

mITX-SKL-S-H110

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► MITX-SKL-S-H110 - USER GUIDE

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Revision History

Revision	Brief Description of Changes	Date of Issue	Author
1.0	Basic draft	2017-Jan-25	hjs
1.1	modified part numbers	2017-April-25	hjs
1.2	Accessories list added, corrections	2017-Aug-10	hjs
1.3	typos corrected	2018-Jan-12	hjs
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	Removed Figure 13: Available Cable Kit (DB9 adapter cables)		
	Changed Block Diagram COM1, COM2 to COM1A		
	(RS232/RS422/RS485 drivers), COM1B and COM3, COM4 to		
	COM2 and COM3		
1.6	Added Chapter 7/	2019-May-07	hjs

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Symbols

The following symbols may be used in this manual

ADANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

▲WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

ACAUTION

CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

NOTICE indicates a property damage message.



Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 60 V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your material.

Please refer also to the "High-Voltage Safety Instructions" portion below in this section.



ESD Sensitive Device!

This symbol and title inform that the electronic boards and their components are sensitive to static electricity. Care must therefore be taken during all handling operations and inspections of this product in order to ensure product integrity at all times.



HOT Surface!

Do NOT touch! Allow to cool before servicing.



This symbol indicates general information about the product and the user manual.

This symbol also indicates detail information about the specific product configuration.



This symbol precedes helpful hints and tips for daily use.

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1/ Introduction

This manual describes the Mini ITX Skylake S/H110 board. This board will also be denoted mITX-SKL-S-H110 within this Users Guide.

The use of this Users Guide implies a basic knowledge of PC hard- and software. This manual is focused on describing the mITX-SKL-S-H110 board's special features and is not intended to be a standard PC textbook.

New users are recommended to study the short installation procedure stated in the following chapter before switching-on the power.

All configuration and setup of the CPU board is either done automatically or manually by the user via the BIOS setup menus.

Latest revision of this manual, datasheet, thermal simulations, BIOS, drivers, BSP's (Board Support Packages), Mechanical drawings (2D and 3D) can be downloaded from Kontron Web Page.

2/ Description

The mainboard mITX-SKL-S-H110 aims to benefit user with the Chipset H110 from Intel. The Processor, Graphics and Memory Controller is built on 14 nm die. See "Processor Support Table" for more specific details.

Main characteristics are:

- Support Skylake Family Processors LGA1151 CPU Socket (37.5 mm x 37.5 mm) Range from 35 to 65W TDP
- Intel®SKL H110 PCH
- 2x NON ECC SODIMM Memory Architecture
- Two independet displays by VGA, Display Port, HDMI or LVDS
- Dual Gigabit Ethernet
- Two Rear COM Ports, Pin 9 for RI/5V/12V selectable COM1 can select for RS232/RS422/RS485
- Two internal serial RS-232 pin headers
- ► Three SATA 3.0 Ports
- PCI Express x16 and mPCle for expansion

Built with these functions, mITX-SKL-S-H110 Mother Board is ideal for ATM, automation, multi-media, gaming, Kiosk, medical equipment, industrial automation, financial automation, process control, semiconductor equipment, and network security markets.

3/Installation procedure

3.1. Packing Check List

The mITX-SKL-S-H110 package includes the following basic items accompany with this manual.

- One main board
- One IO shield

If any of these items are damaged or missed, please contact your vendor and save all packing materials for future replacement and maintenance.

Note: The above packing list is for standard single box packing only.

3.2. Installing the Board

ESD Sensitive Device!

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry.



- Wear ESD-protective clothing and shoes
- Wear an ESD-preventive wrist strap attached to a good earth ground
- Check the resistance value of the wrist strap periodically (OK: 1 M Ω to 10 M Ω)
- Transport and store the board in its antistatic bag
- Handle the board at an approved ESD workstation
- Handle the board only by the edges

To get the board running follow these steps:

1. Turn off the Power Supply

NOTICE

Make sure to use a standard ATX PSU, suitable cable kit and PS_ON#.

2. Connecting Interfaces

Insert all external cables for hard disk, keyboard etc. A monitor must be connected in order to change BIOS settings.

