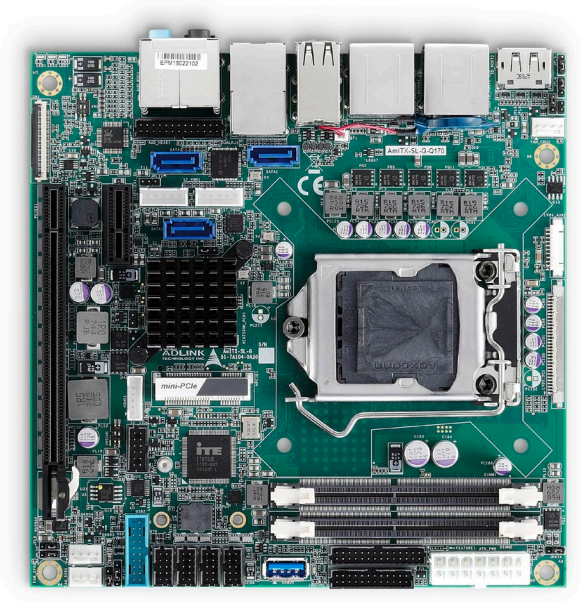
AmITX-SL-G

User's Manual

Mini-ITX Embedded Motherboard with
6th and 7th Gen Intel® Core™ i7/i5/i3 Processors
and Intel® Q170/H110 Chipset



Manual Rev.: 1.3
Revision Date: August 4, 2023
Part Number: 50M-1J070-1030

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

Preface

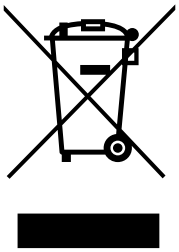
Copyright

Copyright © 2023 ADLINK Technology, Inc. This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

Disclaimer

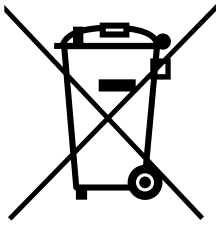
The information in this document is subject to change without prior notice in order to improve reliability, design, and function and does not represent a commitment on the part of the manufacturer. In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

Environmental Responsibility



ADLINK is committed to fulfill its social responsibility to global environmental preservation through compliance with the European Union's Restriction of Hazardous Substances (RoHS) directive and Waste Electrical and Electronic Equipment (WEEE) directive. Environmental protection is a top priority for ADLINK. We have enforced measures to ensure that our products, manufacturing processes, components, and raw materials have as little impact on the environment as possible. When products are at their end of life, our customers are encouraged to dispose of them in accordance with the product disposal and/or recovery programs prescribed by their nation or company.

Battery Labels (for products with battery)









California Proposition 65 Warning



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.

Trademarks

Product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

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

Revision History

Revision	Description	Date	By
1.00	Initial Release	2016-04-11	JC
1.1	Added 7th Gen CPUs; added power consumption values; updated BIOS; updated manual format	2018-09-17	DA
1.2	Update Mini-PCIe slot and DisplayPort specifications, TPM support for A3 HW revision, COM port and Feature Connector pin definitions, BIOS Write Protect jumper settings.	2019-04-30	JC
1.3	LVDS specifications and BIOS menu, values, and descriptions updated	2023-08-04	CC

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

Table of Contents

Preface ..... **ii**
List of Figures ..... **vi**
List of Tables ..... **vi**
1. Introduction **1**
1.1. Packing List 1
1.2. Optional Accessories 1
2. Specifications **3**
2.1. Core System 3
2.2. Rear I/O Connectors 3
2.3. Internal Headers and Connectors 4
2.4. Form Factor 4
2.5. SEMA Board Controller 4
2.6. Debug Header 4
2.7. Video 5
2.8. Audio 5
2.9. LAN 5
2.10. Trusted Platform Module (TPM) 5
2.11. Power Specification 5
2.12. Temperatures 8
2.13. Environmental 8
2.14. Operating Systems 8
2.15. Functional Block Diagram 9
3. Mechanical Layout **11**
3.1. Connector Locations 11
3.2. Mechanical Dimensions 12
3.3. Thermal Solutions 13
4. Connectors and Jumpers **15**
4.1. Rear IO Connectors 15
4.2. Internal Connectors 18
4.3. Jumper and Switch Settings 31
4.4. Onboard Connector Information 34
5. Driver Installation **35**
6. Smart Embedded Management Agent (SEMA) **37**
6.1. Board Specific SEMA Functions 37
7. System Resources **41**
7.1. System Memory Map 41
7.2. I/O Map 41
7.3. Interrupt Request (IRQ) Lines 42
7.4. PCI Configuration Space Map 44

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

7.5. PCI Interrupt Routing Map 45
7.6. SMBus Slave Address 45
8. BIOS Setup 47
8.1. Menu Structure 47
8.2. Main 48
8.3. Advanced 55
8.4. Security 73
8.5. Boot 74
8.6. Save & Exit 75
Safety Instructions 76
Getting Service 77

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

List of Figures

Figure 1: AmITX-SL-G Functional Block Diagram 9
Figure 2: AmITX-SL-G Rear I/O 11
Figure 3: AmITX-SL-G Component-Side Connectors 11
Figure 4: AmITX-SL-G Mechanical Dimensions.....12
Figure 5: Jumper and Switch Locations 31

List of Tables

Table 1: AmITX-SL-G Processors.....1
Table 2: AmITX-SL-G Onboard Connector Information 34
Table 3: SEMA Onboard Voltage Monitor 37
Table 4: SEMA BMC Status 38
Table 5: SEMA Exception Codes 39
Table 6: SEMA BMC Flags.....39
Table 7: System Memory Map 41
Table 8: I/O Map.....41
Table 9: IRQ Lines PIC Mode.....42
Table 10: IRQ Lines APIC Mode 43
Table 11: PCI Configuration Space Map.....44
Table 12: PCI Interrupt Routing Map.....45
Table 13: SMBus Slave Address.....45

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

1. Introduction

The AmITX-SL-G is a Mini-ITX motherboard supporting the Desktop 6th and 7th Generation Intel® Core™ i7/i5/i3 and Pentium®/Celeron® Processor with Intel® Q170/H110 Chipset. The AmITX-SL-G is specifically designed for customers who need high-level processing and graphics performance with a long product life solution.

The AmITX-SL-G features three DisplayPorts, dual Gigabit Ethernet ports, USB 3.0 ports, USB 2.0 ports, SATA 6 Gb/s ports, and High Definition Audio with 7.1 channels. Expansion is provided by one PCIe x16, one PCIe x1, and two mini-PCIe slots. The onboard feature connector provides GPIO, SMBus, and I2 C support. The board is equipped with SPI AMI EFI BIOS, supporting embedded features such as hardware monitor and watchdog timer

Table 1: AmITX-SL-G Processors

Model Number	Chipset
AmITX-SL-G-Q170	Q170
AmITX-SL-G-H110	H110

Latest revision of the datasheet, user's manual, BIOS, drivers, and board support packages, can be downloaded from the product webpage on the ADLINK web site: www.adlinktech.com

1.1. Packing List

- AmITX-SL-G Mini-ITX motherboard
- ATX/AT power cable (P/N: 30-20872-1000)
- SATA dual power cable (P/N: 30-20875-0000)
- SATA cable (P/N: 30-10057-0600)
- Rear I/O shield (P/N: 34-25314-0000)

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 for AmITX-SL-G-H110 (P/N: 30-20874-1000)
- USB 3.0 cable, 2 ports for AmITX-SL-G-Q170 (P/N: 30-20963-0000)

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

This page intentionally left blank.

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

2. Specifications

2.1. Core System

CPU	Desktop 6th Generation Intel® Core™ i7/i5/i3 and Pentium®/Celeron® Processor, LGA1151 socket Intel® Core™ i7-6700 Processor, 4C, 3.4/4.0 GHz, 8M, 65W Intel® Core™ i7-6700TE Processor, 4C, 2.4/3.4 GHz, 8M, 35W Intel® Core™ i5-6500 Processor, 4C , 3.2/3.6 GHz 6M, 65W Intel® Core™ i5-6500TE Processor, 4C, 2.3/3.3 GHz, 6M, 35W Intel® Core™ i3-6100 Processor, 2C, 3.7 GHz, 3M, 51W Intel® Core™ i3-6100TE Processor, 2C, 2.7 GHz, 4M, 35W Intel® Pentium® G4400 Processor, 2C, 3.3 GHz, 3M, 54W Intel® Pentium® G4400TE Processor, 2C, 2.4 GHz, 3M, 35W Intel® Celeron® G3900 Processor, 2C, 2.8 GHz, 2M, 51W Intel® Celeron® G3900TE Processor, 2C, 2.3 GHz, 2M, 35W Desktop 7th Generation Intel® Core™ i7/i5/i3 and Pentium®/Celeron® Processor, LGA1151 socket Intel® Core™ i7-7700 Processor, 4C, 3.6/4.2 GHz, 8M, 65W Intel® Core™ i7-7700T Processor, 4C, 2.9/3.8 GHz, 8M, 35W Intel® Core™ i5-7500 Processor, 4C, 3.4/3.8 GHz, 6M, 65W Intel® Core™ i5-7500T Processor, 4C, 2.7/3.3 GHz, 6M, 35W Intel® Core™ i3-7101E Processor, 2C, 3.9 GHz, 3M, 54W Intel® Core™ i3-7101TE Processor, 2C, 3.4GHz, 3M, 35W **Note:** Availability of features may vary between processor SKUs and operating systems
Chipset	Intel® Q170/H110 Chipset
Memory	Dual channel non-ECC 2133/2400 MHz DDR4 memory up to 32GB in dual SODIMM sockets
Embedded BIOS	AMI EFI in 16MB SPI BIOS

2.2. Rear I/O Connectors

Display	3x DisplayPort (Q170) , 2x DisplayPort (H110)
LAN	Dual GbE RJ-45
USB	4x USB 3.0; 4x USB 2.0
Audio	7.1 channel audio via 5 jacks and S/PDIF output on rear I/O

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

2.3. Internal Headers and Connectors

PCI Express Slots	PCIe x16 (Gen3) PCIe x1 (Gen2) 1x Mini-PCIe card (half size): supporting PCIe x1(Gen 2)/USB 2.0 (top side) 1x Mini-PCIe card (full size): supporting PCIe x1(Gen 2) or mSATA/USB 2.0 (bottom side)
USB	2x USB 3.0 onboard header (Q170) 2x USB 2.0 onboard header (H110) 1x USB 3.0 vertical connector (H110 only supports USB2.0)
SATA	3x SATA 6 Gbps ports (Jumper select NA/3.3V/5V for SATA1 and SATA2 to deliver power by SATA pin7; Default is NA) 2x SATA power connector
Serial	3x RS-232 headers, 1x RS-232/422/485 headers (supports NC/5V/12V power by jumper selection)
LVDS (optional)	Build option
eDP (optional)	Build option
Other	Front Panel Header Audio Header Feature Connector Header PS/2 KB/MS Connector SPI Header ATX Power Connector (14-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

