AmITX-BW-I

User's Manual

Thin Mini-ITX Embedded Motherboard with
Intel® Pentium®/Celeron® Processor N3000 family,
Intel® Atom™ Processor x5-E8000



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ADLINK TECHNOLOGY INC.

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Revision History

Revision	Description	Date	By
1.00	Initial release	2016-04-11	JC

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Preface

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Table of Contents

Revision History **2**

Preface **3**

1. Introduction **7**

1.1. Packing List 7

1.2. Optional Accessories 7

2. Specifications **8**

2.1. Core System 8

2.2. Rear I/O Connectors 8

2.3. Internal Headers and Connectors 8

2.4. Form Factor 9

2.5. SEMA Board Controller 9

2.6. Debug Header 9

2.7. Video 9

2.8 Audio 9

2.9. LAN 9

2.10. Power Specification 9

2.11. Temperatures 10

2.12. Environmental 10

2.13. Operating Systems 10

2.14. Functional Diagram 11

3. Mechanical Layout **12**

3.1. Connector Locations 12

3.2. Mechanical Dimensions 14

4. Connectors and Jumpers **15**

4.1. Rear IO Connectors 15

4.1.1. DC Power Inlet 15

4.1.2. DisplayPort 16

4.1.3. HDMI Connector 16

4.1.4. Ethernet Connectors (LAN1, LAN2) 17

4.1.5. USB 3.0 Connectors (USB1-4) 17

4.1.6. Audio Connectors (Line-out, Mic-in) 18

4.2. Internal Connectors 18

4.2.1. ATX Power Connector (4-pin) 18

4.2.2. SATA Connectors (SATA1, SATA2) 19

4.2.3. SATA Power Connector (ST_PWR) 19

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4.2.4. USB Header 20
4.2.5. PS/2 Keyboard and Mouse Connector 21
4.2.6. Internal Audio Connector 21
4.2.7. CPU Fan and System Fan Connectors 22
4.2.8. Serial COM Port Connectors 22
4.2.9. LVDS Connector 24
4.2.10. LVDS Auxiliary Connector 25
4.2.11. Front Panel Connector 26
4.2.12. Feature Connector 27
4.2.13. SPI Header 28
4.2.14. DB40 Debug Board Connector 29
4.3. Jumper and Switch Settings 30
4.3.1. ATX/AT Mode Jumper Selection (JPY1) 30
4.3.2. Clear CMOS and BIOS Default (JP5) 30
4.3.3. Reset BIOS Defaults (JP6) 30
4.3.4. SATA2/mSATA Select (JP1) 30
4.3.5. LVDS Backlight Power Jumper Selection (JP2) 31
4.3.6. LVDS Panel Power Jumper Selection (JP3) 31
4.3.7. LVDS Backlight Enable Jumper Selection (JP4) 31
4.3.8. Serial Port Mode Switch Setting (SW14, SW10, SW11) 32
4.3.9. BIOS Switch Setting (SW1) 32
4.4. Onboard Connector Information 33
5. Smart Embedded Management Agent (SEMA) 34
5.1. Board Specific SEMA Functions 34
5.1.1. Voltages 34
5.1.2. Main Current 35
5.1.3. BMC Status 35
5.1.4. Exception Codes 35
5.1.5. BMC Flags 36
6. System Resources 37
6.1. System Memory Map 37
6.2. I/O Map 37
6.2.1. I/O Map 37
6.2.2. IRQ Lines PIC mode 38
6.2.3. IRQ Lines APIC mode 39
6.3. PCI Configuration Space Map 40
6.4. PCI Interrupt Routing Map 41
6.5. SMBus Slave Address 41

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7. BIOS Setup 42
7.1. Menu Structure 42
7.2. Main 43
7.2.1. BIOS Information 43
7.2.2. Processor Information 43
7.2.3. SOC Information 43
7.2.4. System Language 43
7.2.5. System Management 44
7.2.6. System Date and Time 46
7.3. Advanced 47
7.3.1. CPU 47
7.3.2. Graphics 47
7.3.3. Memory 49
7.3.4. SATA 49
7.3.5. USB 50
7.3.6. Network 51
7.3.7. PCI and PCIe 51
7.3.8. Super IO 52
7.3.9. ACPI and Power Management 53
7.3.10. Sound 53
7.3.11. Serial Port Console 53
7.3.12. Thermal 55
7.3.13. Security 55
7.3.14. Miscellaneous 55
7.4. Security 56
7.4.1. Password Description 56
7.5. Boot 56
7.5.1. Boot Configuration 56
7.6. Save & Exit 57
Safety Instructions 58
Getting Service 59

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1. Introduction

The AmITX-BW-I is a low-profile Thin Mini-ITX embedded board supporting an Intel® Pentium®/Celeron® processor N3000 family and Intel Atom™ processor x5-E8000 system-on-chip (SoC). The AmITX-BW-I is specifically designed for customers who need significant graphics performance with low power consumption in a long product life solution.

The Intel® Pentium®/Celeron® processor N3000 family and Intel Atom™ processor x5-E8000 SoC (formerly "Braswell") are built on 14nm technology and support non-ECC type DDR3L dual-channel memory at 1600/1333 MHz to provide excellent overall performance. Integrated Intel® Gen 8 Graphics includes features such as OpenGL 4.2, DirectX 12, OpenCL 1.2 and support for H.265/HEVC @ level 5, H.264 @ level 5.1, MPEG2, MVC, VC-1, VP8, WMV9, JPEG, VP8 hardware video decode and H.264 @ level 5.1, MVC, JPEG hardware video encode.

The AmITX-BW-I supports dual stacked SODIMM sockets for up to 8 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 4x 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 GPIO, SMBus, and I²C, and optional SIM card slot and microSD card slot are available. The AmITX-BW-I is equipped with SPI AMI EFI BIOS, supporting embedded features such as hardware monitor and watchdog timer.

Model	Intel Braswell SoC	Core Speed (HFM/Burst)	Thermal Design Power (TDP)	Scenario Design Power (SDP)
AmITX-BW-I-N3710	Pentium® N3710 (4 cores)	1.6/2.56 GHz	6W	4W
AmITX-BW-I-N3160	Celeron® N3160 (4 cores)	1.6/2.24 GHz	6W	4W
AmITX-BW-I-N3060	Celeron® N3060 (2 cores)	1.6/2.48 GHz	6W	4W
AmITX-BW-I-N3010	Celeron® N3010 (2 cores)	1.04/2.24 GHz	4W	3W
AmITX-BW-I-E8000	Atom™ x5-E8000 (4 cores)	1.04/2.00 GHz	5W	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?utm_source=&cKind=&pid=1572

1.1. Packing List

- AmITX-BW-I Thin Mini-ITX motherboard
- SATA dual power cable (P/N: 30-20875-0000)
- SATA cable (P/N: 30-10057-0600)
- Standard rear I/O shield (P/N: 34-25317-0000)

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)
- Low profile rear I/O shield (P/N: 34-25317-1000)

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2. Specifications

2.1. Core System

- CPU: Dual or quad-core Intel® Pentium® , Celeron®, Atom™ Processor SoC
  - Pentium® N3710 1.6/2.56 (Burst) GHz 6W (4W SDP) (4C/1600)
  - Celeron® N3160 1.6/2.24 (Burst) GHz 6W (4W SDP) (4C/1600)
  - Celeron® N3060 1.6/2.48 (Burst) GHz 6W (4W SDP) (2C/1600)
  - Celeron® N3010 1.04/2.24 (Burst) GHz 4W (3W SDP) (2C/1600)
  - Atom™ x5-E8000 1.04/2.00 (Burst) GHz, 5W (4W SDP) (4C/1600)

  Supports: Quad Out-of-Order Execution (OOE) processor cores, Intel® VT-x, support 36-bit physical address, 48-bit linear address size
  Note: Availability of features dependent on processor SKU, Intel® Hyper-Threading Technology is not supported
- Cache: Cores are grouped into dual-core modules
  One die, 32 KB, 8-way L1 instruction cache and 24 KB, 6-way L1 data cache per core
  One die, 1 MB, 16-way L2 cache, shared per two cores (module)
- Memory: Dual channel non-ECC 1600/1333 MHz DDR3L memory up to 8GB in dual stacked SODIMM sockets
- Embedded BIOS: AMI EFI in 8MB SPI BIOS

2.2. Rear I/O Connectors

- Display: 2x DisportPort, 1x HDMI
- LAN: Dual GbE RJ-45
- USB: 4x USB 3.0
- Aduio: Line-Out, Mic-In
- Power: Screw Jack for 12V DC-in

2.3. Internal Headers and Connectors

- PCIe x1 slot
- 2x Mini PCIe slots: one PCIe + USB; one mSATA + USB
- USB: 2x USB 2.0 via onboard header, 2x USB 2.0 via front panel connector
- SATA: 2x SATA 6Gb/s (SATA0, SATA1)
- SATA Power Connector
- Serial: 2x RS-232 headers, 2x RS-232/422/485 headers with 5V power (12V by BOM option)
- LVDS (optional): dual-channel 18/24-bit, switched from DisplayPort (build option)
- eDP (optional): switched from DisplayPort ((build option, not available concurrently with LVDS)
- SIM Card slot (build option)
- microSD Card slot (build option)
- Front Panel Header
- Audio Header
- Feature Connector Header
- PS/2 KB/MS Connector
- TPM Header
- SPI Header
- ATX Power Connector (4-pin)

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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

2.7. Video

- GPU Feature Support: Gen 8-LP Intel® graphics core with 16 execution units supporting maximum of three simultaneous displays
  - Hardware acceleration:
    3-D: DirectX 11.1, OpenGL, 4.2, OpenGL ES 3.0, OpenCL 1.2
    2-D: HEVC, H.264, MPEG2, VC-1 WMV9
  - Hardware video decode: H.265/HEVC @ level 5, H.264 @ level 5.1, MPEG2, MVC, VC-1, VP8, WMV9, JPEG, VP8
  - Hardware video encode: H.264 @ level 5.1, MVC, JPEG

  Note: Availability of features dependent on processor SKU and may vary between operating systems.