3. Connect PSU

Connect PSU to the board by the ATX+12 V 4-pin connector and also the ATX 20-pin connector (ATX PWR 20-pin + 4-pin (Internal Input Power)) to the I/O power jack.

4. Mounting the board in chassis

NOTICE

When mounting the board to chassis etc. please notice that the board contains components on both sides of the PCB which can easily be damaged if board is handled without reasonable care. A damaged component can result in malfunction or no function at all.

When fixing the Motherboard on a chassis it is recommended to use screws with integrated washer and a diameter of > 7 mm. Do not use washers with teeth, as they can damage the PCB and cause short circuits.

5. BIOS Setup

Enter the BIOS setup by pressing the <F2> key during boot up.

Enter "Exit Menu" and Load Setup Defaults.

Refer to the "BIOS Configuration / Setup" section of this manual for details on BIOS setup.



To clear all BIOS settings, including Password protection, activate "Load Default BIOS Settings" Jumper for more than 10 sec (without power connected).

3.3. Requirements IEC60950-1

Take care when designing chassis interface connectors in order to fulfil the IEC60950-1 standard.

Users of mITX-SKL-S-H110 must evaluate the end product to ensure compliance the requirements of the IEC60950-1 safety standard are met:

The motherboard must be installed in a suitable mechanical, electrical and fire enclosure.

The system in its enclosure must be evaluated for temperature and air flow considerations.

The motherboard must be powered by a CSA or UL approved power supply that limits the maximum input current to 10 A via external barrel-type 12 to 24 VDC connector, and to 16 A via internal square 12 VDC ATX connector.

For interfaces having a power pin such as external power or fan, ensure that the connectors and wires are suitably rated. All connections from or to the product shall be with Safety Extra Low Voltage (SELV) circuits only.

Wires have suitable rating to withstand the maximum available power.

The enclosure of the peripheral device fulfills the fire protecting requirements of IEC60950-1.

NOTICE

If any of the supply voltages drops below the allowed operating level longer than the specified hold-up time, all the supply voltages should be shut down and left OFF for a time long enough to allow the internal board voltages to discharge sufficiently.

If the OFF time is not observed, parts of the board or attached peripherals may work incorrectly or even suffer a reduction of MTBF.

The minimum OFF time depends on the implemented PSU model and other electrical factors and needs to be measured individually for each case.

3.4. Product Variants

Table 1: Processor Support

Product Number	Name	Speed	Memory
810700-4500	Core™ i7-6700	3.4 GHz	8 MB
810700-4500	Core™ i5-6500	3.2 GHz	6 MB
810700-4500	Core™ i3-6100	3.7 GHz	3 MB
810700-4500	Pentium G4400	2.9 GHz	3 MB

3.5. Accessories List

Table 2: Accessories List for mITX-SKL-S/H110

Product Number	Part Name	Length (mm)
1061-6709	USB 2.0 cable	200
1061-6746	LED switch cable	200
1061-6748	SATA cable	300

Product Number	Part Name	Length (mm)
1061-6750	15-Inverter	700
1061-6752	LVDS cable	700
Cable Bundle	Cable Bundle- mITX BOARD H110 Chipset Including following cables: 1061-6709, 1061-6746, 1061-6748, 1061-6750 1061-6752	

3.6. Lithium Battery Precautions

ACAUTION

Danger of explosion if the lithium battery is incorrectly replaced.

- Replace only with the same or equivalent type recommended by the manufacturer
- Dispose of used batteries according to the manufacturer's instructions

VORSICHT! Explosionsgefahr bei unsachgemäßem Austausch der Batterie.

- Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Tvp
- Entsorgung gebrauchter Batterien nach Angaben des Herstellers

ATTENTION! Risque d'explosion avec l'échange inadéquat de la batterie.

- Remplacement seulement par le même ou un type équivalent recommandé par le producteur
- L'évacuation des batteries usagées conformément à des indications du fabricant

PRECAUCION! Peligro de explosión si la batería se sustituye incorrectamente.

- Sustituya solamente por el mismo o tipo equivalente recomendado por el fabricante
- Disponga las baterías usadas según las instrucciones del fabricante

ADVARSEL! Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering.

- Udskiftning må kun ske med batteri af samme fabrikat og type
- Levér det brugte batteri tilbage til leverandøren.