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

2.7. Video

GPU Feature Support	Intel® 9th generation LP graphics core architecture with up to 18 execution units supporting DirectX 11/12, OGL4.3/4.4, and up to three independent, simultaneous displays
Display Interface Support	• 3x DisplayPort v1.2 with resolution up to 4096 x 2160 @ 24Hz (3x DisplayPort(Q170), 2x DisplayPort (H110)) • LVDS (optional): Single/dual channel 24-bit LVDS up to 1920x1080 @ 60Hz (from eDP-to-LVDS converter) • eDP (optional): Supports 3840x2160 resolution @ 60Hz, 24bpp (not available concurrently with LVDS)

2.8. Audio

Integrated	Intel® HD Audio on chipset
Audio Codec	Realtek ALC886
Interfaces	• 7.1 channel audio via 5 jacks and S/PDIF output on rear I/O • 7.1 channel audio signals and S/PDIF output via internal header

2.9. LAN

Intel PHY	Intel® i219-LM (PHY) Ethernet controller (H110: i219-V) • Supports Intel® AMT 11.0 (Q170 only) • Supports Intel® vPro™ (Q170 only)
Intel MAC/PHY	Intel® i211AT (MAC/PHY) Ethernet controller
Interface	10/100/1000 GbE connection

2.10. Trusted Platform Module (TPM)

TPM 1.2	TPM 1.2: Atmel AT97SC3204 (optional)
TPM 2.0	TPM 2.0: Infineon SLB9665 (optional for A3 HW revision only)

2.11. Power Specification

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

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

2.11.1. Power Consumption

Processor	Intel® Core™ i7-7700 3.60GHz	Intel® Core™ i7-6700 3.40GHz	Intel® Core™ i3-7101E 3.90GHz	Intel® Core™ i7-7700T 2.90 GHz	Intel® Core™ i5-7500T 2.70GHz	Intel® Core™ i3-7101TE 3.40GHz
Chipset	H110					
Memory	Transcend TS512MSH64V4H 4GB DDR4 2400 SO-DIMM 1Rx8					
Graphics	Intel® HD Graphics 630					
HDD	Intel 545S 256GB SATA 3Gb/s					
OS	Window 10 Enterprise x64 v1709					
Windows Idle mode/Enable EIST						
3.3V(A)	0	0	0	0	0	0
5V(A)	0	0	0	0	0	0
12V(A)	0.66	0.66	0.65	0.63	0.65	0.66
5VSB(A)	0	0	0	0	0	0
Power consumption(W)	7.92	7.92	7.8	7.56	7.8	7.92
Windows Idle mode/Disable EIST						
3.3V(A)	0	0	0	0	0	0
5V(A)	0	0	0	0	0	0
12V(A)	0.66	0.67	0.66	0.64	0.66	0.65
5VSB(A)	0	0	0	0	0	0
Power consumption(W)	7.92	8.04	7.92	7.68	7.92	7.8
Windows typical mode/Enable EIST						
3.3V(A)	0	0	0	0	0	0
5V(A)	0	0	0	0	0	0
12V(A)	7.25	6.48	4.68	4.59	3.84	3.52
5VSB(A)	0	0	0	0	0	0
Power consumption(W)	87	77.76	56.16	55.08	46.08	42.24
Windows typical mode/Disable EIST						
3.3V(A)	0	0	0	0	0	0
5V(A)	0	0	0	0	0	0
12V(A)	6.65	5.75	4.58	4.25	3.34	3.32
5VSB(A)	0	0	0	0	0	0
Power consumption(W)	79.8	69	54.96	51	40.08	39.84

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

Processor	Intel® Core™ i7-7700 3.60GHz	Intel® Core™ i7-6700 3.40GHz	Intel® Core™ i3-7101E 3.90GHz	Intel® Core™ i7-7700T 2.90 GHz	Intel® Core™ i5-7500T 2.70GHz	Intel® Core™ i3-7101TE 3.40GHz
Windows MAX mode/Enable EIST						
3.3V(A)	0	0	0	0	0	0
5V(A)	0	0	0	0	0	0
12V(A)	10.25	8.92	6.66	8.5	5.35	4.56
5VSB(A)	0	0	0	0	0	0
Power consumption(W)	123	107.04	79.92	102	64.2	54.72
Windows MAX mode/Disable EIST						
3.3V(A)	0	0	0	0	0	0
5V(A)	0	0	0	0	0	0
12V(A)	9.85	7.58	6.45	4.58	4.36	4.35
5VSB(A)	0	0	0	0	0	0
Power consumption(W)	118.2	90.96	77.4	54.96	52.32	52.2
System S1 mode						
3.3V(A)	No support	No support	No support	No support	No support	No support
5V(A)	No support	No support	No support	No support	No support	No support
12V(A)	No support	No support	No support	No support	No support	No support
5VSB(A)	No support	No support	No support	No support	No support	No support
Power consumption(W)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
System S3 mode						
3.3V(A)	0	0	0	0	0	0
5V(A)	0	0	0	0	0	0
12V(A)	0	0	0	0	0	0
5VSB(A)	0.09	0.09	0.09	0.09	0.09	0.09
Power consumption(W)	0.45	0.45	0.45	0.45	0.45	0.45
System S4 mode						
3.3V(A)	0	0	0	0	0	0
5V(A)	0	0	0	0	0	0
12V(A)	0	0	0	0	0	0
5VSB(A)	0.06	0.06	0.07	0.06	0.06	0.07
Power consumption(W)	0.3	0.3	0.35	0.3	0.3	0.35

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

Processor	Intel® Core™ i7-7700 3.60GHz	Intel® Core™ i7-6700 3.40GHz	Intel® Core™ i3-7101E 3.90GHz	Intel® Core™ i7-7700T 2.90 GHz	Intel® Core™ i5-7500T 2.70GHz	Intel® Core™ i3-7101TE 3.40GHz
S5 Mode with ECO Disabled						
3.3V(A)	0	0	0	0	0	0
5V(A)	0	0	0	0	0	0
12V(A)	0	0	0	0	0	0
5VSB(A)	0.06	0.06	0.07	0.06	0.06	0.07
Power consumption(W)	0.3	0.3	0.35	0.3	0.3	0.35
S5 Mode with ECO Enabled						
3.3V(A)	No support	No support	No support	No support	No support	No support
5V(A)	No support	No support	No support	No support	No support	No support
12V(A)	No support	No support	No support	No support	No support	No support
5VSB(A)	No support	No support	No support	No support	No support	No support
Power consumption(W)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

2.12. Temperatures

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

2.13. Environmental

Humidity	40° C @ 95% RH non-condensing
Shock and Vibration	IEC 60068-2-64 and IEC-60068-2-27 Vibration: 1Grms(5~500Hz)/OP. 3Grms(5~500Hz)/NON-OP Shock: 20G (with 11 ms duration, half sine wave) operating, 20G(with 11 ms duration, half sine wave) non-operating
HALT	Thermal Stress, Vibration Stress, Thermal Shock and Combined Test

2.14. Operating Systems

Standard Support	Windows 7 32/64-bit (6th Generation Intel® Core™ i7/i5/i3 and Pentium®/Celeron® Processor Only), Windows 8.1 64-bit, Linux 32/64-bit, Win10 64-bit
Extended Support (BSP)	WES7, Linux, VxWorks (TBD)

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

2.15. Functional Block Diagram

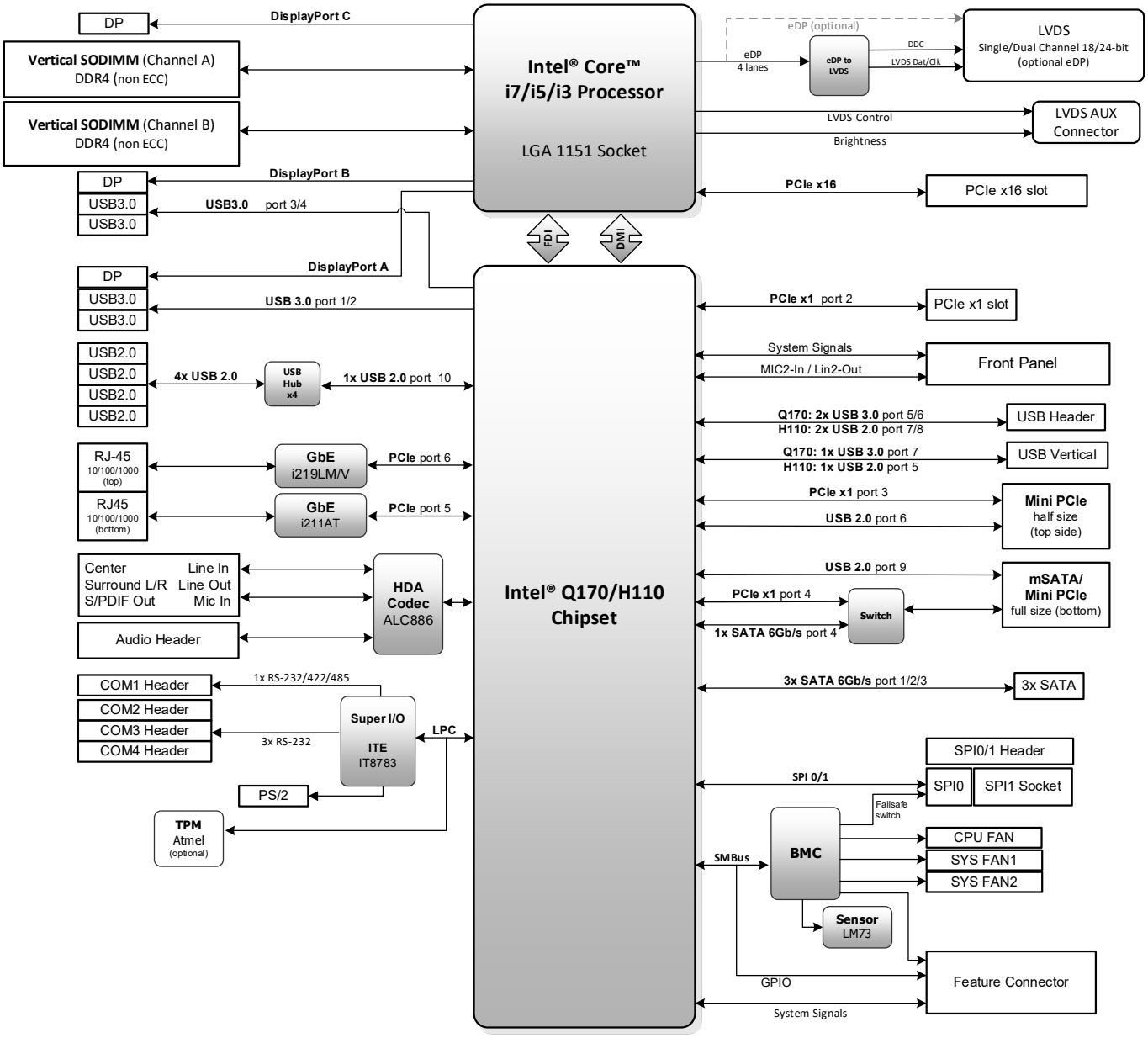


Figure 1: AmITX-SL-G Functional Block Diagram

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

This page intentionally left blank.