- Display Interface Support
  - DisplayPort: Supports DP1.1a, maximum resolution: 3840x2160 @ 30Hz, 2560x1600 @ 60Hz
  - HDMI: Supports HDMI 1.4b, maximum resolution: 3840x2160 @ 30Hz, 2560x1600 @ 60Hz
  - LVDS (optional): Supports single/dual channel 18/24-bit, up to 1920x1200 @ 60 Hz
  - eDP (optional): Supports eDP 1.4, maximum resolution: 2560x1440 @ 60Hz

2.8. Audio

- Audio Codec: ALC886

2.9. LAN

- Intel MAC/PHY: Intel® i211AT (MAC/PHY) Ethernet controller
- 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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2.11. Temperatures

- Operating Temperature: 0°C to 60°C
- Storage Temperature: -20°C to 80°C

2.12. Environmental

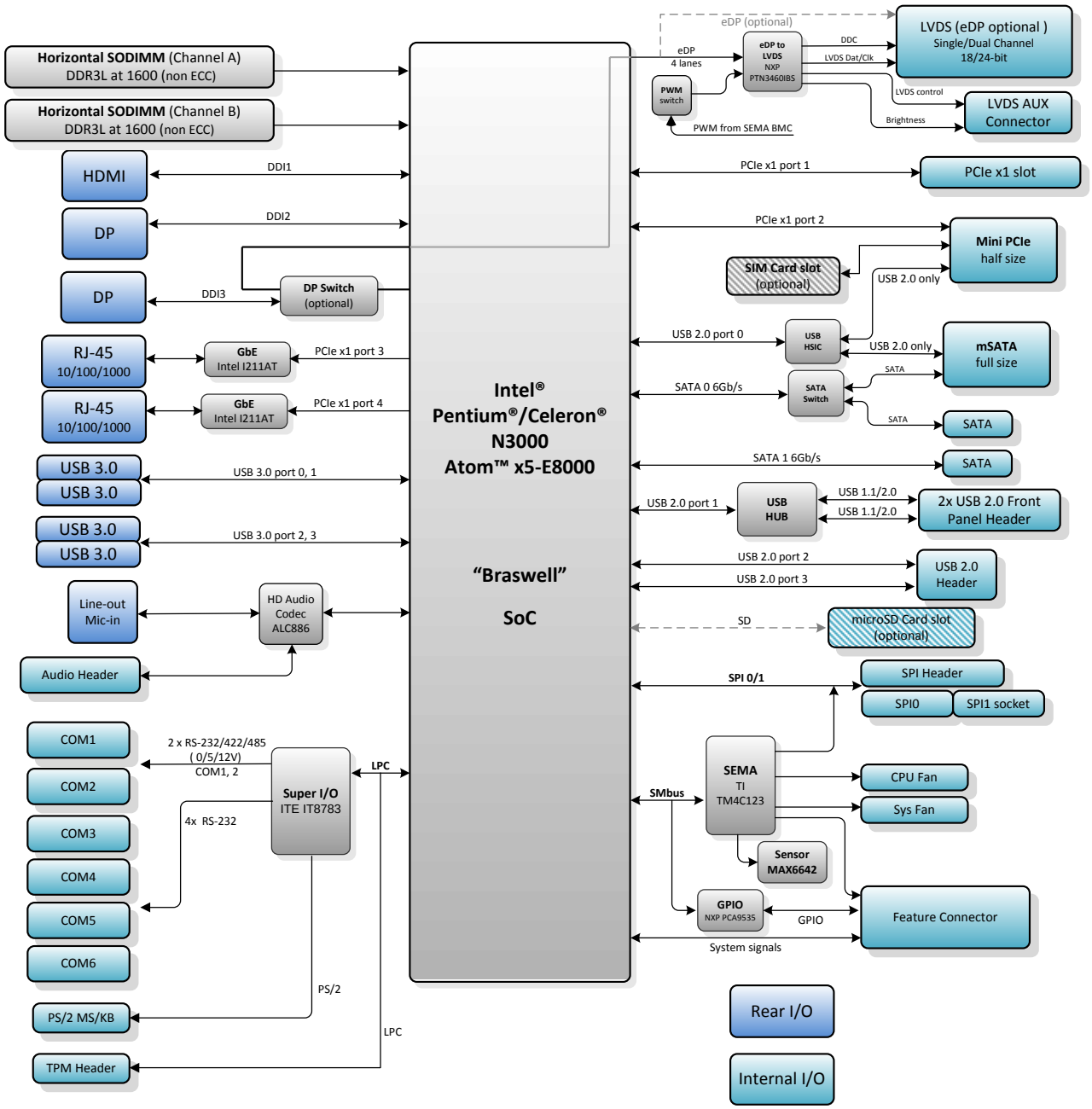
- Humidity: 10-90% RH operating, non-condensing
  5-95% RH storage (and operating with conformal coating)
- Shock and Vibration: IEC 60068-2-64 and IEC-60068-2-27
  MIL-STD-202F, Method 213B, Table 213-I, Condition A and Method 214A, Table 214-I, Condition D
- HALT: Thermal Stress, Vibration Stress, Thermal Shock and Combined Test

2.13. Operating Systems

- Standard Support: Windows 7/8.1/10 32/64-bit, Linux 32/64-bit
- Extended Support (BSP): WES7, Linux

