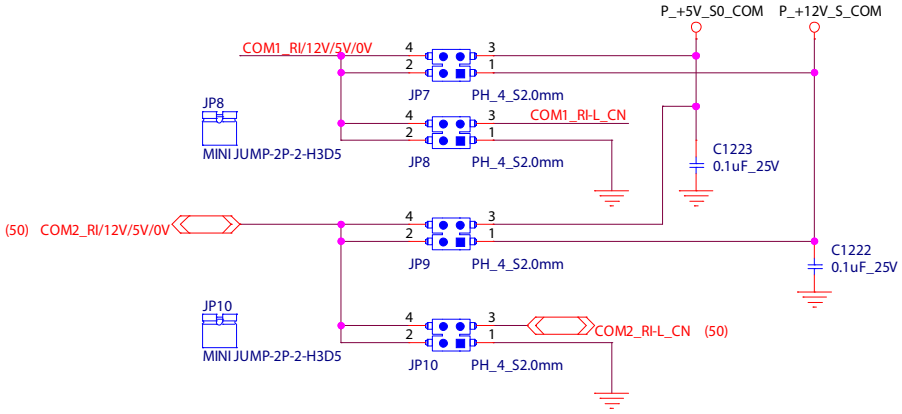
SWS2M (SER2 MODE SEL)			
	RS-232 (default)	RS-422	RS-485
1	ON	ON	OFF
2	OFF	ON	ON

4.3.8. Serial Port Power Selection (JP7, JP8, JP9, JP10)

COM1 Power selection (JP7, JP8)

JP7 COM1 PWR	
1-2	+12V
3-4	+5V

JP8 COM1 PWR	
1-2	GND
3-4	RI(Default)



COM2 Power selection (JP9, JP10)

JP9 COM1 PWR	
1-2	+12V
3-4	+5V

JP10 COM1 PWR	
1-2	GND
3-4	RI(Default)

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4.3.9. BIOS Switch Setting (BSW1)

BSW1		
	ON	OFF
SEL BIOS (Pos. 1-4)	Boot from SPI0 (default)	Boot from SPI1
BIOS MODE (Pos. 2-3)	Normal BIOS	Failsafe BIOS (default)



4.4. Onboard Connector Information

Table 2: AmITX-AL-I Onboard Connector Information

Connector	CN#	Onboard Connector		Mating Connector		ADLINK Cable
		Manufacturer	Part No.	Manufacturer	Part No.	
COM Port	CN29-34	JVE	23N6850-10S10B-01G-B-01	YOUNG YAK	YY-1970H-2*5P (PH2.0)	30-20876-0000 (optional)
ATX power	ATX_PWR1	Alex	9359-04, NATURAL	E.C.I	E.C.I 5015H-2*7P (PH4.2)	30-20872-0000 (standard)
PS/2 KB/MS	CN19	JVE	24W1140-06S10-01T-3.4-CS01	E.C.I	E.C.I 2020 -06P (PH2.0)	30-20873-0000 (optional)
USB	CN40	JVE	23N6850-10S10B-01G-B-V9-01	YOUNG YAK	YY-1970H-2*5P (PH2.0)	30-20874-1000 (optional)
SATA Power	CN24	JVE	24W1170-05S10-01T-3.4-CS01	JWT	A2501H02-5P (PH2.5)YY-1970H-2*5P (PH2.0)	30-20875-0000 (standard)
SATA	CN22-23	WIN WIN	WATM-07ABN4B3B8UW4	JWT	A3811H0-5P (PH3.81)	30-20875-0000 (standard)
DB-40	CN8	Molex	502790-4091	CONN-TEK	MLCO.5-40x172-02	30-30016-0000 (optional)
LVDS	CN13	JVE	FI-X30SSLA-HF	WELL-LIN ENTERPRISE	WL1058-HL-30P (PH1.0)	
LVDS Auxiliary	CN14	Molex	53261-1071	WELL-LIN ENTERPRISE	WL1025-H-10P (PH1.25)	
Feature	CN28	JVE	23N6851-28S10B-01G-2.5-GR01, BLACK	JWT	JWT A2005H00-2C*14 (PH2.0)	
Audio	CN16	MOLEX,	87831-3220, BLACK	JWT	JWT A2005H00-2CX13P (PH2.0)	
Front Panel	CN27	JVE	23N6851-24S10B-01G-2.5-GR01	YY	YY-1970H-2*12P (PH2.0)	
eDP	CN15	HIROSE	DF13E-20DP-1.25V	TBD	TBD	

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5. Smart Embedded Management Agent (SEMA)

The onboard microcontroller (BMC) implements power sequencing and Smart Embedded Management Agent (SEMA) functionality.

The microcontroller communicates via the System Management Bus with the CPU/chipset. The following functions are implemented.

- Total operating hours counter. Counts the number of hours the module has been run in minutes.
- On-time minutes counter. Counts the seconds since last system start.
- Temperature monitoring of CPU and board temperature. Minimum and maximum temperature values of CPU and board are stored in flash.
- Power cycles counter
- Boot counter. Counts the number of boot attempts.
- Watchdog Timer (Type-II). Set / Reset / Disable Watchdog Timer. Features auto-reload at power-up.
- System Restart Cause. Power loss / BIOS Fail / Watchdog / Internal Reset / External Reset
- Fail-safe BIOS support. In case of a boot failure, hardware signals tell external logic to boot from fail-safe BIOS.
- Flash area. 1kB Flash area for customer data
- 128 Bytes Protected Flash area. Keys, IDs, etc. can be stored in a write- and clear-protectable region.
- Board Identify. Vendor / Board / Serial number / Production Date
- Main-current & voltage. Monitors drawn current and main voltages

For a detailed description of SEMA features and functionality, please refer to the **SEMA Technical Manual** and **SEMA Software Manual**, downloadable at: http://www.adlinktech.com/PD/web/PD_detail.php?cKind=&pid=1274

5.1. Board Specific SEMA Functions

5.1.1. Voltages

The BMC of the AmITX-AL implements a voltage monitor and samples several onboard voltages. The voltages can be read by calling the SEMA function “Get Voltages”. The function returns a 16-bit value divided into high-byte (MSB) and low-byte (LSB).