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

3. Mechanical Layout

3.1. Connector Locations

3.1.1. Rear I/O Connectors



Figure 2: AmITX-SL-G Rear I/O

3.1.2. Component-Side Connectors

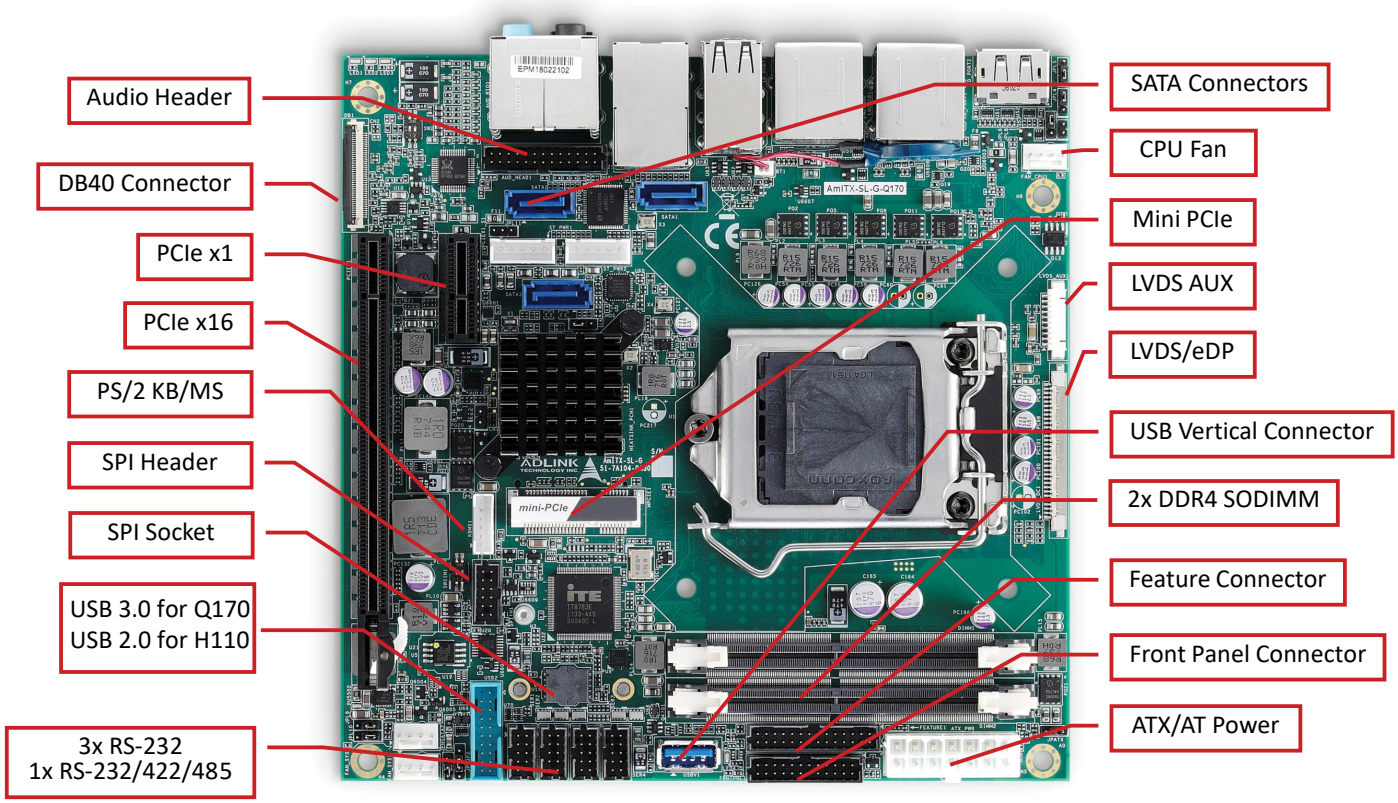
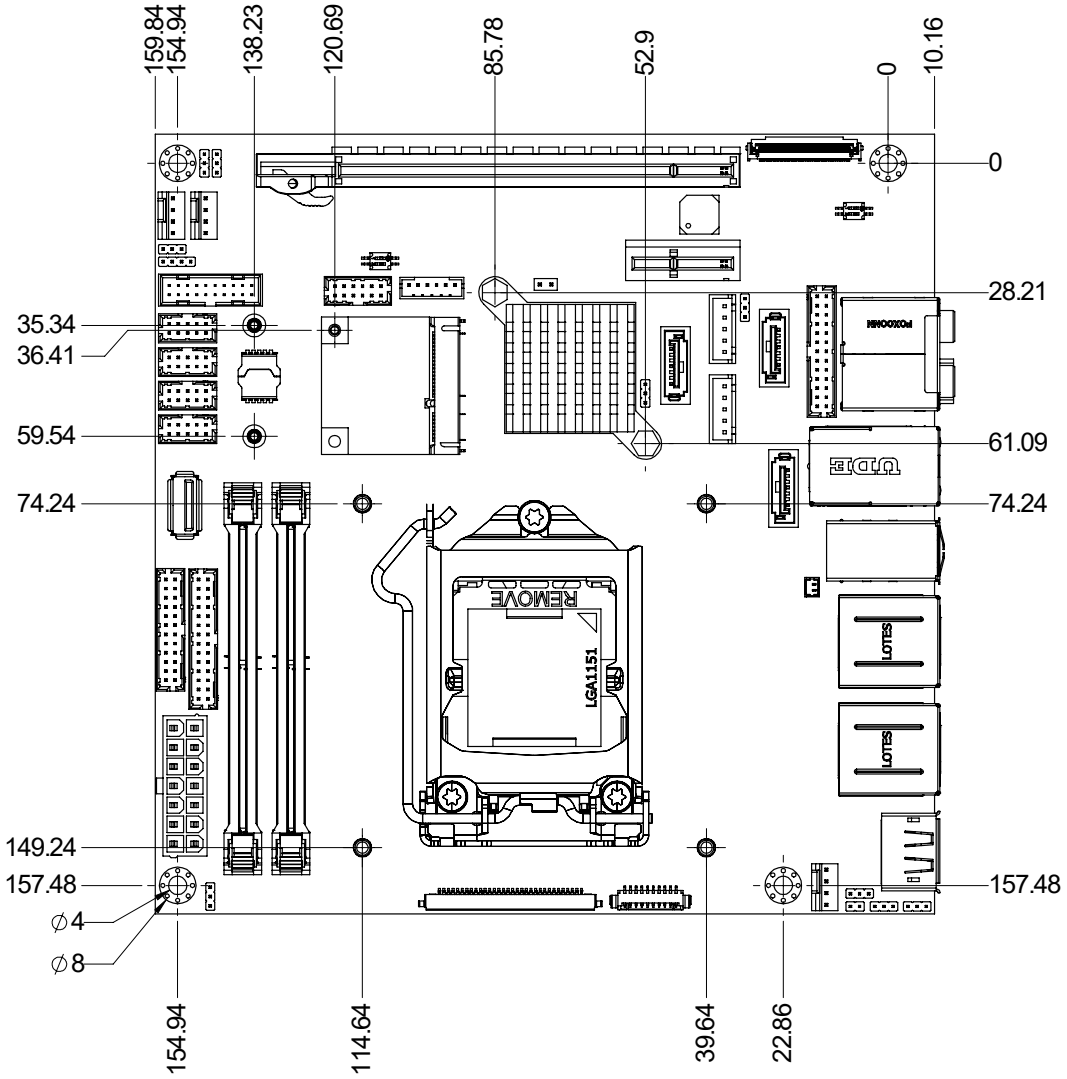


Figure 3: AmITX-SL-G Component-Side Connectors

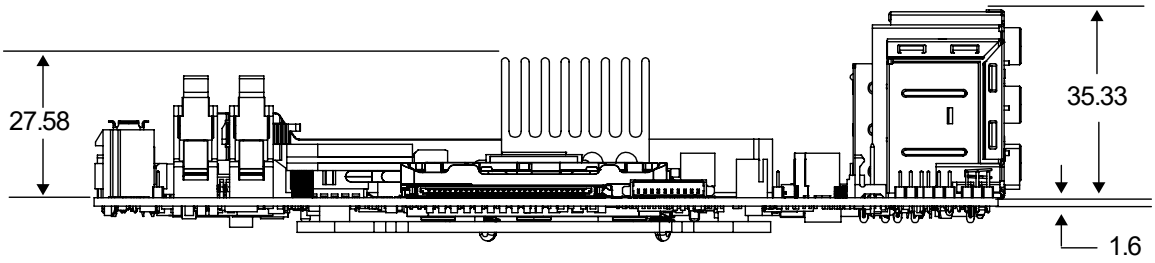
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.2. Mechanical Dimensions

Top View



Side View

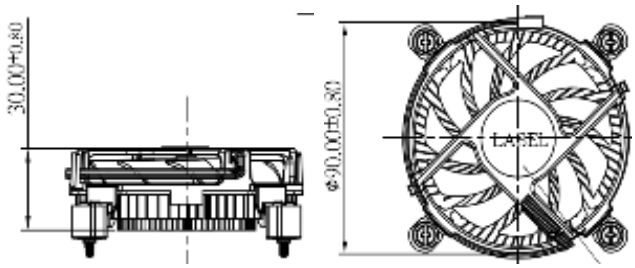
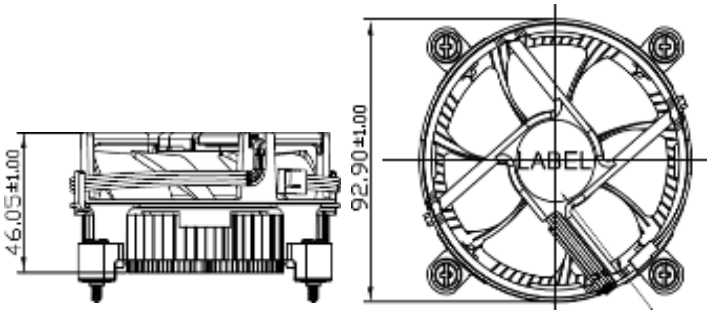
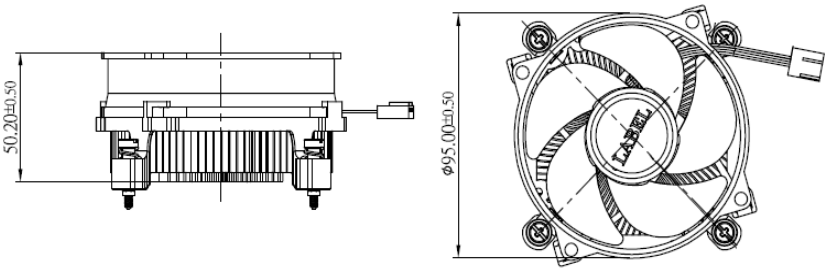


Dimensions: mm

Figure 4: AmITX-SL-G Mechanical Dimensions

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

3.3. Thermal Solutions

LGA1150 CPU Cooler, H=30.0mm, 45W Standard Temp.: 0°C to 60°C P/N: 32-20513-0000	
LGA1150 CPU Cooler, H=46.05mm, 45W Standard Temp.: 0°C to 60°C P/N: 32-20512-0000	
LGA1150 CPU Cooler, H=50.2mm, 95W Standard Temp.: 0°C to 60°C P/N: 32-20113-3000	
LGA1150 CPU Cooler, H=61.4mm, 95W Standard Temp.: 0°C to 60°C P/N: 32-20495-0000	

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

This page intentionally left blank.