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2.14. Functional Diagram



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3. Mechanical Layout

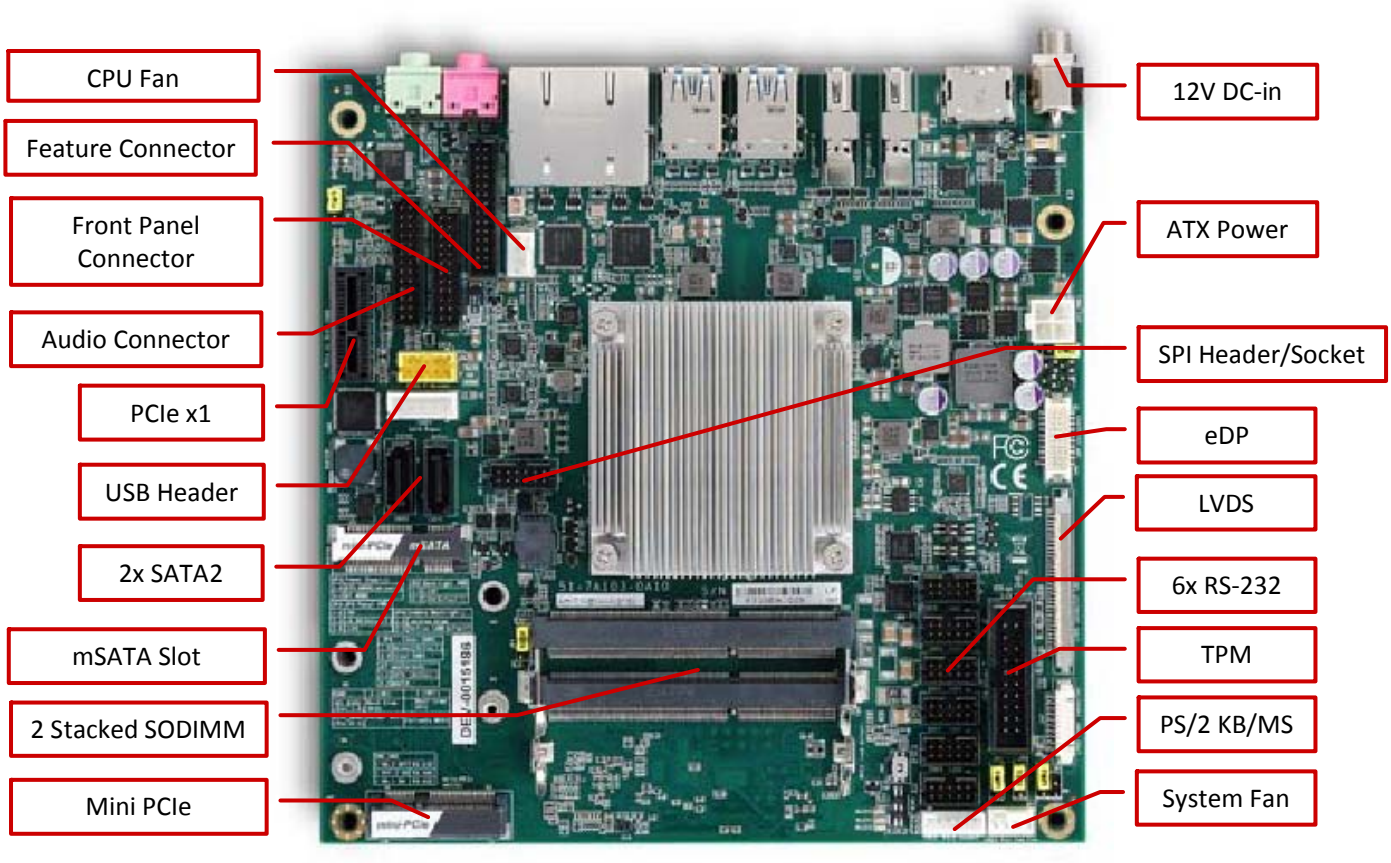
3.1. Connector Locations

Rear I/O



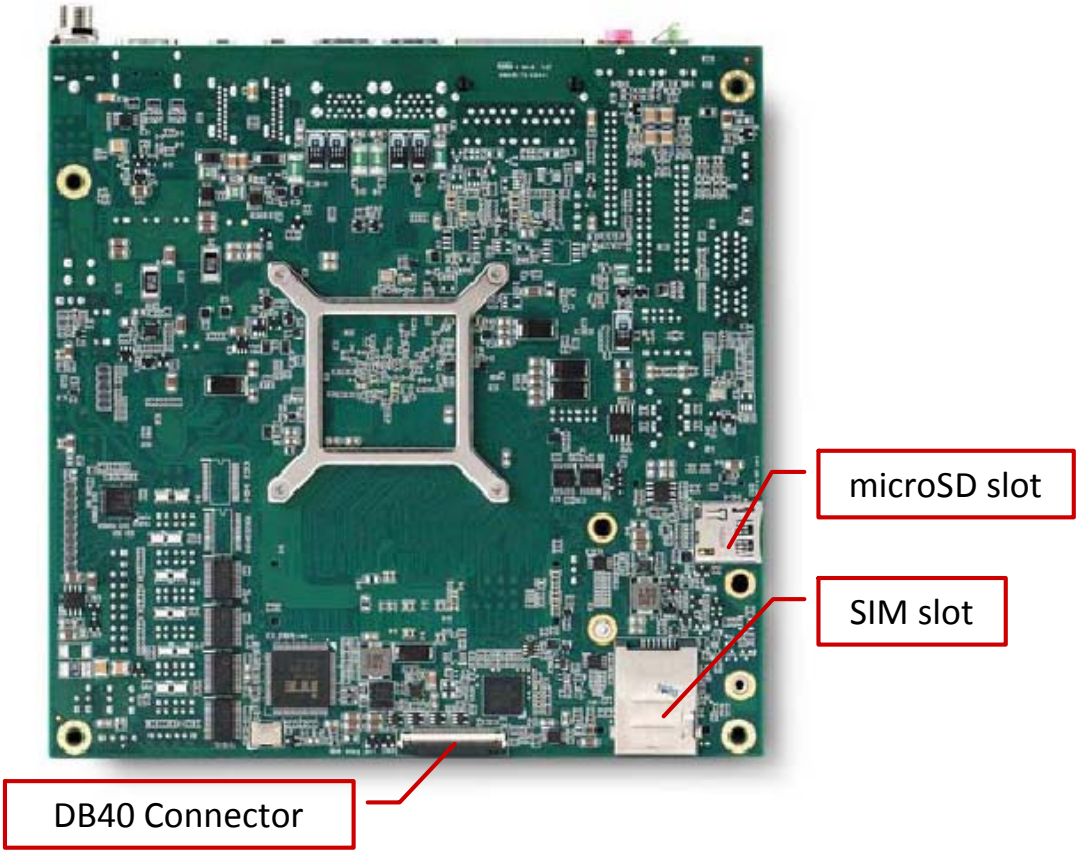
12V DC-in HDMI DP DP USB 3.0 Line-out Mic-in

Top Side Connectors



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Bottom Side Connectors

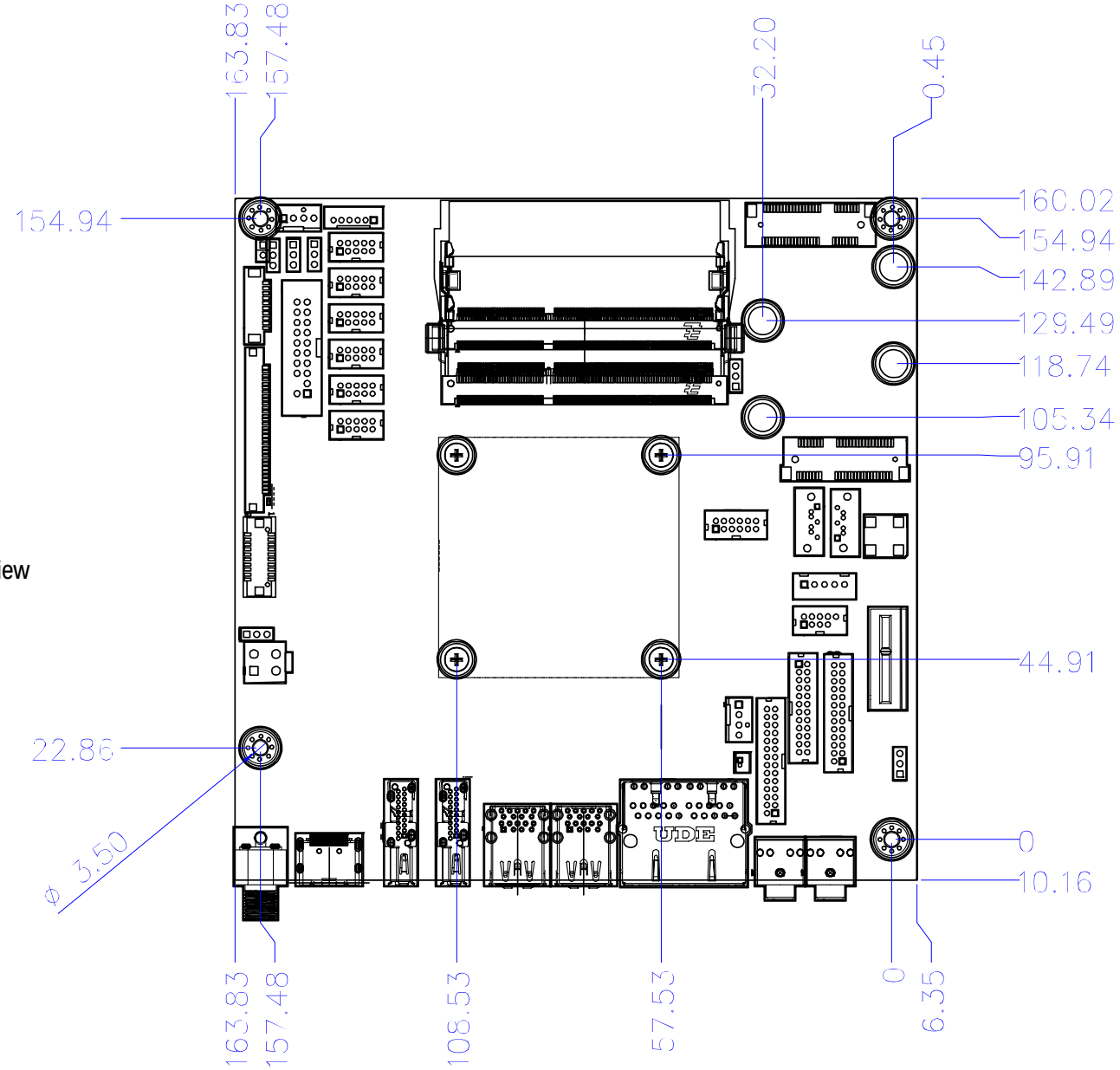


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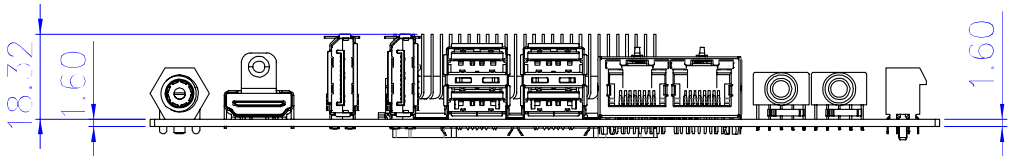
3.2. Mechanical Dimensions

Dimensions: mm

Top View



Side View



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4. Connectors and Jumpers

See 3.1 Connector Locations on page 12 for connector locations.

4.1. Rear IO Connectors

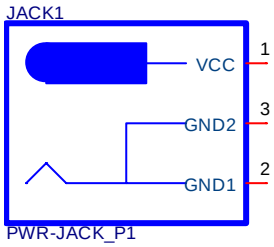
4.1.1. DC Power Inlet

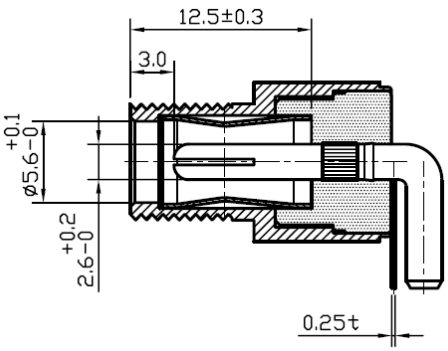
The AmITX-BW-I supports a screw-type external 12V DC-in power connector. Maximum current draw is 10A.