Table 3: SEMA Onboard Voltage Monitor

ADC Channel	Voltage Name	Voltage Formula [V]
0	CPU-Vcore	(MSB<<8 + LSB) x 3.3 / 1024
1	GFX-Vcore	(MSB<<8 + LSB) x 3.3 / 1024
2	Vmem	(MSB<<8 + LSB) x 3.3 / 1024
3	5VSB	(MSB<<8 + LSB) x 1.826 x 3.3 / 1024
4	VIN(12V)	(MSB<<8 + LSB) x 6.000 x 3.3 / 1024
5	5V	(MSB<<8 + LSB) x 1.826 x 3.3 / 1024
6	3.3V	(MSB<<8 + LSB) x 1.100 x 3.3 / 1024

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ADC Channel	Voltage Name	Voltage Formula [V]
7	3.3VSB	(MSB<<8 + LSB) x 1.100 x 3.3 / 1024
8	RTC	(MSB<<8 + LSB) x 3.3 / 1024
9	Main Current	

5.1.2. Main Current

The BMC of the AmITX-AL implements a current monitor. The current can be read by calling the SEMA function "Get Main Current". The function returns four 16-bit values divided in high-byte (MSB) and low-byte (LSB). These 4 values represent the last 4 currents drawn by the board. The values are sampled every 250ms. The order of the 4 values is NOT in chronological order. Access by the BMC may increase the drawn current of the whole system. In this case, there are still 3 samples not influenced by the read access.

Main Current = (MSB_n<<8 + LSB_n) x 8.06mA

5.1.3. BMC Status

Table 4: SEMA BMC Status

This register shows the status of BMC controlled signals on the AmITX-AL.

Status Bit	Signal
0	WDTOUT
1	LVDS_VDDEN
2	LVDS_BKLTEN
3	BIOS_MODE
4	POSTWDT_DISn
5	SEL_BIOS

5.1.4. Exception Codes

In case of an error, the BMC drives a blinking code on the blue Status LED (LED1). The same error code is also reported by the BMC Flags register. The Exception Code is not stored in the Flash Storage and is cleared when the power is removed. Therefore, a "Clear Exception Code" command is not needed or supported.

Table 5: SEMA Exception Codes

Exception Code	Error Message	Description
0	NOERROR	
2	NO_SUSCLK	No connection to SUSCLK
3	NO_SLP_S4_S5	No signal for SLP_S4-S5
4	NO_SLP_S3	No signal for SLP_S3
5	BIOS_FAIL	BIOS failure
6	RESET_FAIL	Reset failure
7	RESETIN_FAIL	Reset In failure

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Exception Code	Error Message	Description
8	NO_CB_PWRGD	No signal for CB Power Good
9	CRITICAL_TEMP	Critical temperature violation
10	POWER_FAIL	Power failure
11	VOLTAGE_FAIL	Voltage failure
12	NO_3V3_5V_A_PG	No signal for 3V3_5V_A Power Good
13	NO_VNN_PG	No signal for VNN Power Good
14	NO_1V24_A_PG	No signal for 1V24_A Power Good
15	NO_VDDQ_PG	No signal for VDDQ Power Good
16	NO_V1P05S_PG	No signal for V1P05S Power Good
17	NO_SYS_GD	No signal for System Good
18	NO_V12	No V12 input
19	MEMORY_ERROR	SDRAM error
20	NO_P3V3_A_READY	No signal for P3V3_A_READY

5.1.5. BMC Flags

The BMC Flags register returns the last detected Exception Code since power-up and shows the BIOS in use and the power mode.

Table 6: SEMA BMC Flags

Bit	Description
[0 ~ 4]	Exception Code
[6]	0 = AT mode 1 = ATX mode
[7]	0 = Standard BIOS 1 = Fail-safe BIOS

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6. System Resources

6.1. System Memory Map

Table 7: System Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
(4GB-2MB)	FFE00000 – FFFFFFFF	2 MB	High BIOS Area
(4GB-18MB) – (4GB-17MB-1)	FEE00000 – FEEFFFFF	1 MB	MSI Interrupts
(4GB-20MB) – (4GB-19MB-1)	FEC00000 – FECFFFFF	1 MB	APIC Configuration Space
15MB – 16MB	F00000 – FFFFFF	1 MB	ISA Hole
1MB -15MB	100000 - EFFFFF	14MB	Main Memory
0K –1MB	00000 – FFFFFF	1MB	DOS Compatibility Memory

6.2. I/O Map

Table 8: I/O Map

Hex Range	Device
020-02D and 030-03D	Interrupt controller 1, 8259 equivalent
02E-02F	Motherboard resource
040-043 and 050-053	System Timer
04E-04F	Motherboard resource
060, 064	8742 equivalent (keyboard)
061, 063, 065, 067	NMI control and status
070-077	Real Time Clock Controller (bit 7 -NMI mask)
092	Reset (Bit 0)/ Fast Gate A20 (Bit 1)
0A0-0B1 and 0B4-0BD	Interrupt controller 2, 8259 equivalent
0B2 and 0B3	Motherboard Resource
2E0-2E7	Serial Port 6
2F0-2F7	Serial Port 5
2E8-2EF	Serial Port 4
2F8-2FF	Serial Port 2
3E8-3EF	Serial Port 3
3F8-3FF	Serial Port 1
378-37F	Available
380-3AF	Available
400-47F	Motherboard Resource
4D0	Master PIC Edge/Level Trigger register
4D1	Slave PIC Edge/Level Trigger register

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Hex Range	Device
0500~0A2F	Motherboard Resource
CF8-CFB	PCI configuration address register (32 bit I/O only)
CF9	Reset Control register (8 bit I/O)
CFC-CFF	PCI configuration data register
D00-FFFF	PCI Express Root Complex
164E-164F	MotherBoard Resource
D000-EFFF	PCIE Root Port
F000-F03F	VGA
F040-F05F	SMBus controller
F060-F097	SATA controller

6.3. Interrupt Request (IRQ) Lines

6.3.1. IRQ Lines PIC Mode

Table 9: IRQ Lines PIC Mode

IRQ#	Typical Interrupt Resource	Connected to Pin	Available
0	Counter 0	N/A	No
1	Keyboard controller	N/A	No
3	Serial Port 2 (COM2)	IRQ3 via SERIRQ / PIRQ	Note (1)
4	Serial Port 1 (COM1)	IRQ4 via SERIRQ / PIRQ	Note (1)
5	Serial Port3 (COM3)	IRQ5 via SERIRQ / PIRQ	Note (1)
6	Serial Port5 (COM5)	IRQ6 via SERIRQ / PIRQ	No
7	Serial Port4 (COM4)	IRQ7 via SERIRQ / PIRQ	Note (1)
8	Real-time clock	N/A	No
10	Serial Port6 (COM6)	IRQ10 via SERIRQ / PIRQ	Note (1)
11	N/A	N/A	Note (1)
12	PS/2 Mouse	IRQ12 via SERIRQ / PIRQ	Note (1)
13	N/A	N/A	Note (1)
14	Intel Serio IO GPIO Host Controller	N/A	Note (1)

Note (1): These IRQs can be used for PCI devices when onboard device is disabled.