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

4. Connectors and Jumpers

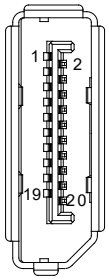
See 3.1 Connector Locations on page 12.

4.1. Rear IO Connectors

4.1.1. DisplayPort

Three DisplayPort v1.2 specification ports up to 4096 x 2160 @24Hz

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

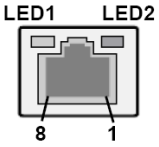


Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.1.2. Ethernet Connectors (LAN1, LAN2)

Dual 10/100/1000Mbit/s LAN Ethernet controllers based on Intel® i219LM/V& i211AT, supporting PXE and WOL over both LANs

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-



LED Behavior

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

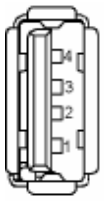
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.1.3. USB Connectors

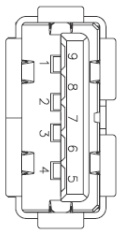
4x USB 3.0, 4x USB 2.0

- 5V supply for external devices
- 5Vsb is supplied during power down to allow wakeup on USB device activity during S3~S4 state
- 1.5A for device power supply protected by a resettable 2A fuse

Pin #	Signal
1	VCC
2	UV0-
3	UV0+
4	GND



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



4.1.4. Audio Connectors

- 7.1 channel audio via 5 jacks and S/PDIF output on rear I/O
- Realtek ALC886 codec

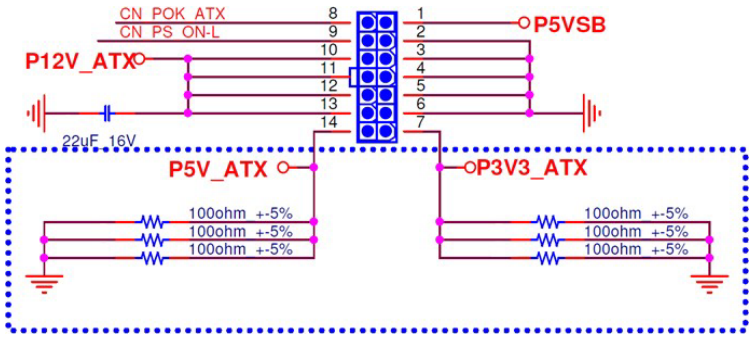
LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.2. Internal Connectors

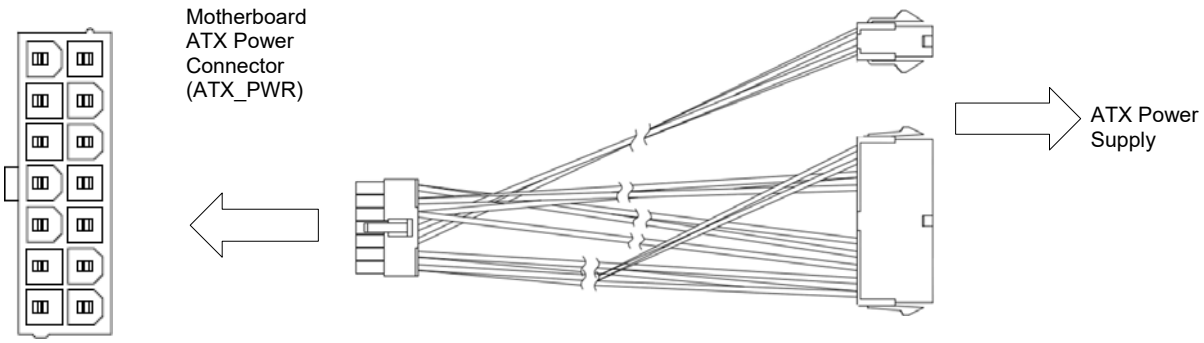
4.2.1. ATX Power Connector (ATX_PWR, proprietary)

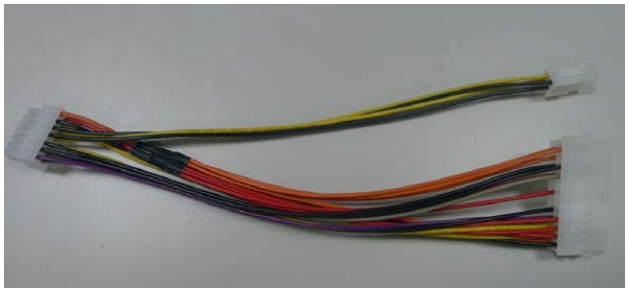
AmITX-SL-G supports a proprietary internal ATX Power Connector (ATX_PWR). An adapter cable is provided for conection to a standard ATX power supply.

Pin #	Signal	Pin #	Signal
1	SB5V	8	P_OK
2	GND	9	PS_ON#
3	GND	10	+12V
4	GND	11	+12V
5	GND	12	+12V
6	GND	13	+12V
7	3.3V	14	+5V



ATX Adapter Cable: ADLINK Part. No. 30-20872-1000 (length 250 mm)





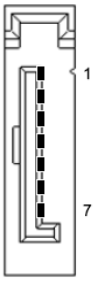
LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.2.2. SATA Connectors (SATA1/2/3)

Three SATA 6 Gbps ports are available on the AmITX-SL-G.

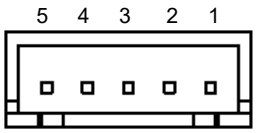
- **Option function:** Jumper select NA/3.3V/5V for SATA1 and SATA2 to deliver power by SATA pin7, Default is NA

Pin #	Signal
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	N/A(default), (option)SATA1/2 SATA DOM PWR

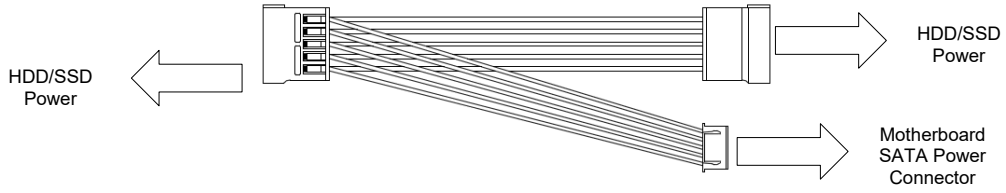


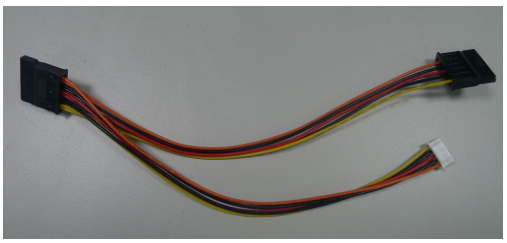
4.2.3. SATA Power Connector (ST_PWR1/2)

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)





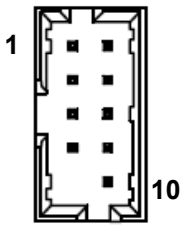
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.2.4. USB Header

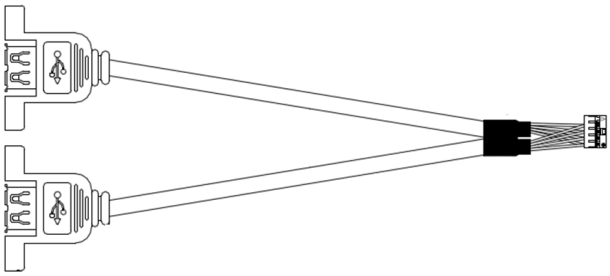
5V/SB5V: 5V supplies for external devices. SB5V is supplied during power down to allow wakeup on USB device activity during S3~S4 state.

H110: 2xUSB2.0:

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



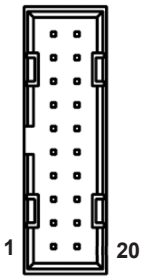
USB Cable (optional):
USB 2.0 Header to 2x Female Type-A Cable (length 200mm), P/N: 30-20874-1000



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

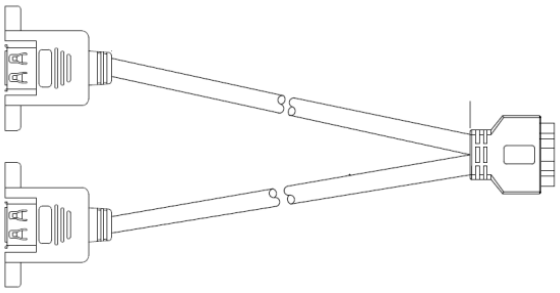
Q170: 2xUSB3.0

Pin #	Signal	Pin #	Signal
1	NC	20	Key
2	USB3_TX_P5	19	USB3_TX_P6
3	USB3_TX_N5	18	USB3_TX_N6
4	GND	17	GND
5	USB3_RX_P5	16	USB3_RX_P6
6	USB3_RX_N5	15	USB3_RX_N6
7	GND	14	GND
8	USB2_P7	13	USB2_P8
9	USB2_N7	12	USB2_N8
10	P5VA_PH	11	P5VA_PH



USB Cable (optional):