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.

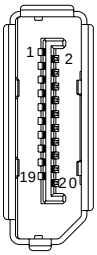
Only connect ONE power supply to the board. Connecting power to both the 12V DC-inlet and the internal ATX Power Connector may damage the board.

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4.1.2. DisplayPort

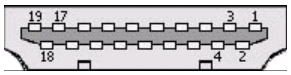
Two DisplayPort v1.1a specification ports up to 3840x2160 @ 30Hz, 2560x1600 @ 60Hz

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	CN_CAD-L	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

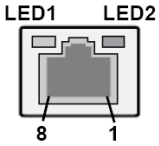
Pin #	Signal	Pin #	Signal
1	TMDS Data2+	2	TMDS Data2 Shield
3	TMDS Data2–	4	TMDS Data1+
5	TMDS Data1 Shield	6	TMDS Data1–
7	TMDS Data0+	8	TMDS Data0 Shield
9	TMDS Data0–	10	TMDS Clock+
11	TMDS Clock Shield	12	TMDS Clock–
13	CEC	14	Reserved
15	SCL	16	SDA
17	DDC/CEC Ground	18	+5 V Power
19	Hot Plug Detect		



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4.1.4. Ethernet Connectors (LAN1, LAN2)

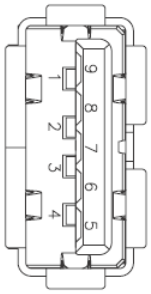
Pin #	10BASE-T/100BASE-TX	1000BASE-T
1	TX+	LAN_MDI0+
2	TX-	LAN_MDI0-
3	RX+	LAN_MDI1+
4	--	LAN_MDI2+
5	--	LAN_MDI2-
6	RX-	LAN_MDI1-
7	--	LAN_MDI3+
8	--	LAN_MDI3-



LED1 (Speed)		LED2 (Link/Activity)	
Status	Description	Status	Description
Off	10 Mb connection	Off	No Link
Green	100 Mb connection	Orange	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, Mic-in)

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

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

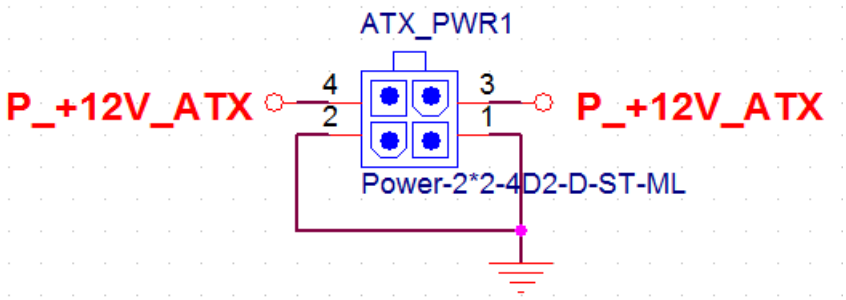
4.2. Internal Connectors

4.2.1. ATX Power Connector (4-pin)

AmITX-BW-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)

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

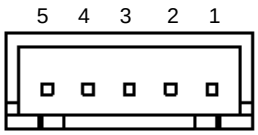
Note: If mSATA is installed, SATA2 is disabled. See 4.3.4 SATA2/mSATA Select (JP1).

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

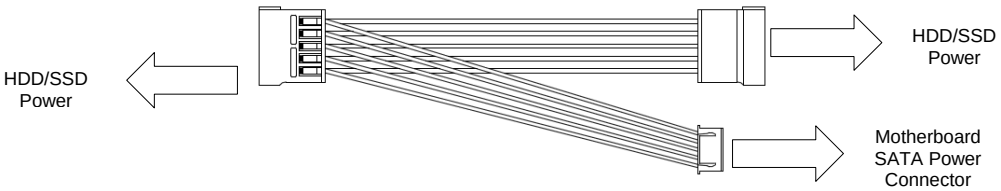


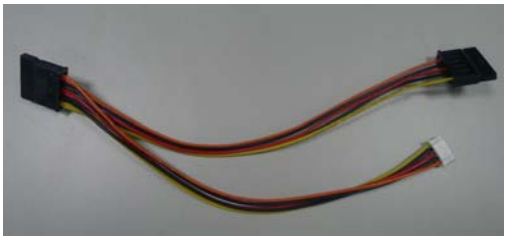
4.2.3. SATA Power Connector (ST_PWR)

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



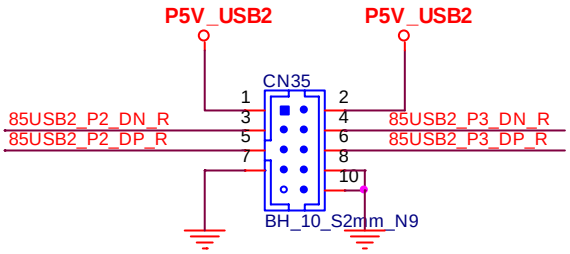
SATA Power Cable: ADLINK Part. No.: 30-20875-0000 (length 200 mm)



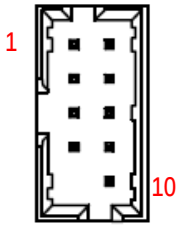


4.2.4. USB Header

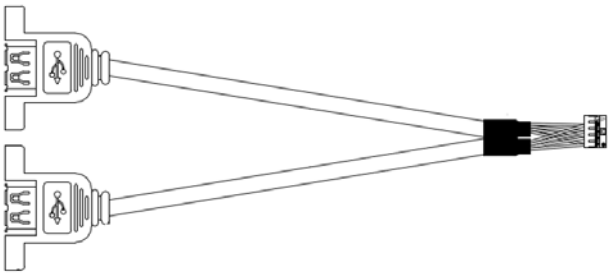
5V/SB5V: 5V supplies for external devices. SB5V is supplied during power down to allow wakeup on USB device activity during S3~S4 state.



Pin #	Signal	Pin #	Signal
1	P5V_USB	2	P5V_USB
3	P2_DN_R-	4	P3_DN_R
5	P2_DP_R	6	P3_DP_R
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

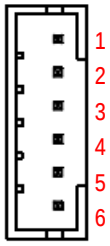


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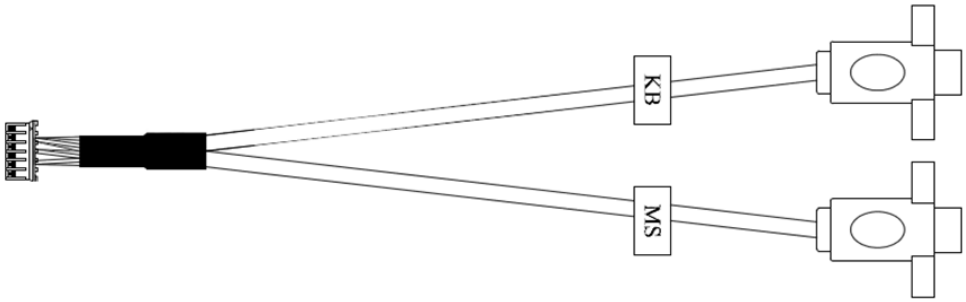
4.2.5. PS/2 Keyboard and Mouse Connector

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

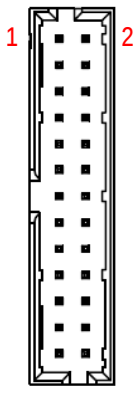


4.2.6. Internal Audio Connector

2x13-pin 2.0 pitch standard wafer connector.

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

Signal	Pin #	Pin #	Signal
LFE-OUT	1	2	CEN-OUT
AAGND	3	4	AAGND
FRONT-OUT-L	5	6	FRONT-OUT-R
AAGND	7	8	AAGND
REAR-OUT-L	9	10	REAR-OUT-R
SIDE-OUT-L	11	12	SIDE-OUT-R
AAGND	13	14	AAGND
MIC1-L	15	16	MIC1-R
AAGND	17	18	AAGND
LINE1-L	19	20	LINE1-R
MUTE	21	22	AAGND
GND	23	24	NC
SPDIF-OUT	25	26	GND

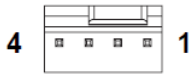


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4.2.7. CPU Fan and System Fan Connectors

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

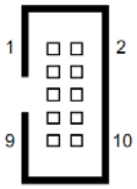
Pin #	Signal
1	GND
2	Fan Power (+12V)
3	Fan Sense
4	Fan Speed Control



4.2.8. Serial COM Port Connectors

Four internal Serial Ports (COM1-6)

Serial Port	Functions
COM1	Supports RS-232 / RS-422 / RS-485, 5V/12V power support by BOM option (default 5V). SW10: Switch for mode selection of COM3 (default RS-232).
COM2	Supports RS-232 / RS-422 / RS-485, 5V/12V power support by BOM option (default 5V). SW11: Switch for mode selection of COM4 (default RS-232).
COM3	Supports RS-232 only, 5V/12V power support by BOM option (default 5V).
COM4	Supports RS-232 only, 5V/12V power support by BOM option (default 5V).
COM5	Supports RS-232 only, 5V/12V power support by BOM option (default 5V).
COM6	Supports RS-232 only, 5V/12V power support by BOM option (default 5V).