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6.3.2. IRQ Lines APIC Mode

Table 10: IRQ Lines APIC Mode

IRQ#	Typical Interrupt Resource	Connected to Pin	Available
0	Counter 0	N/A	No
1	Keyboard controller	N/A	No
2	Cascade interrupt from slave PIC	N/A	No
3	Serial Port 2 (COM2)	IRQ3 via SERIRQ / PIRQ	Note (1)
4	Serial Port 1 (COM1)	IRQ4 via SERIRQ / PIRQ	Note (1)
5	Serial Port3 (COM3)	IRQ5 via SERIRQ / PIRQ	Note (1)
6	Serial Port5 (COM5)	IRQ6 via SERIRQ / PIRQ	No
7	Serial Port4 (COM4)	IRQ7 via SERIRQ / PIRQ	Note (1)
8	Real-time clock	N/A	No
9	Generic	N/A	Note (1)
10	Serial Port6 (COM6)	IRQ10 via SERIRQ / PIRQ	Note (1)
11	N/A	IRQ11 via SERIRQ / PIRQ	Note (1)
12	PS/2 Mouse	IRQ12 via SERIRQ / PIRQ	Note (1)
13	N/A	N/A	Note (1)
14	Intel Serial IO GPIO Host Controller	N/A	Note (1)
15	N/A	N/A	Note (1)
25	High Definition Audio Controller	N/A	
39	Intel SD Host Controller	N/A	
54-511	Microsoft ACPI-Compliant System	N/A	Note (1)

Note (1): These IRQs can be used for PCI devices when onboard device is disabled.

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6.4. PCI Configuration Space Map

Table 11: PCI Configuration Space Map

Bus Number	Device Number	Function Number	Routing	Description
00h	00h	00h	N/A	Intel Host Bridge
00h	02h	00h	Internal	Intel VGA Controller
00h	0Eh	00h	Internal	Intel HD Audio Device
00h	0Fh	00h	Internal	Intel Corporation Communication Device
00h	12h	00h	Internal	Intel SATA Controller
00h	13h	00h	Internal	Intel PCIE Root Port 1
00h	13h	01h	Internal	Intel PCIE Root Port 2
00h	13h	02h	Internal	Intel PCIE Root Port 3
00h	13h	03h	Internal	Intel PCIE Root Port 4
00h	15h	00h	Internal	Intel USB Controller
00h	1Bh	02h	Internal	Intel SD Card Controller
00h	1Fh	00h	Internal	Intel ISA Bridge
00h	1Fh	01h	Internal	Intel SMBUS Controller
02h	00h	00h	Internal	Intel Ethernet Controller
03h	00h	00h	Internal	Intel Ethernet Controller

Note (1): The bus number will be changed if the PEG/PCIE port has device.

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6.5. PCI Interrupt Routing Map

Table 12: PCI Interrupt Routing Map

INT Line	Audio Controller	xHCI Controller	TXE Controller #1	PCIE Port 3	PCIE Port 4	PCIE Port 5
Int0	INTA:25	INTA:None	INTA:None	INTA:22	INTA:23	INTA:20
Int1				INTB:23	INTB:20	INTB:21
Int2				INTC:20	INTC:21	INTC:22
Int3				INTD:21	INTD:22	INTD:23

INT Line	PCIE Port 6	LPC Controller	SATA Controller	SMBus Controller
Int0	INTA:21	INTA:None	INTA:None	INTB:None
Int1	INTB:22			
Int2	INTC:23			
Int3	INTD:20			

6.6. SMBus Slave Address

Table 13: SMBus Slave Address

Device	Address
DIMM A	A0h
DIMM B	A4h
BMC	58h
Extend GPIO	40h

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7. BIOS Setup

7.1. Menu Structure

This section presents the six primary menus of the BIOS Setup Utility. Use the following table as a quick reference for the contents of the BIOS Setup Utility. The subsections in this section describe the submenus and setting options for each menu item. The default setting options are presented in **bold**, and the function of each setting is described in the right hand column of the respective table.

Main	Advanced	Chipset	Security	Boot	Save & Exit
BIOS Information System Information Board Management ► System Date System Time	CPU Configuration ► Graphics Configuration ► Power Management ► System Management ► Thermal Management ► Watchdog Timer ► CSM Configuration ► IT8783 Super IO Configuration ► Serial Console Redirection ► USB ► Network ► Miscellaneous ► Trusted Computing ► SDIO Configuration ►	North Bridge ► South Bridge ► Uncore Configuration ► South Cluster Configuration ►	Setup Administrator Password User Password Secure Boot menu ► HDD Security Configuration ►	Boot Configuration ►	Save Options ► Default Options ► Boot Override ►

Notes:

► indicates a submenu

Gray text indicates info only

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7.2. Main

The Main Menu provides read-only information about your system and also allows you to set the System Date and Time. Refer to the tables below the screen shot of this menu for details of the submenus and settings.