USB 3.0 Header to 2x Female Type-A Cable (length 200mm), P/N: 30-20963-0000

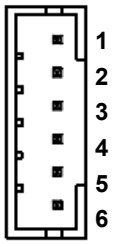


Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

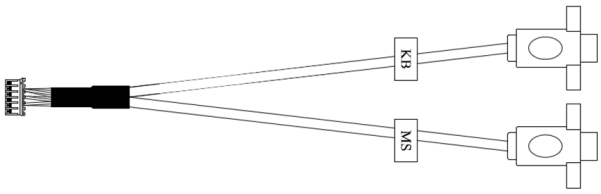
4.2.5. PS/2 Keyboard and Mouse Connector

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

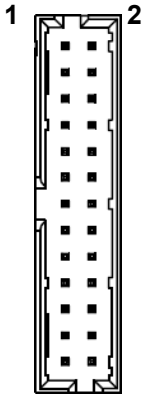


4.2.6. Internal Audio Connector

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

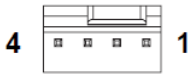


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.2.7. CPU Fan and System Fan Connectors

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

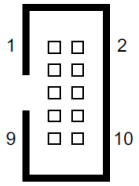
Pin #	Signal
1	GND
2	Fan Power (+12V)
3	Fan Sense
4	Fan Speed Control



4.2.8. Serial COM Port Connectors

Four internal Serial Ports (SER1-4)

Serial Port	Functions
SER1	Supports RS-232 / RS-422 / RS-485, 5V/12V power support by jumper select (JPS3P, default NC). **SWS1M**: Switch for mode selection of SER1 (default RS-232).
SER2	Supports only RS-232
SER3	Supports only RS-232
SER4	Supports only RS-232



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

RS-422 (SER1 only)

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

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

RS-485 (SER1 only)

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

SER1 Mode Switch (SWS1M)

SWS1M (SER1 Mode Select)			
	RS-232 (default)	RS-422	RS-485
1	ON	ON	OFF
2	OFF	ON	ON

Note: See Section 4.3 COM Port (SER1) Mode Selection (SWS1M). Use JPS3P2 for SER1 power selection.

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



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

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), 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
	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	**P_3V3_S** (BOM option with 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

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

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 (JPL4), Backlight Enable Selection (JPL5), and Panel Power Selection (JPL6, JPL8) settings.

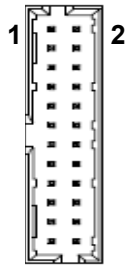
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.2.11. Front Panel Connector

2x12-pin 2.0 pitch standard wafer connector

The front panel connector provides 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	N/A	-			2	N/A		-	
3	N/A	-			4	N/A		-	
5	N/A	-			6	N/A		-	
7	GND	-	PWR		8	GND	PWR	-	
9	Mute	-	Mute		10	LINE2-L		-	
11	+5V	-	PWR	1	12	+5V	PWR	-	1
13	SATA_LED#	25/25mA	O		14	SUS_LED	O		2
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: Maximum load is 1A.

Note 2: 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).

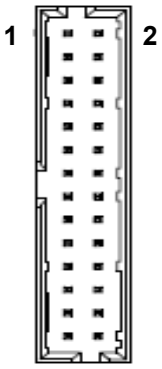
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.2.12. Feature Connector

2x14-pin 2.0 pitch standard wafer connector

The feature connector 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	IOH/IOL	Pull U/D	Type	Note	Pin #	Signal	Type	IOH/IOL	Pull U/D	Note
1	CASE_OPEN#	-	PU 2M	I		2	SMBC	OT	/4mA	PU 2.2K SB3V3	1
3	GND	-	-	PWR		4	SMBD	OT	/4mA	PU 2.2K SB3V3	1
5	TEMPS	-		I	2	6	I2CC	OT	-	PU 2.2K 3V3	1
7	EXT_BAT	-		PWR		8	I2CD	OT	-	PU 2.2K 3V3	1
9	SB3V3	-	-	PWR		10	5V	PWR	-	-	
11	GND	-	-	PWR		12	GND	PWR	-	-	
13	GPIO0	-	PU 10K SB3V3	IOT		14	GPIO1	IOT		PU 10K SB3V3	
15	GPIO2	-	PU 10K SB3V3	IOT		16	GPIO3	IOT		PU 10K SB3V3	
17	GPIO4	-	PU 10K SB3V3	IOT		18	GPIO5	IOT		PU 10K SB3V3	
19	GPIO6	-	PU 10K SB3V3	IOT		20	GPIO7	IOT		PU 10K SB3V3	
21	GPIO8		PU 10K SB3V3	IOT		22	GPIO9	IOT		PU 10K SB3V3	
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).

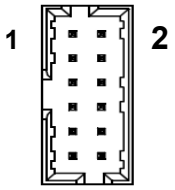
Note 2: Input to SEMA.

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

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

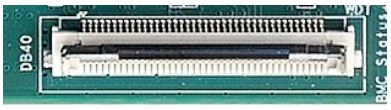


Signal	Description
CLK	Serial Clock
SB3V3	3.3V Standby Voltage power line. Normally output power, but when Motherboard is turned off then the on-board SPI Flash can be 3.3V power sourced via this pin.
CS0#	CS0# Chip Select 0, active low.
ADDIN	ADDIN input signal must be NC.
MOSI	Master Output, Slave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

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

4.2.14. DB40 Debug Board Connector

FPC Connector Type: FCI 59GF Flex 10042867



1 40

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

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

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

4.3. Jumper and Switch Settings

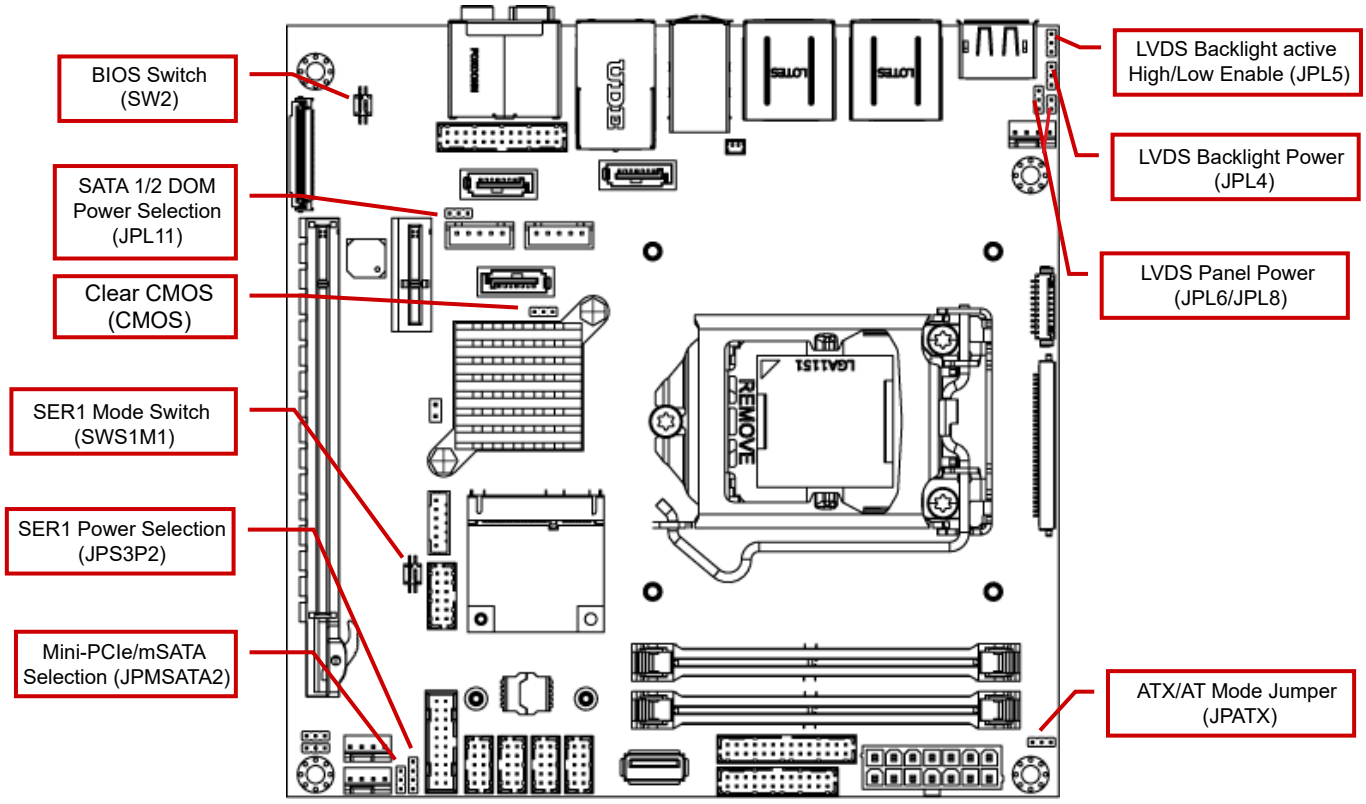


Figure 5: Jumper and Switch Locations

4.3.1. ATX/AT Mode Jumper Selection (JPATX)

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

4.3.2. Clear CMOS (CMOS)

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

4.3.3. Mini-PCIe/mSATA Select (JPMSATA2)

Sets the function of the Mini-PCIe slot on the bottom side of the board.

JPMSATA2	MiniPCIe/mSATA Select
1-2	Mini-PCIe (default)
2-3	mSATA

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

4.3.4. COM Port (SER1) Mode Selection Switch (SWS1M)

SWS1M (SER1 Mode Select)			
	RS-232 (default)	RS-422	RS-485
1	ON	ON	OFF
2	OFF	ON	ON

4.3.5. COM Port (SER1) Power Selection Jumper (JPS3P2)

JPS3P2	SER1 Power
1-2	5V
2-3	NC (default)
3-4	12V

4.3.6. LVDS Backlight Power Selection Jumper (JPL4)

JPL4	Backlight Power
1-2	12V
2-3	5V (default)

4.3.7. LVDS Panel Power Selection Jumpers (JPL6 / JPL8)

JPL6	Panel Power
1-2	5V
2-3	3.3V (default)

JPL6/JPL8	Panel Power
2-2	12V

4.3.8. LVDS Backlight Active High/Low Enable Jumper (JPL5)

JP4	Backlight Power
1-2	Active High
2-3	Active Low (default)

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

BIOS Switch Setting (SW2)

Fail Safe SPI0 + SPI1 (default)		
	ON	OFF
1	Boot from on board BIOS (Default)	Boot from socket BIOS
2	Normal BIOS Mode	Failsafe BIOS Mode (Default)

Default: 1 ON and 2 OFF (Boot from on board BIOS and enable failsafe)

4.3.9. BIOS Write protect Selection (JPL9 & JPL10)

JPL9_on-board BIOS0 Write Protect Selection	
1-2	BMC control (default)
2-3	Enable

JPL10_on board BIOS1 Write Protect Selection	
1-2	BMC control (default)
2-3	Enable