RS-232

Pin #	Signal	Pin #	Signal
1	DCD	2	DSR
3	RxD	4	RTS
5	TxD	6	CTS
7	DTR	8	RI
9	GND	10	5V / 12V

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RS-422 (COM1-2 only)

Pin #	Signal	Pin #	Signal
1	Tx-	2	—
3	Tx+	4	—
5	Rx+	6	—
7	Rx-	8	—
9	GND	10	5V / 12V

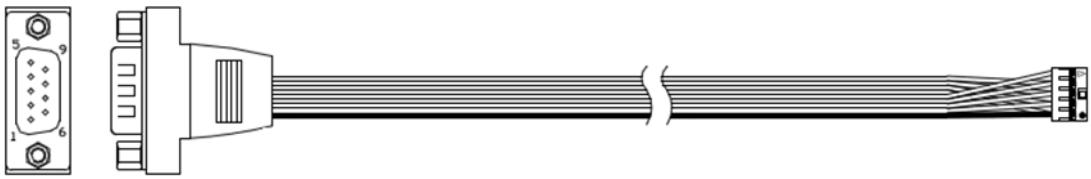
RS-485 (COM1-2 only)

Pin #	Signal	Pin #	Signal
1	Tx/Rx-	2	
3	Tx/Rx+	4	—
5	—	6	—
7	—	8	—
9	GND	10	5V / 12V

SW10/SW11 (RS-422/485 Mode Select)			
	RS-232 (default)	RS-422	RS-485
1	ON*	ON	OFF
2	OFF*	ON	ON

See Section 4.3.8 Serial Port Mode Switch Setting (SW14, SW10, SW11)

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



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4.2.9. LVDS Connector

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) or 5V. 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
	LVDS	LVDS A0-	1	16	LVDS B1+	LVDS	
	LVDS	LVDS A0+	2	17	POWER GND	PWR	Max. 0.5A
	LVDS	LVDS A1-	3	18	LVDS B2-	LVDS	
	LVDS	LVDS A1+	4	19	LVDS B2+	LVDS	
	LVDS	LVDS A2-	5	20	LVDS BCLK-	LVDS	
	LVDS	LVDS A2+	6	21	LVDS BCLK+	LVDS	
Max. 0.5A	PWR	POWER GND	7	22	LVDS B3-	LVDS	
	LVDS	LVDS ACLK-	8	23	LVDS B3+	LVDS	
	LVDS	LVDS ACLK+	9	24	POWER GND	PWR	Max. 0.5A
	LVDS	LVDS A3-	10	25	DDC DATA	OT	PU 2K2Ω, 3.3V
	LVDS	LVDS A3+	11	26	VDD ENABLE	OT	3.3V level
	LVDS	LVDS B0-	12	27	DDC CLK	OT	PU 2K2Ω, 3.3V
	LVDS	LVDS B0+	13	28	LCDVCC	PWR	Max 0.5A
Max. 0.5A	PWR	POWER GND	14	29	LCDVCC	PWR	Max 0.5A
	LVDS	LVDS B1-	15	30	LCDVCC	PWR	Max 0.5A

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4.2.10. LVDS Auxiliary Connector

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), Panel Power Selection (JP3), and Panel Power Selection (JP3) settings.

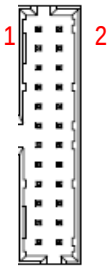
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4.2.11. Front Panel Connector

2x12-pin 2.0 pitch standard wafer connector

The front panel connector of AmITX-BW-I provides two USB2.0 header, 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	USB6/7_5V	-	PWR	1	2	USB6/7_5V	PWR	-	1
3	USB6-	-			4	USB7-		-	
5	USB6+	-			6	USB7+		-	
7	GND	-	PWR		8	GND	PWR	-	
9	Mute	-	Mute		10	LINE2-L		-	
11	+5V	-	PWR	2	12	+5V	PWR	-	2
13	SATA_LED#	25/25mA	O		14	SUS_LED	O	7mA	3
15	GND	-	PWR		16	PWRBTN_IN#	I		
17	RSTIN#	-	I		18	GND	PWR	-	
19	SB3V3	-	PWR		20	LINE2-R		-	
21	AGND	-	PWR		22	AGND	PWR	-	
23	MIC2-L	-	AI		24	MIC2-R	AI	-	



Note 1: 5V/SB5V: 5V supplies for external devices. SB5V is supplied during power down to allow wakeup on USB device activity during S3~S4 state.

Note 2: Maximum load is 1A.

Note 3: SUS_LED (System Power LED): Connect 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).

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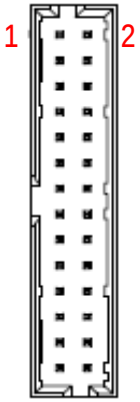
4.2.12. Feature Connector

2x13-pin 2.0 pitch standard wafer connector

The feature connector of AmITX-BW-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 occurred, system will notice/show case open alert in POST when the next booting.
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	TEMPS	-		I	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).

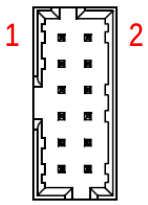
Note 2: Input to SEMA.

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4.2.13. SPI Header

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

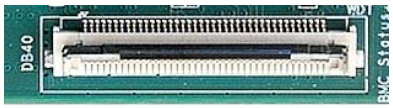


Signal	Description
CLK	Serial Clock
SB3V3	3.3V Standby Voltage power line. Normally output power, but when Motherboard is turned off then the on-board SPI Flash can be 3.3V power sourced via this pin.
CS0#	CS0# Chip Select 0, active low.
ADDIN	ADDIN input signal must be NC.
MOSI	Master Output, Slave 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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4.2.14. 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 (continued)	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

4.3.1. ATX/AT Mode Jumper Selection (JPY1)

JPY1	ATX/AT Mode
1-2	ATX (default)
2-3	AT

4.3.2. Clear CMOS and BIOS Default (JP5)

JPY1	ATX/AT Mode
1-2	Normal (default)
2-3	Clear CMOS

4.3.3. Reset BIOS Defaults (JP6)

JPY1	ATX/AT Mode
1-2	Normal (default)
2-3	Reset BIOS Defaults

4.3.4. SATA2/mSATA Select (JP1)

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

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4.3.5. LVDS Backlight Power Jumper Selection (JP2)

JP1	Backlight Power
1-2	12V
2-3	5V (default)

4.3.6. LVDS Panel Power Jumper Selection (JP3)

JP2	Panel Power
1-2	5V
2-3*	3.3V (default)

4.3.7. LVDS Backlight Enable Jumper Selection (JP4)

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

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4.3.8. Serial Port Mode Switch Setting (SW14, SW10, SW11)

SW14 (SER1 MODE SEL)			
	RS-232 (default)*	RS-422	RS-485
1	ON*	ON	OFF
2	OFF*	ON	ON

SW10 (SER3 MODE SEL)			
	RS-232 (default)	RS-422	RS-485
1	ON*	ON	OFF
2	OFF*	ON	ON

SW11 (SER4 MODE SEL)			
	RS-232 (default)	RS-422	RS-485
1	ON*	ON	OFF
2	OFF*	ON	ON

4.3.9. BIOS Switch Setting (SW1)

SW1	
ON (default)	Boot from SPI0*
OFF	Boot from SPI1

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4.4. Onboard Connector Information

Connector	CN#	Onboard Connector		Mating Connector		ADLINK Cable
		Manufacturer	Part No.	Manufacturer	Part No.	
COM Port	CN36-39	JVE	23N6850-10S10B-01G-B-01	YOUNG YAK	YY-1970H-2*5P (PH2.0)	30-20876-0000 (optional)
ATX power		Molex	9359-12P	E.C.I	E.C.I 5016H-2*7P (PH4.2)	30-20872-0000 (standard)
PS/2 KB/MS	CN3	JVE	24W1140-06S10-01T-3.4-CS01	E.C.I	E.C.I 2020 -06P (PH2.0)	30-20873-0000 (optional)
USB	CN35	JVE	23N6850-10S10B-01G-B-V9-01	YOUNG YAK	YY-1970H-2*5P (PH2.0)	30-20874-1000 (optional)
SATA Power	CN29	JVE	24W1170-05S10-01T-3.4-CS01	YOUNG YAK	YY-1970H-2*5P (PH2.0)	30-20875-0000 (standard)
SATA	CN16-17	WIN WIN	WATM-07DBN4B2B8UW			30-10057-0600 (standard)
DB-40		Molex	502790-4091			30-30016-0000 (optional)
LVDS	CN21	JVE	FI-X30SSLA-HF	WELL-LIN ENTERPRISE	WL1058-HL-30P (PH1.0)	
LVDS Auxiliary	CN45	Molex	53261-1071	WELL-LIN ENTERPRISE	WL1025-H-10P (PH1.25)	
Feature	CN14	JVE	23N6850-28S10B-01G-C-01	JWT	JWT A2005H00-2C*14 (PH2.0)	
Audio	CN9	JVE	23N6850-26S10B-01G-C-01	JWT	JWT A2005H00-2CX13P (PH2.0)	
Front Panel	CN26	JVE	23N6850-24S10B-01G-C-01	YY	YY-1970H-2*12P (PH2.0)	

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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 tells 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 cExpress-BT 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).