7.2.1. BIOS Information

Feature	Options	Description
BIOS Vendor	Info only	Vendor.
BIOS Version	Info only	Project BIOS Version
Build Data and Time	Info only	Data and Time
MRC Version	Info only	Intel MRC Version
GOP Version	Info only	Intel GOP Version
TXE FW Version	Info only	Intel TXE FW Version
BIOS Boot Source	Info only	Display Platform Current Boot BIOS

7.2.2. System Information

Feature	Options	Description
Project Name	Info only	Project Name.
CPU Board Version	Info only	Project Board Version.
CPU Brand String	Info only	CPU Brand String Information.
CPU Frequency	Info only	CPU Frequency Information.
Total Memory	Info only	Total memory size.
Memory Frequency	Info only	Memory Frequency
SOC SKU	Info only	SOC SKU Information

7.2.3. Board Information

7.2.3.1. Board Information > Board Information

Feature	Options	Description
Serial Number	Info only	Display System Serial Number
Manufacturing Date	Read only	Display Manufacturing Date
Last Repair Date	Read only	Display Last Repair Date
MAC ID	Read only	Display MAC ID

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7.2.3.2. Board Information > Runtime Statistics

Feature	Options	Description
Runtime Statistics	Info only	
Total Runtime	Read only	The returned value specifies the total time in minutes the system is running in S0 state.
Current Runtime	Read only	The returned value specifies the time in seconds the system is running in S0 state. This counter is cleared when the system is removed from the external power supply.
Power Cycles	Read only	The returned value specifies the number of times the external power supply has been shut down
Boot Cycles	Read only	The boot counter is increased after a HW- or SW-Reset or after a successful power-up.
Boot Reason	Read only	The boot reason is the event which causes the reboot of the system.

7.2.4. System Date and Time

Feature	Options	Description
System Date	Weekday, MM/DD/YYYY	Set the Date. Use Tab to switch between Date elements.
System Time	HH/MM/SS	Set the Time. Use Tab to switch between Time elements.

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7.3. Advanced

This menu contains the settings for most of the user interfaces in the system.

7.3.1. CPU Configuration

Feature	Options	Description
CPU Configuration	Info only	
Socket 0 CPU Information	Submenu	Display socket specific CPU Information
Speed	Info only	Display CPU Speed Frequency
64-bit	Info only	Display CPU 64-bit supported
CPU Power Management	Submenu	CPU Power Management options
Active Processor Cores	**Disabled** Enabled	Number of cores to enable in each processor package.
Intel Virtualization Technology	Disabled **Enabled**	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology
VT-d	**Disabled** Enabled	Enable/Disable CPU VT-d
Bi-direction PROCHOT	Disabled **Enabled**	When a processor thermal sensor trips (either core), the PROCHOT# will be driven. If bi-direction is enabled, external agents can drive PROCHOT# to throttle the processor.
Thermal Monitor	Disabled **Enabled**	Enable/Disable Thermal Monitor.
Monitor Mwait	Disabled Enabled **Auto**	Enable/Disable Monitor Mwait
P-STATE Coordination	**HW_ALL** SW_ALL SW_ONLY	Change P-State Coordination type.
DTS	Disabled **Enabled**	Enabled/Disabled Digital Thermal Sensor.

7.3.1.1. CPU Configuration > Socket 0 CPU Information

Feature	Options	Description
Socket 0 CPU Information	Info only	
CPU Signature	Info only	Display CPU Signature
Microcode Patch	Info only	Display Microcode Patch
Max CPU Speed	Info only	Display Max CPU Speed
Min CPU Speed	Info only	Display Min CPU Speed
Processor Cores	Info only	Display Processor Cores numbers
Intel HT Technology	Info only	Display Not Supported
Intel VT-x Technology	Info only	Display supported

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Feature	Options	Description
L1 Data Cache	Info only	Display L1 Data Cache
L1 Code Cache	Info only	Display L1 Code Cache
L2 Cache	Info only	Display L2 Cache
L3 Cache	Info only	Display L3 Cache

7.3.1.2. CPU Configuration > CPU Power Management

Feature	Options	Description
CPU Power Management Configuration	Info only	
EIST	Disabled **Enabled**	Enable/Disable Intel SpeedStep
Turbo Mode	Disabled **Enabled**	Turbo Mode
Boot performance mode	**Max Performance** Max Battery	Select the performance state that the BIOS will set before OS handoff.
C-States	Disabled **Enabled**	Enable/Disable C States
Enhanced C-States	Disabled **Enabled**	Enable/Disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
Max Package C State	**PC2** PC1 C0	Controls the Max Package C State that the processor will Support.
Max Core C State	**Fused Value** Core C10 Core C9 Core C8 Core C7 Core C6 Core C1 Unlimited	This option controls the Max Core C State that cores will support.
C-State Auto Demotion	Disabled **C1**	Configure C-State Auto Demotion
C-State Auto Un-Demotion	Disabled **C1**	Configure C-State Auto Un-Demotion
Power Limit 1 Enable	Disabled **Enabled**	Enable/Disable Power Limit 1
Power Limit 1	Info Only	Display Power Limit 1 value
Power Limit 1 Clamp Mode	Disabled **Enabled**	Enable/Disable Power Limit 1 Clamp Mode

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Feature	Options	Description
Power Limit 1 power	**Auto** 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	Power Limit 1 in Watts. Auto will program Power Limit 1 based on silicon default support value.
Power Limit 1 Time Window	**Auto** 1 2 3 4 5 6 7 8 10 12 14 16 20 24 28 32 40 48 56 64 80 96 112 128	Power Limit 1 Time Window value in Seconds. Auto will program Power Limit 1 Time Window based on silicon default support value.

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7.3.2. Graphics Configuration

Feature	Options	Description
LVDS	Info only	
Data format and Color Depth	VESA 24 bpp JEIDA 24 bpp **JEIDA/VESA 18 bpp**	Data format and Color Depth select
LVDS Output Mode	**Single LVDS bus** Dual LVDS bus	Single/Dual mode select
DE Polarity	**Active High** Active Low	DE Polarity select
Vsync Polarity	**Active High** Active Low	Vsync Polarity select
Hsync Polarity	**Active High** Active Low	Hsync Polarity select
LVDS Backlight Brightness	**Value Range**	A change takes effect immediately. The Value range starts by 0 and ends of 255.