ADVARSEL! Eksplosjonsfare ved feilaktig skifte av batteri.

- Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten.
- Brukte batterier kasseres i henhold til fabrikantens instruksjoner

VARNING! Explosionsfara vid felaktigt batteribyte.

- Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
- Kassera använt batteri enligt fabrikantens instruktion.

VAROITUS! Paristo voi räjähtää, jos se on virheellisesti asennettu.

- Vaihda paristo ainoastaan lalteval- mistajan suosittelemaan tyyppiln
- Hävitä käytetty paristo valmistajan ohjeiden mukaisesti

4/System Specifications

4.1. Component Main Data

The table below summarizes the features of the mITX-SKL-S-H110 embedded motherboard.

Table 3: Component Main Data

Motherboard mITX-SKL-S/H110			
Form factor	Mini ITX (170.18 mm by 170.18 mm)		
Processor	Onboard CPU variants		
Flocessol	Intel® Skylake-5 Processor line, LGA1151 CPU Socket (37.5 mm x 37.5 mm)		
	Range from 35 to 65 W TDP, Core™ i7-6700, Core™ i5-6500, Core™ i3-6100, Pentium G4400		
BIOS	AMI UEFI BIOS with128Mb Serial Peripheral Interface (SPI) Flash ROM support AMT11.0		
PCH	Intel®SKL PCH 110 series		
I/O Control	ITE IT8785E-I (4x COMs)		
Memory	2x Dual-Channel DDR4SO-DIMM, Support DDR4(1.2 V)1866/2133 MT/s (PC4-1866/ PC4-2133), max. up to 32 GB memory using 2x16 GB modules		
Storage	3 x SATA 3.0		
Watchdog Timer	Reset; 1 sec.~255 min. and 1 sec. or 1 min./step		
Wake On	Wake On LAN, Wake On Time, Wake On USB		
H/W Status Monitor	Monitoring CPU and system temperature, voltage status and fan speed		
TPM	Infineon SLB9665TT 2.0		
Power management	Support S5, S4, S3, S0		
Battery	CR2032, 220mAh		
	See Safety Instructions below this table!		
Expansion	One PCIe x16 slot (PCIe Gen3), can operate at 2.5 GT/s, 5 GT/s, or 8 GT/s.		
Operating System	Windows 8.1, 10		
Support	Linux		
	Board support packages in different flavors, downloadable from the web page		
External I/O			
LAN, USB3.0	2x RJ-45 LAN Port (with two LED indicators) + dual USB3.0 (4 x USB)		
Audio	3 × Audio Jacks for MIC-input, Line-out and Line-input		
VGA	1 x VGA connector High rise type		
HDMI	1 x HDMI connector right angle type (V1.4a)		
Display Port	1 x Display Port connector upright type		
СОМ	1 x RS-232/422/485 D-SUB 9-Pin Ports for COM1		
	1 x RS-232 D-SUB 9-Pin Ports for COM2		
	COM1 and COM2 Pin 9 Selection for 5 V/12 V/RI , 5 V and 12 V (Max. : 1 A output with Fuse)		