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	+V1.05S	(MSB<<8 + LSB) x 3.3 / 1024
3	Vmem	(MSB<<8 + LSB) x 3.3 / 1024
4	+V1.0V	(MSB<<8 + LSB) x 3.3 / 1024
5	+V3.3V	(MSB<<8 + LSB) x 1.1 x 3.3 / 1024
6	+VIN	(MSB<<8 + LSB) x 6.000 x 3.3 / 1024
7	(MAIN CURRENT)	Use Main Current Function

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5.1.2. Main Current

The BMC of the cExpress-BT 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

This register shows the status of BMC controlled signals on the cExpress-BT.

Status Bit	Signal
0	WDT_OUT
1	LVDS_VDDEN
2	LVDS_BKLTEN
3	BIOS_MODE
4	POSTWDT_DISn
5	SEL_BIOS
6	BIOS_DIS0n
7	BIOS_DIS1n

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.

Exception Code	Error Message
0	NOERROR
2	NO_SUSCLK
3	NO_SLP_S5
4	NO_SLP_S4
5	NO_SLP_S3
6	BIOS_FAIL
7	RESET_FAIL
8	POWER_FAIL
9	LOW_VIN
10	VCORE
11	VGFX
12	V1P05S

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Exception Code	Error Message
13	VMEM
14	V1P0A
15	V3P3A
16	+P12V_5V
18	CRITICAL_TEMP
19	NO_CB_PWROK
20	NO_HW_PWORK
21	NO_V1P24A_PG

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.

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

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

6.2.1. I/O Map

Hex Range	Device
020-02D and 030-03D	Interrupt controller 1, 8259 equivalent
02E-02F	SuperI/O
040-04D and 050-053	Timer, 8254-2 equivalent
04E-04F	UART index/data registers
060, 062, 064, 066, 068-06F	8742 equivalent (keyboard)
061, 063, 065, 067	NMI control and status
070-07F	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	APM control and status port respectively
0E0-0EF	Available
0F0	Co-processor error register
228-22F	Serial Port 6
2E0-2E7	Serial Port 5
2E8-2EF	Serial Port 4
2F8-2FF	Serial Port 2
3B0-3BB, 3C0-3DF	VGA
3E8-3EF	Serial Port 3
3F8-3FF	Serial Port 1
378-37F	Available
380-3AF	Available
4D0	Master PIC Edge/Level Trigger register
4D1	Slave PIC Edge/Level Trigger register
0A00~0A2F	Reserved for SIO functions base address (ex: PME /GPIO etc)
CF8-CFB	PCI configuration address register (32 bit I/O only)

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Hex Range	Device
CF9	Reset Control register (8 bit I/O)
CFC-CFF	PCI configuration data register
1C00	GPIO Base Address for SB
1800	PM (ACPI) Base Address for SB
1860	Alias for ICH TCO base address.
D000-EFFF	PCIE Root Port
F000-F03F	VGA
F040-F05F	Smbus controller
F060-F07F	SATA controller

6.2.2. IRQ Lines PIC mode

IRQ#	Typical Intterupt 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	Audio Controller	IRQ5 via SERIRQ / PIRQ	Note (1)
6	Serial Port6 (COM6)	IRQ6 via SERIRQ / PIRQ	No
7	Serial Port3 (COM3)	IRQ7 via SERIRQ / PIRQ	Note (1)
8	Real-time clock	N/A	No
9	Generic	N/A	Note (1)
10	Serial Port5 (COM5)	IRQ10 via SERIRQ / PIRQ	Note (1)
11	Serial Port4 (COM4)	IRQ11 via SERIRQ / PIRQ	Note (1)
12	PS/2 Mouse	IRQ12 via SERIRQ / PIRQ	Note (1)
13	Math Processor	N/A	Note (1)
14	Generic	N/A	Note (1)

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

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6.2.3. IRQ Lines APIC mode

IRQ#	Typical Intterupt 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	Audio Controller	IRQ5 via SERIRQ / PIRQ	Note (1)
6	Serial Port6 (COM6)	IRQ6 via SERIRQ / PIRQ	No
7	Serial Port3 (COM3)	IRQ7 via SERIRQ / PIRQ	Note (1)
8	Real-time clock	N/A	No
9	Generic	N/A	Note (1)
10	Serial Port5 (COM5)	IRQ10 via SERIRQ / PIRQ	Note (1)
11	Serial Port4 (COM4)	IRQ11 via SERIRQ / PIRQ	Note (1)
12	PS/2 Mouse	IRQ12 via SERIRQ / PIRQ	Note (1)
13	Math Processor	N/A	Note (1)
14	Generic	N/A	Note (1)
33~38	I2C ES Controller	N/A	Note (1)
45,47	SD Host Controller	N/A	Note (1)
48~50,91	Intel Serial IO GPIO 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. 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	13h	00h	Internal	Intel AHCI Controller
00h	14h	00h	Internal	Intel xHCI USB Controller
00h	1Ah	00h	Internal	Intel En/Decryption Controller
00h	1Bh	00h	Internal	Intel HD Audio Device
00h	16h	03h	Internal	Intel Serial Device
00h	17h	00h	Internal	Intel AHCI controller
00h	1Ch	00h	Internal	Intel PCI-to-PCI Bridge(PCIE)
00h	1Ch	01h	Internal	Intel PCI-to-PCI Bridge(PCIE)
00h	1Ch	02h	Internal	Intel PCI-to-PCI Bridge(PCIE)
00h	1Fh	00h	Internal	Intel ISA Bridge
00h	1Fh	02h	Internal	Intel Memory controller
00h	1Fh	03h	Internal	Intel SMBUS Controller
02h	00h	00h	Internal	Intel Ethernet Controller
03h	00h	00h	Internal	Intel Ethernet Controller

Note (1): The Bus number would be changed if PEG/PCIE port has device.

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6.4. PCI Interrupt Routing Map

INT Line	P.E.G Root Port	Audio Controller	xHCI Controller	TXE Controller #1
Int0	INTA:16	INTA:22	INTA:20	INTA:21
Int1	INTB:17			
Int2	INTC:18			
Int3	INTD:19			

INT Line	PCIE Port 1	PCIE Port 2	PCIE Port 3	PCIE Port 4
Int0	INTA:16	INTB:17	INTC:18	INTD:19
Int1	INTB:17	INTC:18	INTD:19	INTA:16
Int2	INTC:18	INTD:19	INTA:16	INTB:17
Int3	INTD:19	INTA:16	INTB:17	INTC:18

INT Line	LPC Controller	SATA Controller	SMBus Controller
Int0	INTA:16	INTA:19	INTB:18
Int1	INTB:17		
Int2	INTC:18		
Int3	INTD:19		

6.5. 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	Security	Boot	Save & Exit
- BIOS Information - Processor Information - IGFX VBIOS Version - Total Memory - SOC Information - System Language - System Management ▶ - System Date - System Time	- CPU ▶ - Memory ▶ - Graphics ▶ - SATA ▶ - USB ▶ - Network ▶ - PCI and PCIe ▶ - Super IO ▶ - ACPI and Power Management ▶ - Sound ▶ - Serial Port Console ▶ - Thermal ▶ - Miscellaneous ▶ - Intel(R) I211 Gigabit Network Connection ▶ - Intel(R) I211 Gigabit Network Connection ▶ - Driver Health ▶	- Administrator Password - User Password - Secure Boot menu ▶	- Boot Configuration ▶ - Boot Option Priorities ▶ - CSM Parameters ▶	- 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.
Core Version	Info only	Version.
Compliancy	Info only	Compliancy Information.
Project Version	Info only	Project Version
Build Data and Time	Info only	Data and Time
Access Level	Info only	Level type

7.2.2. Processor Information

Feature	Options	Description
CPU brand string	Info only	CPU Brand String.
Max CPU Speed	Info only	Standard CPU frequency.
CPU Signature	Info only	Signature
Processor Cores	Info only	Cores number.
IGFX VBIOS version	Info only	IGFX VBIOS version.
Total Memory	Info only	Total memory size.

7.2.3. SOC Information

Feature	Options	Description
Braswell SoC	Info only	Stepping.
TXE FW Version	Info only	TXE FW Version.
Stepping	Info only	PCH Stepping.

7.2.4. System Language

Feature	Options	Description
System Language	English	Choose the system default language

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7.2.5. System Management

7.2.5.1. System Management > Board Information

Board Information	Info only	
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
Hardware Version	Read only	Display SEMA hardware version
Serial Number	Read only	Display SEMA serial number
Manufacturing Date	Read only	Display SEMA manufacturing date
Last Repair Date	Read only	Display SEMA last repair date
MAC ID	Read only	Display SEMA MAC ID
SEMA Features:	Read only	Display SEMA features

7.2.5.2. System Management > Temperatures and Fan Speed

Feature	Options	Description
Temperatures and Fan	Info only	
Board Temperatures	Info only	
Current	Read only	Display current board temperature
Startup	Read only	Display board startup temperature
Min	Read only	Display board min. temperature
Max	Read only	Display board max. temperature
CPU Fan Speed	Read only	Display CPU fan speed
System Fan1 Speed	Read only	Display system fan speed

7.2.5.3. System Management > Power Consumption

Feature	Options	Description
Power Consumption	Info only	
Current Input Current	Read only	Display input current
VCC-CORE	Read only	Display actual VCC-CORE voltage
VNN_A	Read only	Display actual VNN_A voltage
VGG_S3	Read only	Display actual VGG_S3 voltage
VDDQ	Read only	Display actual VDDQ voltage
VRTC	Read only	Display actual VRTC voltage
V3P3_S	Read only	Display actual V3P3_S voltage

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Feature	Options	Description
V5_SBY	Read only	Display actual V5_SBY voltage
V12	Read only	Display actual V12 voltage
V3P3_A	Read only	Display actual V3P3_A voltage
V5_S0	Read only	Display actual V5_S0 voltage

7.2.5.4. System Management > 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 Bootcounter 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.