7.3.3. Power Management

Feature	Options	Description
Enable ACPI Auto Configuration	**Disabled** Enabled	Enable/Disable BIOS ACPI Auto Configuration.
Enable Hibernation	Disabled **Enabled**	Enable/Disable System ability to hibernate. This option may be not effective with some OS.
ACPI Sleep State	**S3 only (Suspend to RAM)** Suspend Disabled	Select ACPI sleep state the system will enter when the SUSPEND button is pressed.
Emulation AT/ATX	Emulation AT **ATX**	Select Emulation AT or ATX function. If this option set to [Emulation AT], BIOS will report no suspend functions to ACPI OS. Win Windows XP, it will make OS show shutdown message during system shutdown.
Lock Legacy Resources	**Disabled** Enabled	Enables or Disables Lock of Legacy Resources
ECO Mode	**Disabled** Enabled	Reduces the power consumption of the system, but after a shut down, you have to wait at least 5 seconds before you can restart the system.
Power Consumption	Submenu	Power Consumption

7.3.3.1. Power Management > Power Consumption

Feature	Options	Description
Power Consumption	Info only	
Current Input Current	Read only	Display input current
Current Input Power	Read only	Display input power
V-CORE	Read only	Display actual VCORE voltage

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Feature	Options	Description
VGFX	Read only	Display actual VGFX voltage
VMEM	Read only	Display actual VMEM voltage
5VSB	Read only	Display actual 5VSB voltage
VIN(12V)	Read only	Display actual VIN(12V) voltage
5V	Read only	Display actual 5V voltage
3.3V	Read only	Display actual 3.3V voltage
3.3VSB	Read only	Display actual 3.3VSB voltage

7.3.4. System Management

Feature	Options	Description
System Management	Info only	
Version	Info only	Display Version.
SEMA Firmware	Read only	Display SEMA firmware.
Build Date	Read only	Display SEMA firmware build date
SEMA Boot loader	Read only	Display SEMA boot loader.
Build Date	Read only	Display SEMA boot loader build date.
SEMA Features	Submenu	SEMA Features information
Flags	Submenu	SEMA Flags information

7.3.4.1. System Management > SEMA Features

Feature	Options	Description
SEMA Supported Features	Info only	
Uptime & Power Cycles Counter	Info only	
System Reset Event	Info only	
1024 Bytes User-Flash	Info only	
Watchdog	Info only	
Temperatures	Info only	
Voltage Monitor	Info only	
Display Backlight control	Info only	
Power-Up Watchdog	Info only	
Power Monitor (current sense)	Info only	
Boot Counter	Info only	
Dual-BIOS	Info only	
I2C bus 1	Info only	
I2C bus 2	Info only	
Programmable CPU fan	Info only	
Programmable System fan	Info only	

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Feature	Options	Description
AT/ATX mode	Info only	
ACPI Thermal Trigger	Info only	
Power-Up to last state	Info only	
Backlight restore	Info only	
DTS register available	Info only	
DTS offset registers programmable	Info only	
TIVA BMC	Info only	
PEC Control	Info only	
Reserved_34	Info only	
SEMA Error Log	Info only	

7.3.4.2. System Management > Flags

Feature	Options	Description
Flags	Info only	
BMC Flags	Read only	
BIOS Select	Read only	Display the selection of current BIOS ROM.
ATX/AT-Mode	Read only	Display ATX/AT-Mode.
Exception Code	Read only	System exception reason.

7.3.5. Thermal Management

Feature	Options	Description
Temperatures and Fan Speed	Submenu	Temperatures and Fan Speed.
Smart Fan	Submenu	Smart Fan.
Critical Trip Point	Enabled Disabled	This value is the temperature threshold of the critical trip point.
Passive Cooling Trip Point	Enabled Disabled	The time-out value for Control, Bulk, and Interrupt transfers.

7.3.5.1. Thermal Management > Temperatures and Fan Speed

Feature	Options	Description
Temperatures and Fan	Info only	
CPU Temperature	Info only	
Current	Read only	Display current board temperature
Board Temperatures	Info only	
Current	Read only	Display board current. temperature
Startup	Read only	Display board startup. temperature
Min	Read only	Display board Min. temperature

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Feature	Options	Description
Max	Read only	Display board Max. temperature
CPU Fan Speed	Read only	Display CPU Fan RPM
System Fan1 Speed	Read only	Display System Fan1 RPM

7.3.5.2. Thermal Management > Smart Fan

Feature	Options	Description
Smart Fan	Info only	
CPU Smart Fan Temperature Source	CPU Sensor **Board Sensor**	CPU smart fan temperature source
CPU Fan Mode	AUTO (Smart Fan) Fan Off **Fan On**	CPU fan mode
PWM Level	100	PWM level
System Smart Fan1Temperature Source	CPU Sensor **Board Sensor**	System Smart Fan1Temperature Source
System Fan1 Mode	**AUTO (Smart Fan)** Fan Off Fan On	System Fan1 Mode
Trigger Point 1	Read only	
Trigger Temperature	15	Trigger Temperature
PWM Level	30	PWM level
Trigger Point 2	Read only	
Trigger Temperature	60	Trigger Temperature
PWM Level	40	PWM level
Trigger Point 3	Read only	
Trigger Temperature	70	Trigger Temperature
PWM Level	63	PWM level
Trigger Point 4	Read only	
Trigger Temperature	80	Trigger Temperature
PWM Level	100	PWM level

7.3.6. Watchdog Timer

Feature	Options	Description
Watchdog Timer	Info only	
Power Up watchdog Attention: F12 disables the Power Up Watchdog.	Enabled **Disabled**	The Power-Up Watchdog resets the system after a certain amount of time after power-up. Pressing F12 during start up disables the power up watchdog

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7.3.7. CSM Configuration

Feature	Options	Description
Compatibility Support Module Configuration	Info only	
CSM Support	Enabled **Disabled**	Enable/Disable CSM Support
CSM16 Module Version	Read Only	Display CSM16 Module Version
GateA20 Active	**Upon Request** Always	UPON REQUEST - GA20 can be disabled using BIOS services. ALWAYS - do not allow disabling GA20; this option is useful when any RT code is executed above 1MB
Boot option filter	**UEFI and Legacy** Legacy only UEFI only	This option controls Legacy/UEFI ROMs priority
Option ROM execution	Info only	
Network	Do not launch **UEFI** Legacy	Controls the execution of UEFI and Legacy PXE OpROM
Storage	Do not launch **UEFI** Legacy	Controls the execution of UEFI and Legacy Storage OpROM
Video	Do not launch **UEFI** Legacy	Controls the execution of UEFI and Legacy Video OpROM
Other PCI device	Do not launch **UEFI** Legacy	Determines OpROM execution policy for devices other than Network, Storage, or Video.

7.3.8. IT8783 Super IO Configuration

Feature	Options	Description
IT8783F Super IO Configuration	Info only	
Serial Port 1 Configuration	Submenu	Set Parameters of Serial Port 1.
Serial Port 2 Configuration	Submenu	Set Parameters of Serial Port 2.
Serial Port 3 Configuration	Submenu	Set Parameters of Serial Port 3.
Serial Port 4 Configuration	Submenu	Set Parameters of Serial Port 4.
Serial Port 5 Configuration	Submenu	Set Parameters of Serial Port 5.
Serial Port 6 Configuration	Submenu	Set Parameters of Serial Port 6.