Note: There will be the following limitations with write protect enabled

A. S3 and S4 will not be supported under OS.

B. IAMT cannot be supported

C. ME version information in the BIOS menu will show “zero”

D. Do not install OS when BIOS Write Protect is enabled.

E. Intel GbE LAN cannot update MAC address

F. User cannot refresh the BIOS.

4.3.10. SATA1/2 DOM Power Selection (JPL11)

JPL11 SATA1/2 DOM Power selection	
1-2	3.3V
2-3	5V
N/A	Default

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

4.4. Onboard Connector Information

Table 2: AmITX-SL-G Onboard Connector Information

Connector	CN#	Onboard Connector Manufacturer	Part No.	Mating Connector Manufacturer	Part No.	ADLINK Cable
COM Port	SER1-4	JVE	23N6850-10S10B-01G-B-01	YOUNG YAK	YY-1970H-2*5P (PH2.0)	30-20876-0000 (optional)
ATX power	ATX_PW	Molex	39-28-1143	E.C.I	E.C.I 5016H-2*7P (PH4.2)	30-20872-0000 (standard)
PS/2 KB/MS	KBMS1	JVE	24W1140-06S10-01T-3.4-CS01	E.C.I	E.C.I 2020 -06P (PH2.0)	30-20873-0000 (optional)
USB (H110)	USB2	CST	CBF-2000-1009	YOUNG YAK	YY-1970H-2*5P (PH2.0)	30-20874-1000 (optional)
USB (Q170)	USB2	LOTES	ABA-USB-050-K08	ALLPASS Elec	A37-0903-113	30-20963-0000 (optional)
SATA Power	ST_PWR1-2	JVE	24W1170-05S10-01T-3.4-CS01	YOUNG YAK	YY-1970H-2*5P (PH2.0)	30-20875-0000 (standard)
SATA	SATA1-3	WIN WIN	WATM-07ABN4B3B8UW4			30-10057-0600 (standard)
DB-40	DB1	Molex	502790-4091			30-30016-0000 (optional)
LVDS	LVDS_DC1	JVE	FI-X30SSLA-HF	WELL-LIN ENTERPRISE	WL1058-HL-30P (PH1.0)	
LVDS Auxiliary	LVDS_AUX1	Molex	53261-1071	WELL-LIN ENTERPRISE	WL1025-H-10P (PH1.25)	
Feature	FEATURE1	JVE	23N6851-28S10B-01G-2.5-GR01	JWT	JWT A2005H00-2C*14 (PH2.0)	
Audio	AUD_HEAD1	JVE	23N6851-26S10B-01G-2.5-GR01	JWT	JWT A2005H00-2CX13P (PH2.0)	
Front Panel	FRNTPNL1	JVE	23N6851-24S10B-01G-2.5-GR01	YY	YY-1970H-2*12P (PH2.0)	

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

5. Driver Installation

Drivers can be downloaded through the following link.

https://www.adlinktech.com/Products/Industrial_Motherboards_SBCs/Mini-ITXEmbeddedBoards/AmITX-SL-G?lang=en

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

This page intentionally left blank.

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

6. 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 on the ADLINK web site: www.adlinktech.com .

6.1. Board Specific SEMA Functions

6.1.1. Voltages

The BMC 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
0	CPU-Vcore
1	GFX-Vcore
3	Vmem
5	RTC
6	3.3V
7	3.3VSB
8	5V
9	VIN (12V)
10	Main Current
11	5VSB

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

6.1.2. Main Current

The BMC 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.

$$\text{Main Current} = (\text{MSB_n} << 8 + \text{LSB_n}) \times 8.06\text{mA}$$

6.1.3. BMC Status

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

Table 4: SEMA BMC Status

Status Bit	Signal
0	WDT_OUT
1	LVDS_VDDEN
2	SPI_HEADER_EN
3	BIOS_MODE
4	POSTWDT_DISn
5	SEL_BIOS

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

6.1.4. 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
0	NOERROR
2	NO_SUSCLK
3	NO_SLP_S5
4	NO_SLP_S4
5	NO_SLP_S3
6	NO_ATX_PWRGD
7	BIOS_FAIL
8	RESET_FAIL
9	RESETIN_FAIL
10	CRITICAL_TEMP
11	POWER_FAIL
12	VOLTAGE_FAIL
13	NO_SYS_GD
14	NO_3V3_A_PGD
15	NO_VDDQ_PG
16	NO_P_5V_3V3_S0_PG
17	NO_1V0_A_PG
18	NO_VCORE_PG
19	NO_5V_STBY_PG
20	NO_5V_STBY_PG

6.1.5. 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.

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

This page intentionally left blank.

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

7. System Resources

7.1. 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

7.2. I/O Map

Table 8: 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
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

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

Hex Range	Device
4D1	Slave PIC Edge/Level Trigger register
0A00~0AFF	Reserved for SIO functions base address (ex: PME /GPIO etc)
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

7.3. Interrupt Request (IRQ) Lines

7.3.1. IRQ Lines PIC Mode

Table 9: IRQ Lines PIC Mode

IRQ#	Typical Interupt 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 Port 3 (COM3)	IRQ5 via SERIRQ / PIRQ	Note (1)
6	Generic	N/A	No
7	Serial Port 4 (COM4)	IRQ7 via SERIRQ / PIRQ	Note (1)
8	Real-time clock	N/A	No
9	Generic	N/A	Note (1)
10	Generic	N/A	Note (1)
11	Generic	N/A	Note (1)
12	PS/2 Mouse	IRQ12 via SERIRQ / PIRQ	Note (1)
13	Math Processor	N/A	Note (1)
14	Serial IO GPIO HOST	IRQ14 via SERIRQ / PIRQ	Note (1)

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

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

7.3.2. IRQ Lines APIC Mode

Table 10: IRQ Lines APIC Mode

IRQ#	Typical Interupt 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 Port 3 (COM3)	IRQ5 via SERIRQ / PIRQ	Note (1)
6	Generic	N/A	No
7	Serial Port 4 (COM4)	IRQ7 via SERIRQ / PIRQ	Note (1)
8	Real-time clock	N/A	No
9	Generic	N/A	Note (1)
10	Generic	N/A	Note (1)
11	Thermal/SMbus	N/A	Note (1)
12	PS/2 Mouse	IRQ12 via SERIRQ / PIRQ	Note (1)
13	Math Processor	N/A	Note (1)
14	Serial IO GPIO HOST	IRQ14 via SERIRQ / PIRQ	Note (1)
15	N/A	N/A	Note (1)
16	HDA, AHCI	N/A	Note (1)
17	N/A	N/A	Note (1)
18	N/A	N/A	Note (1)
19	AMT-SOL(COM5)	N/A	Note (1)
20	N/A	N/A	Note (1)
21	N/A	N/A	Note (1)
22	N/A	N/A	Note (1)
23	N/A	N/A	Note (1)

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

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

7.4. 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	01h	00h	N/A	Intel PEG port
00h	02h	00h	Internal	Intel I.G.D.
00h	08h	00h	Internal	System device
00h	14h	00h	Internal	xHCI Controller
00h	14h	02h	Internal	Data Acqusition
00h	16h	00h	Internal	Intel Management Engine Interface #1
00h	16h	03h	Internal	Intel Serial Device
00h	17h	00h	Internal	Intel AHCI controller
00h	1Ch	00h	Internal	Intel PCI Express Root port 1
00h	1Ch	05h	Internal	Intel PCI Express Root port 6
00h	1Ch	06h	Internal	Intel PCI Express Root port 7
00h	1Ch	07h	Internal	Intel PCI Express Root port 8
00h	1Ch	08h	Internal	Intel PCI Express Root port 9
00h	1Fh	00h	Internal	Intel ISA Bridge
00h	1Fh	02h	Internal	Intel Memory controller
00h	1Fh	03h	Internal	Intel Multimedia
00h	1Fh	04h	Internal	Intel SMBUS
00h	1Fh	06h	Internal	Intel Ethernet controller
01h(Note 1)	00h	00h	Internal	Intel Ethernet I211

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

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

7.5. PCI Interrupt Routing Map

Table 12: PCI Interrupt Routing Map

INT Line	P.E.G Root Port	Audio Controller	xHCI Controller	ME Controller #1	GbE Controller	HDA Controller
Int0	INTA:16	INTA:16	INTA:16	INTA:16	INTA:16	INTA:16
Int1	INTB:17			INTB:17		
Int2	INTC:18			INTC:18		
Int3	INTD:19		INTD:19	INTD:19		

INT Line	PCIE Port 1	PCIE Port 6	PCIE Port 7	PCIE port 8	PCIE port 9
Int0	INTA:16	INTB:17	INTC:18	INTD:19	INTA:16
Int1	INTB:17	INTC:18	INTD:19	INTA:16	INTB:17
Int2	INTC:18	INTD:19	INTA:16	INTB:17	INTC:18
Int3	INTD:19	INTA:16	INTB:17	INTC:18	INTD:19

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

7.6. SMBus Slave Address

Table 13: SMBus Slave Address

Device	Address
DIMM A	A0h
DIMM B	A4h
BMC	50h
Extend GPIO	40h

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

This page intentionally left blank.

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

8. BIOS Setup

8.1. 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
- System Information - Processor Information - PCH Information - System Management ► - System Date - System Time	- CPU ► - Audio ► - SATA ► - Thermal ► - Memory ► - Graphics ► - USB ► - ACPI and ► - Power Management - PCI and PCIe ► - Super IO ► - Serial Port ► - Console - Network ► - Security ► - Miscellaneous ►	- Password Description ► - Administrator Password - User Password - Secure Boot ►	- Boot Configuration - CSM Parameters	- Save Options - Default Options - Boot Override

Notes:

► indicates a submenu
Gray text indicates info only

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

8.2. 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 for details of the submenus and settings.

8.2.1. System Information

Feature	Options	Description
Project Version	Info only	Project Version.
Build Date and Time	Info only	BIOS build date and time.

8.2.2. Processor Information

Feature	Options	Description
Type	Info only	CPU Brand String.
Speed	Info only	Standard CPU frequency.
ID	Info only	Processor ID.
Stepping	Info only	Processor stepping.
Number of Processors	Info only	Processor core number.
GT Info	Info only	GT speed.
IGFX VBIOS version	Info only	IGFX VBIOS version.
Total Memory	Info only	Total memory size.

8.2.3. PCH Information

Feature	Options	Description
Name	Info only	PCH name.
PCH SKU	Info only	PCH SKU.
Stepping	Info only	PCH Stepping.
LAN PHY Revision	Info only	LAN PHY Revision
ME FW version	Info only	ME FW version.
ME Firmware SKU	Info only	ME FW SKU.