7.2.5.5. 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.

7.2.5.6. System Management > Power Up

Feature	Options	Description
Power Up	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.
Power-up Mode Attention: The Power-Up Mode only has effect, if the module is in ATX-Mode.	Turn on Remain off Last State	Turn On: The machine starts automatically when the power supply is turned on. Remain Off :To start the machine the power button has to be pressed. Last State: when powered on during a power failure the system will automatically power on when power is restored

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7.2.5.7. System Management > LVDS Backlight

Feature	Options	Description
LVDS Backlight	Info only	
LVDS Backlight Bright	255	The value range starts by 0 and ends by 255.

7.2.5.8. System Management > Smart Fan

Feature	Options	Description
Smart Fan	Info only	
CPU Smart FanTemperature Source	CPU Sensor System Sensor	Select CPU smart fan source
CPU Fan Mode	AUTO (Smart Fan) Fan Off Fan On	Select CPU fan mode
Trigger Point 1	Read only	
Trigger Temperature	15	Specifies the temperature threshold at which the BMC turns on the CPU fan with the specified PWM level
PWM Level	30	Select PWM level
Trigger Point 2	Read only	
Trigger Temperature	60	Specifies the temperature threshold at which the BMC turns on CPU fan the specified PWM level
PWM Level	40	Select PWM level
Trigger Point 3	Read only	
Trigger Temperature	70	Specifies the temperature threshold at which the BMC turns on CPU fan the specified PWM level
PWM Level	63	Select PWM level
Trigger Point 4	Read only	
Trigger Temperature	80	Specifies the temperature threshold at which the BMC turns on CPU fan the specified PWM level
PWM Level	100	Select PWM level
Trigger Temperature	65	Specifies the temperature threshold at which the BMC turns on System fan2 the specified PWM level
PWM Level	100	Select PWM level

7.2.6. System Date and Time

Feature	Options	Description
System Date	Weekday, MM/DD/YYYY	Requires the alpha-numeric entry of the day of the week, day of the month, calendar month, and all 4 digits of the year, indicating the century and year (Fri XX/XX/20XX)
System Time	HH/MM/SS	Presented as a 24-hour clock setting in hours, minutes, and seconds

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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

Feature	Options	Description
CPU	Info only	
CPU Brand String	Info only	Display CPU brand string
CPU Signature	Info only	Display CPU Signature
Microcode Patch	Info only	Display CPU Microcode version
Max CPU Speed	Info only	Display CPU Max frequency
Min CPU speed	Info only	Display CPU Min frequency
Processor Cores	Info only	Display number of processor
Intel HT Technology	Info only	Display Intel HT technology support
Intel VT-x Technology	Info only	Display Intel VT-x technology support
64-bit	Info only	Display 64-bit support
L1 Data Cache	Info only	Display L1 data cache size
L1 Code Cache	Info only	Display L1 code cache size
L2 Cache	Info only	Display L2 cache size
L3 Cache	Info only	Display L3 cache size
Limit CPUID Maximum	Disabled Enabled	Enabled/Disabled CPUID Maximum limit.
Intel Virtualization Technology	Disabled Enabled	When enabled, a VMM can utilize the additional hardware capabilities provided by vanderpool technology.
Configured Revision ID Control	Disabled Enabled	Select the Revision ID(Revision ID, CRID 0, CRID 1, CRID 2) reflected in PCI config space.
EIST	Disabled Enabled	Enabled/Disabled Intel SpeedStep.
CPU C state Report	Disabled Enabled	Enabled/Disabled CPU C state report to OS.
DTS	Disabled Enabled	Enabled/Disabled Digital Thermal Sensor.

7.3.2. Graphics

Feature	Options	Description
Graphics	Info only	
IGFX VBIOS version	Info only	
Primary Display	Auto IGFX PEG PCIE	Select which of Auto/IGFX/PEG/PCIE Graphics device should be Primary Display.
Integrated Graphics Device	Enabled Disabled	Enable: Enable Integrated Graphics Device (IGD) when selected as the Primary Video Adaptor. Disable: Always disable IGD

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Feature	Options	Description
Aperture Size	128MB 256MB 512MB	Select the Aperture Size.
DVMT Pre-Allocated	32MB 64MB 96MB 128MB 160MB 192MB 224MB 256MB 288MB 320MB 352MB 384MB 416MB 448MB 480MB 512MB	Select DVMT 5.0 Pre-Allocated 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.
LVDS Backlight Mode	GTT Mode BMC Mode	Select LVDS Backlight control function.
GT-Power Management Control	Info only	
RC6(Render Standby)	Enabled Disabled	Check to enable render standby support.
Switch LVDS-DDI3	DDI3 LVDS	DDI3 function choose to Display Port or DDI3 or LVDS.
Primary IGFX Boot Display	Auto HDMI LFP EFP3 EFP2	Select the Video Device which will be activated during POST.
LCD Panel Type	VBIOS Default 640x480 800x600 1024x768 1280x1024 1400x1050(RB) 1400x1050 1600x1200 1366x768 1680x1050 1920x1200 1440x900 1600x900 1024x768 1280x800 1920x1080 2048x1536	Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.
NXP PTN3460 Configuration	Info only	

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Feature	Options	Description
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

7.3.3. Memory

Feature	Options	Description
Total Memory	Info only	Display tatal system memory size
Memory Frequency	Info only	Display memory frequency
Memory Voltage	Info only	Display memory voltage
Memory Slot0	Info only	DisplaySlot 0 memory size
Memory Slot2	Info only	DisplaySlot 2 memory size
SPD Write Protect	Disabled Enabled	Enable: Writes to SMBus slave addresses A0h - AEh are disabled.
Max TOLUD	Dynamic 2GB 3 GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.

7.3.4. SATA

Feature	Options	Description
SATA	Info only	
SATA Controller(s)	Disabled Enabled	Enable/Disable SATA Device.
SATA Mode Selection	IDE AHCI RAID	Determines how SATA Controller(s) operate.
SATA Test Mode	Disabled Enabled	Test mode Enabled / Disabled
SATA Interface Speed	Default Gen1 Gen2 Gen3	Indicates the maximum speed the SATA controller can support.
SATA Port Configuration	Submenu	SATA Device Options Settings.

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7.3.4.1. SATA > SATA Port Configuration

Feature	Options	Description
SATA Port Configuration	Info only	
SATA Port 0	Info only	
Not Present	Info only	
Port 0	Disabled **Enabled**	Enable / Disable SATA Port.
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.
Device Sleep Support	Enabled **Disabled**	Enable/Disable Device Sleep Support on that port.
Hot Plug	Enabled **Disabled**	Designates this port as Hot Pluggable.
SATA Port 1	Info only	
Not Present	Info only	
Port 1	Disabled **Enabled**	Enable/Disable SATA Port.
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.
Device Sleep Support	Enabled **Disabled**	Enable/Disable Device Sleep Support on that port.
Hot Plug	Enabled **Disabled**	Designates this port as Hot Pluggable.

7.3.5. USB

Feature	Options	Description
USB Module version	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 Configuration	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.

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7.3.6. Network

Feature	Options	Description
Network	Info only	
Network Stack	Disabled Enabled	Enable/Disable Network Stack.
LAN 1 Controller	Disabled Enabled	Control the PCI Express Root Port.
Wake on LAN	Disabled Enabled	If Enabled: LAN_PWR always ON; If Disabled: LAN_PWR OFF when enter Suspend mode.
LAN 2 Controller	Disabled Enabled	Control the PCI Express Root Port.
Wake on LAN	Disabled Enabled	If Enabled: LAN_PWR always ON; If Disabled: LAN_PWR OFF when enter Suspend mode.

7.3.7. PCI and PCIe

Feature	Options	Description
PCI and PCIE	Info only	
PCIe Configuration	Submenu	PCIe Configuration

7.3.7.1. PCI and PCIe > PCIe Configuration

Feature	Options	Description
PCIe Configuration	Info only	
PCIe Express Root Port1	Submenu	PCIe Express Root Port1
PCIe Express Root Port4	Submenu	PCIe Express Root Port4

PCI and PCIe > PCIe Configuration > PCIe Express Root Port1

Feature	Options	Description
PCIe Express Root Port1	Disabled Enabled	Control the PCI Express Root Port
ASPM	Auto Disable L0s L1 L0sL1	PCI Express Active State Power Management settings.
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 .

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Feature	Options	Description
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	Enable or disable PCI Express Hot Plug.
PCIe Speed	Auto Gen1 Gen2	Configure PCIe Speed. CHV A1 always with Gen1 Speed.
Tx Eq Deemphasis Selection	3.5dB 6dB	Select the level of de-dmphasis for an Upstream component.

7.3.8. Super IO

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

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=3,4,5,6,7,9,10,11,12 IO=2F8;IRQ=3,4,5,6,7,9,10,11,12 IO=3E8;IRQ=3,4,5,6,7,9,10,11,12 IO=2E8;IRQ=3,4,5,6,7,9,10,11,12	Select an optimal setting for Super IO Device.