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7.3.8.1. Super IO > Serial Port 1 Configuration

Feature	Options	Description
Serial Port 1 Configuration	Info only	
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM)
Device Setting	Info only	
Change Setting	Auto IO=3F8;IRQ=4; IO=3F8;IRQ=3,4,5,7,9,10,11,12 IO=2F8;IRQ=3,4,5,7,9,10,11,12 IO=3E8;IRQ=3,4,5,7,9,10,11,12 IO=2E8;IRQ=3,4,5,7,9,10,11,12	Select an optimal setting for Super IO Device.
RS485 Direction Control Enable	**Disable** Enable	Enable/Disable RTSN asserted for RS485 automatic direction control when transmitting data to or receiving data from RS485 transceiver.

7.3.9. Serial Console Redirection

Feature	Options	Description
Serial Port Console	Info only	
COM1	Info only	
Console Redirection	**Disabled** Enabled	Console Redirection enable or disable.
Console Redirection Settings	Submenu	The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.
COM2	Info only	
Console Redirection	**Disabled** Enabled	Console Redirection enable or disable.
Console Redirection Settings	Submenu	The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.
COM3	Info only	
Console Redirection	**Disabled** Enabled	Console Redirection enable or disable.
Console Redirection Settings	Submenu	The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.
COM4	Info only	
Console Redirection	**Disabled** Enabled	Console Redirection enable or disable.

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Feature	Options	Description
Console Redirection Settings	Submenu	The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.
COM5	Info only	
Console Redirection	**Disabled** Enabled	Console Redirection enable or disable.
Console Redirection Settings	Submenu	The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.
COM6	Info only	
Console Redirection	**Disabled** Enabled	Console Redirection enable or disable.
Console Redirection Settings	Submenu	The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

7.3.9.1. Serial Console Redirection > Console Redirection Settings

Feature	Options	Description
COM0 Console Redirection Settings	Info only	
Terminal Type	VT100 VT100+ VT-UTF8 **ANSI**	VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes. ANSI: Extended ASCII char set.
Bits per second	9600 19200 38400 57600 **115200**	Selects serial port transmission speed. The speed must be matched on the remote computer. Long or noisy lines may require lower speeds.
Data Bits	7 **8**	Select data bits.
Parity	**None** Even Odd Mark Space	Select parity.
Stop Bits	**1** 2	Select number of stop bits.
Flow Control	**None** Hardware RTS/CTS	Select flow control.
VT-UTF8 Combo Key Support	Disabled **Enable**	Enable VT-UTF8 combination key support for ANSI/VT100 terminals.
Recorder Mode	**Disabled** Enable	With this mode enabled only text will be sent. This is to capture terminal data.

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Feature	Options	Description
Resolution 100x31	**Disabled** Enable	Enables or disables extended terminal resolution
Legacy OS Redirection	**80x24** 80x25	On legacy OSes, the number of rows and columns supported by redirection
Putty KeyPad	**VT100** LINUX XTERMR6 SCO ESCN VT400	Select Function Key and KeyPad on Putty.
Redirection After BIOS Post	**Always Enabled** BootLoader	The Settings specify if BootLoader is selected, then legacy console redirection is disabled before booting to legacy OS.

7.3.10. USB

Feature	Options	Description
USB Module version	Info only	
USB Controllers:	Info only	
USB Devices:	Info only	
Legacy USB Support	**Enabled** Disabled	Enables Legacy USB support.
XHCI Hand-off	Disabled **Enabled**	This is a workaround for OSes without XHCI hand-off support.
USB Mass Storage Driver Support	**Enabled** Disabled	Enable/Disable USB Mass Storage Driver Support.
USB hardware delays and time-outs:	PCH USB Configuration	
USB transfer time-out	1 sec 5 sec 10 sec **20 sec**	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec **20 sec** 30 sec 40 sec	USB mass storage device start unit command time-out.
Device power-up delay	**Auto** Manual	Maximum time the device will take before it properly reports itself to the host controller.

7.3.11. Network

Feature	Options	Description
Onboard LAN Controller	Disabled Enabled	Enable/Disable onboard Intel I210LM LAN Controller..
Network Stack	Disabled Enabled	Enable/Disable UEFI Network Stack..

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7.3.12. Miscellaneous

Feature	Options	Description
Chassis Intrusion Support	**Disabled** Enabled	Chassis Intrusion Support.

7.3.13. Trusted Computing

Feature	Options	Description
Security Device Support	**Disabled** Enabled	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

7.3.14. SDIO Configuration

Feature	Options	Description
SDIO Configuration	Info only	
SDIO Access Mode	**Auto** ADMA SDMA PIO	Auto Option: Access SD device in DMA mode if controller supports it, otherwise in PIO mode. DMA Option: Access SD device in DMA mode. PIO Option: Access SD device in PIO Mode.

7.4. Chipset

Feature	Options	Description
North Bridge	Submenu	North Bridge Parameters
South Bridge	Submenu	South Bridge Parameters
Uncore Configuration	Submenu	Uncore Configuration.
South Cluster Configuration	Submenu	South Cluster Configuration

7.4.1. North Bridge

Feature	Options	Description
Memory Information	Info Only	
Total memory	Read Only	Display Memory Size information
Memory Voltage	Read Only	Display Memory voltage
Memory Slot0	Read Only	Display Memory Slot0 information
Memory Slot1	Read Only	Display Memory Slot1 information
Max TOLUD	2 GB 2.25 GB 2.5 GB 2.75 GB 3 GB	Maximum Value of TOLUD
Above 4GB MMIO BIOS assignment	Disable Enable	Enable/Disable above 4GB memory mapped IO BIOS assignment. This is disable automatically when Aperture Size is set to 2048MB

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Feature	Options	Description
PCIE VGA Workaround	Disable Enable	Enable it if your PCIe card cannot boot to DOS. This is for Test only.