8.2.4. Access Level

Feature	Options	Description
Access	Level	Administrator

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

8.2.5. System Management

8.2.5.1. 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

8.2.5.2. Temperatures and Fan Speeds

Feature	Options	Description
Temperatures and Fan	Info only	
CPU Temperature	Info only	
Current	Read only	Display current CPU temperature
Startup	Read only	Display CPU startup temperature
Min	Read only	Display CPU min. temperature
Max	Read only	Display CPU max. temperature
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
System Fan2 Speed	Read only	Display system fan speed

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

8.2.5.3. Power Consumption

Feature	Options	Description
Power Consumption	Info only	
VCORE	Read only	Display actual VCORE voltage
VGFX	Read only	Display actual VGFX voltage
VMEM	Read only	Display actual VMEM voltage
RTC	Read only	Display actual RTC voltage
3.3V	Read only	Display actual 3.3V voltage
3.3VSB	Read only	Display actual 3.3VSB voltage
5V	Read only	Display actual 5V voltage
VIN(12V)	Read only	Display actual VIN(12V) voltage
5VSB	Read only	Display actual 5VSB voltage
Input Current	Read only	Display actual Input Current voltage

8.2.5.4. 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.

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

8.2.5.5. 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.

8.2.5.6. 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

8.2.5.7. LVDS Backlight

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

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

8.2.5.8. 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
System Smart Fan1Temperature Source	**CPU Sensor** System Sensor	Select System Smart Fan1 Temperature source
System Fan1 Mode	**AUTO (Smart Fan)** Fan Off Fan On	Select System fan1 mode
Trigger Point 1	Read only	
Trigger Temperature	15	Specifies the temperature threshold at which the BMC turns on the System fan1 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 System fan1 the specified PWM level
PWM Level	40	Select PWM level
Trigger Point 3	Read only	

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

Feature	Options	Description
Trigger Temperature	70	Specifies the temperature threshold at which the BMC turns on System fan1 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 System fan1 the specified PWM level
PWM Level	100	Select PWM level
System Smart Fan2 Temperature Source	**CPU Sensor** System Sensor	System Smart Fan2 Temperature source
System Fan2 Mode	**AUTO (Smart Fan)** Fan Off Fan On	Select System fan2 mode
Trigger Point 1	Read only	
Trigger Temperature	15	Specifies the temperature threshold at which the BMC turns on the System fan2 with the specified PWM level
PWM Level	30	Select PWM level
Trigger Point 2	Read only	
Trigger Temperature	50	Specifies the temperature threshold at which the BMC turns on System fan2 the specified PWM level
PWM Level	40	Select PWM level
Trigger Point 3	Read only	
Trigger Temperature	58	Specifies the temperature threshold at which the BMC turns on System fan2 the specified PWM level
PWM Level	63	Select PWM level
Trigger Point 4	Read only	
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

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

8.2.5.9. SPI ROM WP

Feature	Options	Description
SPI ROM Write Protect	Enabled **Disabled**	Enable/Disable SPI ROM Write Protect

8.2.6. 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

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

8.3. Advanced

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

8.3.1. CPU

Feature	Options	Description
CPU	Info only	
CPU Brand String	Info only	Display CPU brand string
ID	Info only	Display CPU ID
Microcode version	Info only	Display CPU Microcode version
Speed	Info only	Display CPU Max frequency
Number of Processors	Info only	Display CPU Number of Processors
Processor Cores	Info only	Display number of processor
VMX	Info only	Display Intel VMX
SMX/TXT	Info only	Display Intel SMX technology 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
L4 Cache	Info only	Display L4 cache size
Active Processor Cores	All 1 2 3	Number of cores to enable in each processor package
Hyper-Threading	Disabled **Enabled**	Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology).
Intel (VMX) Virtualization Technology	Disabled **Enabled**	When enabled, a VMM can utilize the additional hardware capabilities provided by vanderpool technology.
VT-d	Disabled **Enabled**	VT-d capability
Intel(R) Speed Shift Technology	Disabled **Enabled**	Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Intel(R) SpeedStep(tm)	Disabled **Enabled**	Enabled/Disabled Intel SpeedStep.
Turbo Mode	Disabled **Enabled**	Enabled/Disabled Intel turbo mode.

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

Feature	Options	Description
Package Power Limit MSR Lock	**Disabled** Enabled	Enable/Disable locking of Package Power Limit settings. When enabled, PACKAGE_POWER_LIMIT MSR will be locked and a reset will be required to unlock the register.
Power Limit 1 Override	**Disabled** Enabled	Enable/Disable Power Limit 1 override. If this option is disabled, BIOS will program the default values for Power Limit 1 and Power Limit 1 Time Window.
Power Limit 2 Override	Disabled **Enabled**	Enable/Disable Power Limit 2 override. If this option is disabled, BIOS will program the default values for Power Limit 2.
Power Limit 2	Info only	Platform Power Limit 1 Power in Mili Watts. BIOS will round to the nearest 1/8W when programming. Any value can be programmed between Max and Min Power Limits (specified by PACKAGE_POWER_SKU_MSR). For 12.50W, enter 12500. This setting will act as the new PL1 value for the Package RAPL algorithm.
CPU C states	Disabled **Enabled**	Enabled/Disabled CPU C states
Enhanced C-states	Disabled **Enabled**	Enable/Disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State
Package C State limit	Auto CPU Default C10 C9 C8 C7S C7 C6 C3 C2 C0/C1	Maximum Package C State Limit Setting. CPU Default: Leaves to Factory default value.Auto: Initializes to deepest available Package C State Limit.

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

8.3.2. Audio

Feature	Options	Description
Audio		
HD Audio	Disabled Enabled **Auto**	Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled. Enabled = HDA will be unconditionally enabled. Auto = HDA will be enabled if present, disabled otherwise.
PME Enable	Disabled **Enabled**	Enable or disable power management capability of Audio Controller.
Select OS for Audio	Audio header **Rear Panel** Rear Panel with 7.1 channel	BIOS will change Audio Verb table.

8.3.3. 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 Controller Speed	**Default** Gen1 Gen2 Gen3	Indicates the maximum speed the SATA controller can support.
RAID0	Disabled **Enabled**	Enable/Disable RAID0 feature.
RAID1	Disabled **Enabled**	Enable/Disable RAID1 feature.
RAID10	Disabled **Enabled**	Enable/Disable RAID10 feature.
RAID5	Disabled **Enabled**	Enable/Disable RAID5 feature.
Serial ATA Port 0	Info only	Serial ATA Port 0 Status
Serial ATA Port 1	Info only	Serial ATA Port 1 Status
Serial ATA Port 2	Info only	Serial ATA Port 2 Status
Serial ATA Port 3	Info only	Serial ATA Port 3 Status

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

8.3.4. Thermal

Feature	Options	Description
Thermal		
DTS SMM	**Enabled** Disabled	Disabled: ACPI thermal management uses EC reported temperature values.Enabled: ACPI thermal management uses DTS SMM mechanism to obtain CPU temperature values.Out of Spec: ACPI Thermal Management uses EC reported temperature values and DTS SMM is used to handle Out of Spec condition.
Automatic Thermal Reporting	**Disabled** Enabled	Configure _CRT, _PSV, and _AC0 automatically based on values recommended in BWG thermal reporting.
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.
Watch ACPI Event Shutdown	**Disabled** Enabled	Watchdog ACPI Event Shutdown Enabled/Disabled.

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

8.3.5. Memory

Feature	Options	Description
Memory RC Version	Info only	Display memory RC version
Memory Frequency	Info only	Display memory frequency
Total Memory	Info only	Display tatal system memory size
DIMM#1	Info only	Display DIMM#1 status
Size	Info only	Display DIMM#1 Size
DIMM#2	Info only	Display DIMM#2 status
Size	Info only	Display DIMM#2 Size
Memory Timings (tCL-tRCD-tRP-tRAS)	Info only	Display memory timings
Max TOLUD	**Dynamic** 1 GB 1.25 GB 1.5 GB 1.75 GB 2 GB 2.25 GB 2.5 GB 2.75 GB 3 GB 3.25 GB 3.5 GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.
MRC Fast Boot	**Enabled** Disabled	Enable/Disable MRC fast boot.
Memory Remap	**Enabled** Disabled	Enable/Disable memory remap above 4G.
Memory Thermal Management	**Enabled** Disabled	Enable/Disable Memory Thermal Management.
SPD Write Protect	**Enabled** Disabled	Enable:Writes to SMBus slave addresses A0h - AEh are disabled

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

8.3.6. Graphics

Feature	Options	Description
IGFX VBIOS version	Info only	
Graphics Turbo IMON Current	**31**	Graphics turbo IMON current values supported(14-31).
Primary Display	**Auto** IGFX PEG PCIE	Select which of Auto/IGFX/PEG/PCIE Graphics device should be Primary Display.
Primary PEG	**Auto** PEG11 PEG12	Select PEG0/PEG1/PEG2/PEG3 Graphics device should be Primary PEG.
Primary PCIE	**Auto** PCIE1 PCIE2 PCIE3	Select Auto/PCIE1/PCIE2/PCIE3/PCIE4/PCIE5/PCIE6/PCIE7 Graphics device should be Primary PCIE.
Internal Graphics	**Auto** Disabled Enabled	Keep IGD enabled based on the setup options.
GTT Size	2MB 4MB **8MB**	Select the GTT Size.
Aperture Size	128MB **256MB** 512MB 1024MB 2048MB	Select the Aperture Size.
DVMT Pre-Allocated	0M 32M 64M 4M 8M 12M 16M 20M 24M 28M 32M/F7 36M 40M 44M 48M 52M 56M 60M	Select DVMT 5.0 Pre-Allocated Graphics Memory size used by the Internal Graphics Device.

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

Feature	Options	Description
DVMT Total Gfx Mem	128M **256M** MAX	Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.
Gfx Low Power Mode	**Enabled** Disabled	This option is applicable for SFF only.
LVDS Backlight Mode	PCH Control **BMC Control**	Select LVDS Backlight Control function.
GTT LVDS Backlight Control	0% 20% 40% 60% 80% **100%**	GTT LVDS Backlight Control.
Primary IGFX Boot Display	**VBIOS Default** EFP LFP EFP3 EFP2	Select the Video Device which will be activated during POST.
LCD Panel Type	**VBIOS Default** 640x480 800x600 1024x768 1280x1024 1400x1050 1600x1200 1366x768 1680x1050 1920x1200 1440x900 1600x900 1280x800 1920x1080 2048x1536	Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.
Panel Scaling	**Auto** Off Force Scaling	Select the LCD panel scaling option used by the Internal Graphics Device.
Active LFP	**No LVDS** eDP Port-A	Configure LFP usage
Nxp configuration	Info only	
Data format and Color Depth	VESA 24 bpp JEIDA 24 bpp **JEIDA/vesa 18 bpp**	Data format and Color Depth select

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

Feature	Options	Description
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
Spreading depth	**No Spreading** 0.5% 1.0% 1.5% 2.0% 2.5%	Clock frequency center spreading depth.
GT – Power Management Control	Info only	
GT Info	Info only	Display GT speed
RC6 (Render Standby)	**Enabled** Disabled	Check to enable render standby support.