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7.3.9. ACPI and 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.

7.3.10. Sound

Feature	Options	Description
Sound	Info only	
Audio Controller	**Disabled** Enabled	Control Detection of the Azalia device. Disabled = Azalia will be unconditionally disabled. Enabled = Azalia will be unconditionally Enabled.

7.3.11. Serial Port Console

Feature	Options	Description
Serial Port Console	Info only	
COM0	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.
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	

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Feature	Options	Description
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.
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.

7.3.11.1. Serial Port Console > 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.
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 FunctionKey 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.

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7.3.12. Thermal

Feature	Options	Description
Thermal	Info only	
CPU Temperature	Info only	
Critical Trip Point	Disabled Enabled	This value is the temperature threshold of the Critical Trip Point.
Active Cooling Trip Point	Disabled 40 C 50 C 60 C 70 C BMC Default	This value is the temperature threshold of the Active Cooling Trip Point.
Passive Cooling Trip Point	Disabled Enabled	The value is the temperature threshold of the Passive Cooling Trip Point.
Passive TC1 Value	1	This value sets the TC1 value for the ACPI Passive Cooling Formula.
Passive TC2 Value	5	This value sets the TC2 value for the ACPI Passive Cooling Formula.
Passive TSP Value	10	This item sets the TSP value for the ACPI Passive Cooling Formula. It represents in tenths of a second how often the OS will read the temperature when passive cooling is enabled.

7.3.13. Security

Feature	Options	Description
Security	Info only	
Intel TXT(LT) Support	Disabled Enabled	Enables or Disables Intel(R) TXT(LT) support.
BIOS Security Configuration	BIOS Security Configuration settings.	
Trusted Computing	Trusted Computing Settings.	

7.3.14. Miscellaneous

Feature	Options	Description
Miscellaneous	Info only	
USB3 Clock Spread Spectrum	Disabled Enabled	Enable USB3 Clock Spread Spectrum feature.
Display Clock Spread Spectrum	Disabled Enabled	Enable DISPLAY Clock Spread Spectrum feature.
SATA Clock Spread Spectrum	Disabled Enabled	Enable SATA Clock Spread Spectrum feature.
PCI Clock Spread Spectrum	Disabled Enabled	Enable PCI Clock Spread Spectrum feature.
Security	Info only	
BIOS Security Configuration		BIOS Security Configuration
Trusted Computing		Trusted Computing Settings
Chassis Intrusion Support	Disabled Enabled	Chassis Intrusion Support

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7.4. Security

7.4.1. Password Description

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

7.4.1.1. Secure Boot Menu

Feature	Options	Description
System Mode	Setup	
Secure Boot	Info only	
Vendor Boot	Info only	
Secure Boot	Disabled Enabled	Secure Boot can be enabled if: 1. System running in User mode with enrolled Platform Key (PK) 2. CSM function is disabled.
Secure Boot Mode	Standard Custom	Secure Boot mode selector. 'Custom' Mode enables users to change Image Execution policy and manage Secure Boot keys.

7.5. Boot

7.5.1. Boot Configuration

Feature	Options	Description
Boot Configuration	Info only	
Setup Prompt Timeout	6	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 disables Quiet Boot option.
Fast Boot	Disabled Enabled	Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect on BBS boot options.
New Boot Option Policy	Default Place First Place Last	Controls the placement of newly detected UEFI boot options
BOM Config	Default Legacy System Yocto Linux	BOM Config
CSM Configuration	Submenu	CSM configuration: Enable/Disable, Option ROM execution settings, etc.

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7.5.1.1. Boot Configuration > CSM Configuration

Feature	Options	Description
CSM Support	**Enabled** Disable	Enable/Disable CSM Support.
CSM16 Module Version	Info only	
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.
Option ROM Messages	**Force BIOS** Keep Current	Set display mode for Option ROM.
INT19 Trap Response	**Immediate** Postponed	BIOS reaction on INT19 trapping by Option ROM: IMMEDIATE - execute the trap right away; POSTPONED - execute the trap during legacy boot.
Boot option filter	**UEFI and Legacy** Legacy only UEFI only	This option controls Legacy/UEFI ROMs priority.
Launch PXE OpROM policy	**Do not launch** UEFI only Legacy only	Controls the execution of UEFI and Legacy PXE OpROM
Option ROM execution	Info only	
Network	**Do not launch** UEFI only Legacy	Controls the execution of UEFI and Legacy PXE OpROM
Storage	Do not launch UEFI only **Legacy**	Controls the execution of UEFI and Legacy Storage OpROM
Video	Do not launch UEFI only **Legacy**	Controls the execution of UEFI and Legacy Video OpROM
Other PCI device	Do not launch **UEFI only** Legacy only	Determines OpROM execution policy for devices other than Network, Storage, or Video.

7.6. Save & Exit

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.
Default Options	Info only	
Restore Defaults	Yes No	Restore/Load Default values for all the setup options.
Save as User Defaults	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.
Boot Override	Info only	

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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.

A Lithium-type battery may be provided for uninterrupted, backup or emergency power.



CAUTION

Risk of explosion if battery is replaced with one of an incorrect type. Dispose of used batteries according to their instructions.

- Equipment must be serviced by authorized technicians when:
  - The power cord or plug is damaged;
  - Liquid has penetrated the equipment;
  - It has been exposed to high humidity/moisture;
  - It is not functioning or does not function according to the user's manual;
  - It has been dropped and/or damaged; and/or,
  - It has an obvious sign of breakage.

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Getting Service

Ask an Expert: http://askanexpert.adlinktech.com

ADLINK Technology, Inc.
Address: 9F, No.166 Jian Yi Road, Zhonghe District
New Taipei City 235, Taiwan
Tel: +886-2-8226-5877
Fax: +886-2-8226-5717
Email: service@adlinktech.com

Ampro ADLINK Technology, Inc.
Address: 5215 Hellyer Avenue, #110, San Jose, CA 95138, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-360-0222
Email: info@adlinktech.com

ADLINK Technology (China) Co., Ltd.
Address: 300 Fang Chun Rd., Zhangjiang Hi-Tech Park, Pudong New Area
Shanghai, 201203 China
Tel: +86-21-5132-8988
Fax: +86-21-5132-3588
Email: market@adlinktech.com

ADLINK Technology Beijing
Address: Rm. 801, Power Creative E, No. 1, B/D, Shang Di East Rd.
Beijing, 100085 China
Tel: +86-10-5885-8666
Fax: +86-10-5885-8625
Email: market@adlinktech.com

ADLINK Technology Shenzhen
Address: 2F, C Block, Bldg. A1, Cyber-Tech Zone, Gao Xin Ave. Sec. 7, High-Tech Industrial Park S.
Shenzhen, 518054 China
Tel: +86-755-2643-4858
Fax: +86-755-2664-6353
Email: market@adlinktech.com

LiPPERT ADLINK Technology GmbH
Address: Hans-Thoma-Strasse 11, D-68163, Mannheim, Germany
Tel: +49-621-43214-0
Fax: +49-621 43214-30
Email: emea@adlinktech.com

PENTA ADLINK Technology GmbH
Ulrichsbergerstrasse 17
94469 Deggendorf, Germany
Tel: +49 (0) 991 290 94 – 10
Fax: +49 (0) 991 290 94 - 29
Email: emea@adlinktech.com

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

ADLINK Technology, Inc. (French Liaison Office)
Address: 6 allée de Londres, Immeuble Ceylan
91940 Les Ulis, France
Tel: +33 (0) 1 60 12 35 66
Fax: +33 (0) 1 60 12 35 66
Email: france@adlinktech.com

ADLINK Technology Japan Corporation
Address: KANDA374 Bldg. 4F, 3-7-4 Kanda Kajicho, Chiyoda-ku
Tokyo 101-0045, Japan
Tel: +81-3-4455-3722
Fax: +81-3-5209-6013
Email: japan@adlinktech.com

ADLINK Technology, Inc. (Korean Liaison Office)
Address: 2F, Kyungdong B/D, 4 Sunae-ro 46 beon-gil
Bundang-gu, Seongnam-si, Gyeonggi-do, Korea, 13595
Toll Free +82-80-800-0585
Tel +82-31-786-0585
Fax +82-31-786-0583
Email: korea@adlinktech.com

ADLINK Technology Singapore Pte. Ltd.
Address: 84 Genting Lane #07-02A, Cityneon Design Centre
Singapore 349584
Tel: +65-6844-2261
Fax: +65-6844-2263
Email: singapore@adlinktech.com

ADLINK Technology Singapore Pte. Ltd. (Indian Liaison Office)
Address: #50-56, First Floor, Spearhead Towers
Margosa Main Road (between 16th/17th Cross), Malleswaram
Bangalore - 560 055, India
Tel: +91-80-65605817, +91-80-42246107
Fax: +91-80-23464606
Email: india@adlinktech.com

ADLINK Technology, Inc. (Israeli Liaison Office)
Address: 27 Maskit St., Corex Building
PO Box 12777
Herzliya 4673300, Israel
Tel: +972-77-208-0230
Fax: +972-77-208-0230
Email: israel@adlinktech.com

ADLINK Technology, Inc. (UK Liaison Office)
Tel: +44 774 010 59 65
Email: UK@adlinktech.com

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