7.4.2. South Bridge

Feature	Options	Description
Serial IRQ Mode	Quiet Continuous	Configure Serial IRQ Mode
SMBus Support	Disable Enable	Enable/Disable SMBus Support
OS Selection	Windows Android Win7 Intel Linux	Select the target OS.
PCI CLOCK RUN	Disable Enable	Enable CLKRUN# logic to stop PCI clocks.
Real Time Option	RT Disabled RT Enabled, Agent IDI1 RT Enabled, Agent Disabled	Select Real-Time Enable and IDI Agent Real-Time traffic Mask Bits

7.4.3. Uncore Configuration

7.4.3.1. Uncore Configuration > GOP Configuration

Feature	Options	Description
Active LFP Config	**No LFP** eDP	Active Local Flat Panel Config
LVDS Backlight Mode	GTT Mode **BMC Mode**	Select LVDS Backlight control function.
DDI Port 1	No Device Display Port HDMI **DisplayPort with HDMI/DVI Compatible**	DDI port 1 function choose to display Port or HDMI
DDI Port 2	No Device Display Port HDMI **DisplayPort with HDMI/DVI Compatible**	DDI port 2 function choose to display Port or HDMI

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Feature	Options	Description
LCD Panel Type	**Auto** 640x480 800x600 1024x768 1280x1024 1400x1050(RB) LVDS1 1400x1050 LVDS2 1600x1200 LVDS 1366x768 LVDS 1680x1050 1920x1200 1440x900 LVDS 1600x900 LVDS 1024x768 LVDS2 1280x800 1920x1080 LVDS 2048x1536 LVDS	Select LFP panel used by Internal Graphics Device by selecting the appropriate setup item.
GOP Brightness level	**Value**	Set GOP Brightness Level1; Value ranges from 0-255

7.4.3.2. Uncore Configuration > IGD Configuration

Feature	Options	Description
IGD Configuration	Info only	
Integrated Graphics Device	**Enabled** Disabled	Enable: Enable Integrated Graphics Device (IGD) when selected as the Primary Video Adaptor. Disable: Always disable IGD
Primary Display	**IGD** PCIE HG	Select which of IGD/PCI Graphics device should be Primary Display.
Aperture Size	128MB **256MB** 512MB	Select the Aperture Size.
DVMT Pre-Allocated	**64MB** 96MB 128MB 160MB 192MB 224MB 256MB 288MB 320MB 352MB 384MB 416MB 448MB 480MB 512MB	Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
DVMT Total Gfx Mem	128M **256M** MAX	Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.

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7.4.4. South Cluster Configuration

Feature	Options	Description
HD-Audio Configuration	Submenu	HD-Audio Configuration Settings
PCI Express Configuration	Submenu	PCI Express Configuration Settings
SATA Devices	Submenu	Press <Enter>.to select the SATA Device Configuration Setup options.
SCC Configuration	Submenu	SCC Configuration Settings
USB Configuration	Submenu	USB Configuration Settings
Miscellaneous	Submenu	Enable/Disable Misc. Features

7.4.4.1. South Cluster Configuration > HD-Audio Configuration

Feature	Options	Description
HD-Audio Configuration	Info only	
HD-Audio Support	Disabled **Enabled**	Enable/Disable HD-Audio Support

7.4.4.2. South Cluster Configuration > PCI Express Configuration

Feature	Options	Description
PCIe Configuration	Info only	
Compliance Mode	**Disabled** Enabled	Compliance Mode Enable/Disable
PCIe Express Root Port3	Submenu	Control the PCI Express Root Port. Auto: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIE root port Disable: Disable PCIE root port
PCIe Express Root Port4	Submenu	Control the PCI Express Root Port. Auto: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIE root port Disable: Disable PCIE root port
PCIe Express Root Port5	Submenu	Control the PCI Express Root Port. Auto: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIE root port Disable: Disable PCIE root port
PCIe Express Root Port6	Submenu	Control the PCI Express Root Port. Auto: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIE root port Disable: Disable PCIE root port

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7.4.4.3. South Cluster Configuration > PCI Express Configuration > PCIe Express Root Port3

Feature	Options	Description
PCIe Express Root Port3	Disabled **Enabled**	Control the PCI Express Root Port. Auto: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIE root port Disable: Disable PCIE root port
ASPM	**Disable** L0s L1 L0sL1 Auto	PCI Express Active State Power Management settings.
L1 Substates	Disable L1.1 L1.2 **L1.1 & L1.2**	PCI Express L1 Substates Settings
ACS	Disabled **Enabled**	Enable/Disable Access Control Services Extend Capability.
URR	**Disabled** Enabled	PCI Express Unsupported Request Reporting Enable/Disable .
FER	**Disabled** Enabled	PCI Express Device Fatal Error Reporting Enable/Disable .
NFER	**Disabled** Enabled	PCI Express Device Non-Fatal Error Reporting Enable/Disable.
CER	**Disabled** Enabled	PCI Express Device Correctable Error Reporting Enable/Disable .
CTO	**Default Setting** 16-55 ms 65-210 ms 260-900 ms 1-3.5 s Disable	PCI Express Completion Timer To Enable/Disable
SEFE	**Disabled** Enabled	Root PCI Express System Error on Fatal Error Enable/Disable .
SENFE	**Disabled** Enabled	Enable or disable Root PCI Express System Error on Non-Fatal Error.
SECE	**Disabled** Enabled	Root PCI Express System Error on Correctable Error Enable/Disable.
PME SCI	Disabled **Enabled**	PCI Express PME SCI Enable/Disable.
Hot Plug	**Disabled** Enabled	PCI Express Hot Plug Enable/Disable.
PCIe Speed	**Auto** Gen1 Gen2	Configure PCIe Speed.
Transmitter Half Swing	**Disabled** Enabled	Transmitter Half Swing Enable/Disable.

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Feature	Options	Description
Extra Bus Reserved	**0**	Extra Bus Reserved (0-7) for bridges behind this Root Bridge.
Reserved Memory	**10**	Reserved Memory and Prefetchable memory (1-20MB) Range for this Root Bridge.
Reserved I/O	**4**	Reserved I/O (4K/8K/12K/46K/20K) Range for this Root Bridge.
PCH PCIE LTR	Disabled **Enabled**	PCH PCIE Latency Reporting Enable/Disable.
Snoop Latency Override	Disable Manual **Auto**	Snoop Latency Override for PCH PCIE. Disable: Disable override. Manual: Manually enter override values Auto (Default): Maintain default BIOS flow.
Non Snoop Latency Override	Disable Manual **Auto**	Non Snoop Latency Override for PCH PCIE. Disable: Disable override. Manual: Manually enter override values Auto (Default): Maintain default BIOS flow.
PCIE LTR Lock	**Disabled** Enabled	PCIE LTR Configuration Lock.
PCIe Selectable De-emphasis	Disabled **Enabled**	When the Link is operating at 5.0 GT/s speed, this bit selects the level of de-emphasis for an Upstream component. 1b – 3.5 dB 0b – 6 dB.