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

8.3.7. USB

Feature	Options	Description
USB Configuration	Info only	
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.
Port 60/64 Emulation	**Disabled** Enabled	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
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.
PCH USB Configuration ►	Submenu	

8.3.8. PCH USB Configuration

Feature	Options	Description
USB Configuration	Info only	
XHCI Disable Compliance Mode	**FALSE** TRUE	Options to disable Compliance Mode. Default is FALSE to not disable Compliance Mode. Set TRUE to disable Compliance Mode.
USB Port Disable Override	**Disabled** Enabled	Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.

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

8.3.9. 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.
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.

8.3.10. PCI and PCIe

Feature	Options	Description
PCI Common Settings	Info only	
PERR# Generation	**Disabled** Enabled	Enable/Disable PCI Device to Generate PERR#.
SERR# Generation	**Disabled** Enabled	Enable/Disable PCI Device to Generate SERR#.
PEG Port Configuration ►	Submenu	
PCI Express Configuration ►	Submenu	

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

8.3.10.1.PCI and PCIe > PEG Port Configuration

Feature	Options	Description
PEG Port Configuration	Info only	
PEG 0:1:0	Info only	
Enable Root Port	Disabled Enabled **Auto**	Enable or Disable the Root Port
Max Link Speed	**Auto** Gen1 Gen2 Gen3	Configure PEG 0:1:0 Max Speed
PEG0 Slot Power Limit Value	**75**	Sets the upper limit on power supplied by slot. Power limit (in watts) is calculated by multiplying this value by the Slot Power Limit Scale. Values 0-255
PEG0 Slot Power Limit Scale	**1.0x** 0.1x 0.01x 0.001x	Select the scale used for the Slot Power Limit Value.
PEG0 Physical Slot Number	**1**	Set the physical slot number attached to this Port. The number has to be globally unique within the chassis. Values 0-8191

8.3.10.2.PCI and PCIe > PCI Express Configuration

Feature	Options	Description
PEG Port Configuration	Info only	
PCI Express Root Port 6 ►	Submenu	PCI Express Root Port 6 Settings
PCI Express Root Port 7 ►	Submenu	PCI Express Root Port 7 Settings
PCI Express Root Port 8 ►	Submenu	PCI Express Root Port 8 Settings
PCI Express Root Port 9 ►	Submenu	PCI Express Root Port 9 Settings

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

PCI Express Configuration > PCI Express Root Port [5-8]

Feature	Options	Description
PCI Express Root Port [6-9]	Disabled **Enabled**	Control the PCI Express Root Port.
PME SCI	Disabled **Enabled**	Enable or disable PCI Express PME SCI.
Hot Plug	**Disabled** Enabled	Enable or disable PCI Express Hot Plug.
PCIe Speed	**Auto** Gen1 Gen2 Gen3	Select PCI Express port speed.

8.3.11. Super IO

Feature	Options	Description
IT8783F Super IO	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.

8.3.11.1. Super IO > Serial Port [1-4] Configuration

Feature	Options	Description
Serial Port [1-4] Configuration	Info only	
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM)
Device Settings	Info only	
Change Setting	Auto Change IO and IRQ	Select an optimal settings for Super IO Device

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

8.3.12. Serial Port Console

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	As above.
COM3	Info only	
Console Redirection	**Disabled** Enabled	Console Redirection enable or disable.
Console Redirection Settings ►	Submenu	As above.
COM4	Info only	
Console Redirection	**Disabled** Enabled	Console Redirection enable or disable.
Console Redirection Settings ►	Submenu	As above.
Legacy Console Redirection	Info only	
Legacy Console Redirection Settings ►	Submenu	Legacy Console Redirection Settings
Serial Port for Out-of-Band Management/ Windows Emergency Management Services (EMS)	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.

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

8.3.12.1. Serial Port Console > Console Redirection Settings [COM1-4]

Feature	Options	Description
COM[1-4] 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	**8**	Select data bits.
Parity	**None**	Select parity.
Stop Bits	**1**	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. Default value is Always Enable which means legacy console redirection is enabled for legacy OS.

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

8.3.12.2. Serial Port Console > Legacy Console Redirection Settings

Feature	Options	Description
Legacy Serial Redirection Port	**COM1** COM2 COM3 COM4	Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages

8.3.12.3. Serial Port Console > Console Redirection Settings [EMS]

Feature Options Description		
Out-of-Band Mgmt Port	COM1 COM2 COM3 COM4	Microsoft Windows Emergency Management Services (EMS) allows for remote management of a Windows Server OS through a serial port.
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	**8**	Select data bits.
Parity	**None**	Select parity.
Stop Bits	**1**	Select number of stop bits.

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

8.3.13. Network

Feature	Options	Description
Network	Info only	
Network Stack	**Disabled** Enabled	Enable/Disable Network Stack.
PCH LAN i219LM Controller	Disabled **Enabled**	Control i219 Lan support.
Wake on LAN	Disabled **Enabled**	Enable or disable integrated LAN to wake the system. (The Wake On LAN cannot be disabled if ME is on at Sx state.)
PCH LAN i211 Controller	Disabled **Enabled**	Control i211 Lan support.
AMT Configuration	Info only	
AMT BIOS Features	Disabled **Enabled**	When disabled AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup.\n\nNote:\nThis option does not disable Manageability Features in FW.
MEBx hotkey Features	**Disabled** Enabled	OEMFLag Bit 1:\nEnable automatic MEBx hotkey press.
MEBx Selection Screen	**Disabled** Enabled	OEMFLag Bit 2:Enable/Disable MEBx selection screen.
Hide Un-Configure ME Confirmation Prompt	**Disabled** Enabled	OEMFlag Bit 6:Hide Un-Configure ME without password Confirmation Prompt
MEBx OEM Debug Menu Enable	**Disabled** Enabled	OEMFlag Bit 14:Enable MEBx debug message output.
Un-Configure ME	**Disabled** Enabled	OEMFlag Bit 15:Un-Configure ME without password.
ASF support	Disabled **Enabled**	Enable/Disable Alert Standard Format support.
Activate Remote Assistance Process	**Disabled** Enabled	Trigger CIRA boot.
USB Provisioning of AMT	Disabled **Enabled**	Enable/Disable of AMT USB Provisioning
PET Progress	Disabled **Enabled**	User can Enable/Disable PET Events progress to recieve PET events or not.
CIRA Timeout	Info only	
WatchDog	Disabled **Enabled**	Enable/Disable WatchDog Timer.
OS Timer	**0 - 65535**	Set OS watchdog timer.
BIOS Timer	**0 - 65535**	Set BIOS watchdog timer.

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

8.3.14. Security

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

8.3.14.1. Security > Security Configuration

Feature	Options	Description
Security Configuration	Info only	
RTC Lock	Disabled **Enabled**	Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.
BIOS Lock	**Disabled** Enabled	Enable/Disable the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.

8.3.14.2. Security > Trusted Computing

Feature	Options	Description
Configuration	Info only	
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.
TPM State	Disabled **Enabled**	Enable/Disable Security Device. NOTE: Your Computer will reboot during restart in order to change State of the Device.
Pending operation	**None** TPM Clear	Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device."
Device Select	TPM 1.2 TPM 2.0* **Auto**	TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices,* Auto will support both with the default set to TPM 2.0 devices. If not found, TPM 1.2 devices will be enumerated. *This option is available for A3 HW revision only. TPM 2.0 is only supported on A3 HW revision.
Current Status Information	Info only	
TCM Enabled Status:	Info only	
TPM Active Status:	Info only	
TPM Owner Status:	Info only	

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

8.3.15. Miscellaneous

Feature	Options	Description
Miscellaneous	Info only	
Chassis Intrusion Support	Enabled **Disabled**	Chassis Intrusion Support

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

8.4. Security

8.4.1. Password Description

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

8.4.2. Password Description > Secure Boot

Feature	Options	Description
System Mode	Setup	
Secure Boot	Info only	
Vendor Keys	Info only	
Secure Boot	**Disabled** Enabled	Secure Boot can be enabled if: System running in User mode with enrolled Platform Key (PK) 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.

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

8.5. Boot

8.5.1. 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 disables Quiet Boot option.
Boot Option Priorities	Info only	
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
CSM Configuration ►	Submenu	CSM configuration: Enable/Disable, Option ROM execution settings, etc.

8.5.1.1. Boot Configuration > CSM Configuration

Feature	Options	Description
Compatibility Support Module Configuration	Info	
CSM Support	Enabled Disable	Launch CSM
CSM16 Module Version	Info only	
GataA20 Active	Upon Request Always	Upon Request – GA20 can be disabled using BIOS services. Always – do not allow disabling of 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 what devices system can boot to
Option ROM execution	Info only	

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

Feature	Options	Description
Network	Do not launch UEFI only Legacy only	Controls the execution of UEFI and Legacy PXE OpROM
Storage	Do not launch UEFI only Legacy only	Controls the execution of UEFI and Legacy Storage OpROM
Video	Do not launch UEFI only **Legacy only**	Controls the execution of UEFI and Legacy Video OpROM
Other PCI devices	Do not launch UEFI only **Legacy only**	For PCI devices other than Network, Mass storage or Video defines which OpROM to launch

8.6. Save & Exit

Feature	Options	Description
Save Options	Info only	
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	
Discard Changes	Yes No	Save Changes done so far to any of the setup options.
Default Option	Info only	
Restore Defaults	Yes No	Discard Changes done so far to any of the setup options.
Save as User Defaults	Yes No	Restore/Load Default values for all the setup options.
Restore User Defaults	Yes No	Save the changes done so far as User Defaults.
Boot Override	Info only	

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

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.

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

Getting Service

Ask an Expert: https://www.adlinktech.com/en/Askanexpert

ADLINK Technology, Inc.
Address: No.66 Huaya 1st Road, Guishan District
Taoyuan City 333411, Taiwan
Tel: +886-3-216-5088
Fax: +886-3-328-5706
Email: service@adlinktech.com

Ampro ADLINK Technology, Inc.
Address: 6450 Via Del Oro, San Jose, CA 95119-1208, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-600-1189
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 GmbH
Address: Hans-Thoma-Strasse 11, D-68163, Mannheim, Germany
Tel: +49-621-43214-0
Fax: +49-621 43214-30
Email: emea@adlinktech.com

Please visit the Contact page at www.adlinktech.com for information on how to contact the ADLINK regional office nearest you.

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