7.4.4.4. South Cluster Configuration > SATA Devices

Feature	Options	Description
SATA Drives	Info only	
Chipset-SATA Controller Configuration	Info only	
Chipset SATA	Disabled **Enabled**	Enable/Disable the Chipset SATA Controller. The Chipset SATA Controller supports 2 black internal SATA ports (up to 3Gb/s supported per port).
SATA Mode Selection	**AHCI**	Determines how SATA Controller(s) operate.
SATA Interface Speed	Gen1 **Gen2** Gen3	Select SATA Interface Speed, CHV A1 always with Gen1 Speed.
SATA Test Mode	**Disabled** Enabled	Test mode **Enabled /** Disabled
Aggressive LPM Support	**Disabled** Enabled	Enable PCH to aggressively enter link power state.
SATA Port Configuration	Submenu	SATA Device Options Settings.
SATA Port 0	Info only	
Software Preserve	Info only	

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Feature	Options	Description
Port 0	Disabled **Enabled**	Enable or Disable SATA Port.
SATA Port 0 Hot Plug Capability	**Disabled** Enabled	If enabled, SATA port will be reported as Hit Plug capable.
Configured as eSATA	Info only	
Mechanical Preserve Switch	Disabled **Enabled**	Controls reporting if this port has a Mechanical Preserve Switch. Note: Requires hardware support.
Spin Up Device	Enabled **Disabled**	If enable for any ports Staggered Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.
SATA device Type	**Hard Disk Drive** Solid State Drive	Identify the SATA port is connected to solid state drive or Hard Disk drive
SATA port 0 DevSlp	**Disabled** Enabled	Enable/Disable SATA Port 0 DevSlp. Board rework for LP needed before enable.
DITO Configuration	**Disabled** Enabled	Enable/Disable DITO Configuration.
DITO Value	Read Only	
DM Value	Read Only	

7.4.4.5. South Cluster Configuration > SCC Configuration

Feature	Options	Description
SCC SD Card Support (D27:F0)	Disabled **Enabled**	Enable/Disable SCC SD Card Support

7.4.4.6. South Cluster Configuration > USB Configuration

Feature	Options	Description
XHCI Pre-Boot Driver	**Disabled** Enabled	Enable/Disable XHCI Pre-Boot Driver Support
XHCI Mode	Disabled **Enabled**	Once disable, XHCI controller would be function disabled, none of the USB devices are detectable and usable during boot and in OS. Do not disable it unless for debug purpose.
USB Port Disable Override	**Disabled** Enabled	Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.
USB Port #0	Disabled **Enabled**	Enable/Disable USB port. Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.

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7.4.4.7. South Cluster Configuration > Miscellaneous

Feature	Options	Description
High Precision Timer	Disabled **Enabled**	Enable or Disable the High Precision Event Timer
State After G3	**S0 State** S5 State Last State	Specify what state to go to when power is re-applied after a power failure (G3 State). S0 State: System will boot directly as soon as power applied. S5 State: System keeps in power-off state until power button is pressed.
Wake on LAN	**Disabled** Enabled	Enable or Disable the Wake on LAN

7.5. Security

7.5.1. Password Description

Feature	Options	Description
Setup Administrator Password	Enter password	
User Password	Enter password	
Secure Boot menu	Submenu	Customizable Secure Boot settings.

7.5.1.1. Secure Boot Menu

Feature	Options	Description
Secure Boot	Info Only	
System Mode	Info only	
Secure Boot	Info only	
Secure Boot Control	**Disabled** Enabled	Secure Boot can be enabled if: 1. System running in User mode with enrolled Platform Key (PK) 2. CSM function is disabled.

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7.6. Boot

7.6.1. Boot Configuration

Feature	Options	Description
Boot Configuration	Info only	
Setup Prompt Timeout	**1**	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Bootup NumLock State	**On** Off	Select the keyboard NumLock state.
Quiet Boot	Disabled **Enabled**	Enable or Disable Quiet Boot option.
Fast Boot	**Disabled** Enabled	Enable or Disable Fast Boot features. Most probes are skipped to reduce time cost during boot..
New Boot Option Policy	**Default** Place First Place Last	Controls the placement of newly detected UEFI boot options
Boot Mode select	Legacy **UEFI**	Select boot mode LEGACY/UEFI
Boot Option #1~ #8	**Hard Disk** CD/DVD USB Hard Disk USB CD/DVD USB Key USB Floppy USB LAN Network Disabled	Set the system boot order

7.7. Save & Exit

7.7.1. Save Options

Feature	Options	Description
Save Changes and Exit	Yes/No	Exit system setup after saving the changes.
Discard Changes and Exit	Yes/No	Exit system setup without saving any changes.
Save Changes and Reset	Yes/No	Reset the system after saving the changes.
Discard Changes and Reset	Yes/No	Reset system setup without saving any changes.
Save Changes	Yes/No	Save Changes done so far to any of the setup options.
Discard Changes	Yes/No	Discard Changes done so far to any of the setup options.

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7.7.2. Default Options

Feature	Options	Description
Restores Defaults	Yes/No	Restore/Load Default values for all the setup options.
Save as User Default	Yes/No	Save the changes done so far as User Defaults.
Restore User Defaults	Yes/No	Restore the User Defaults to all the setup options.

7.7.3. Boot Override

Feature	Options	Description
UEFI: Built-in EFI Shell		Launches built-in EFI Shell
Launch EFI Shell from file system device		Launches EFI Shell from file system device

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Safety Instructions

Read and follow all instructions marked on the product and in the documentation before you operate your system. Retain all safety and operating instructions for future use.

- Please read these safety instructions carefully.
- Please keep this User‘s Manual for later reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment, turn off the power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources.
  - Keep equipment away from high heat or high humidity.
  - Keep equipment properly ventilated (do not block or cover ventilation openings).
  - Make sure to use recommended voltage and power source settings.
  - Always install and operate equipment near an easily accessible electrical socket-outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings.
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.
- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

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