Internal I/O		
SATA	3 x SATA 3.0 (6 Gb/s)	
PC Buzzer	Standard PC buzzer on board	
USB	$1 \times (2 \times 5)$ 2.54 mm pin-header , supports 2 x USB 2.0	
GPIO	1x(2x5)2.00 mm box-header (voltage level 3.3 V)	
LVDS	$1\times(2\times20)$ 1.25 mm pin-header for 24-bit	
Mini PCIe	1 x for half size (co-layout m-SATA)	
Audio	$1 \times (1 \times 4) 2.0$ mm pin-header for Speaker with 2 W + 2 W amplifier	
Serial	2 x RS-232 pin-header 2.0 mm	
Internal Header		
Fan Power	2 x (1 x 4) 2.54 mm pin-header for CPU & System fan with Pulse Width Modulation (PWM) function	
Chassis Intrusion	1 x (1 x 3) 2 mm pin-header	
CMOS Clear	1x(1x3)2 mm pin-header	
Front Panel	1x(2x5)2.54 mm pin-header	
Power COM pin 9	2 x (2 x 3) 2.0 mm pin-header; (1: 5 V , 3: 12 V , 5: RI ; 2,4,6: Pin9)	
Display		
Graphics Controller	Intel®Gen 9 LP (generation 9 Low Power) graphics core 1. Support below API Direct3D* 2015, Direct3D 11.2, Direct3D 11.1, Direct3D 9, Direct3D 10, Direct2D OpenGL* 5.0 OpenCL* 2.1, OpenCL 2.0, OpenCL 1.2 2. Supports full HW accelerated video decoding for AVC, VC1, MPEG2, HEVC, VP8, JPEG. 3. Supports full HW accelerated video encode for AVC, MPEG2, HEVC, VP8. 4. Switchable/Hybrid graphics when discrete graphics card available.	
DP to LVDS Controller	Realtek® RTD2136	
DP to VGA Controller	Parade PS8613	
Display Interface	VGA, Display Port 1.2, HDMI 1.4 (DDI x 3) and LVDS Note: Three (3) Independent Displays Max.	
Resolution	VGA 1920x1200 DP/LVDS 1920x1200 @ 60 Hz, 24 bpp (One panel display) HDMI 4096x2160 @ 24 Hz, 24 bpp (One panel display)	
Ctloous-t		
Ethernet Controller	LAN1: Intel® I219LM(Jacksonville) 10/100/1000 Gigabit Ethernet PHY with AMT11.0	
	LAN2: Intel® I211AT10/100/1000 Gigabit Ethernet Controller	

Interface	IEEE 802.3 10BASE-T / 100BASE-TX / 1000BASE-T compliant	
Audio		
HDAC	Realtek®ALC269Q High Definition Audio Codec	
Power Supply		
Power Type	4-pin ATX 12V power connector	
	and :	
	20-pin ATX Power connector,	

▲CAUTION

Danger of explosion if the lithium battery is incorrectly replaced.

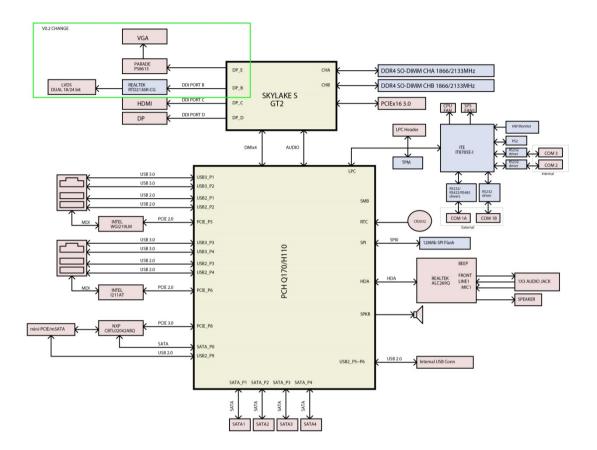
- Replace only with the same or equivalent type recommended by the manufacturer
- Dispose of used batteries according to the manufacturer's instructions

Table 4: Environmental Conditions

Table 4: Chivi of mental Conditions			
Operating	0°C to +60°C (32°F~140°F) operating temperature (forced cooling).		
	It is the customer's responsibility to provide sufficient airflow around each of the		
	components to keep them within allowed temperature range. Please refer to the thermal		
	simulation report for information about airflow.		
	10% to 90% relative humidity (non-condensing)		
Storage	-20°C~80°C (-4°F~176°F); lower limit of storage temperature is defined by specification		
	restriction of on-board CR2032 battery.		
	Board with battery has been verified for storage temperature down to -40 C by Kontron.		
	Up to 95% relative humidity (non-condensing)		
Radiated Emissions	All Peripheral interfaces intended for connection to external equipment are EMI protected.		
(EMI)	FCC class B Generic Emission Standard		
Safety	IEC 60950-1: 2005, 2nd Edition		
	UL 60950-1		
	CSA C22.2 No. 60950-1		
	Product Category: Information Technology Equipment Including Electrical Business		
	Equipment. Product Category CCN: NWGQ2, NWGQ8. File number: E147705		
Restriction of	All boards in the mITX-SKL family are RoHS compliant		
Hazardous			
Substances (RoHS)			

4.2. Block Diagram

Figure 1: Block Diagram



5/ Jumpers and Connectors

5.1. Hardware Configuration Setting

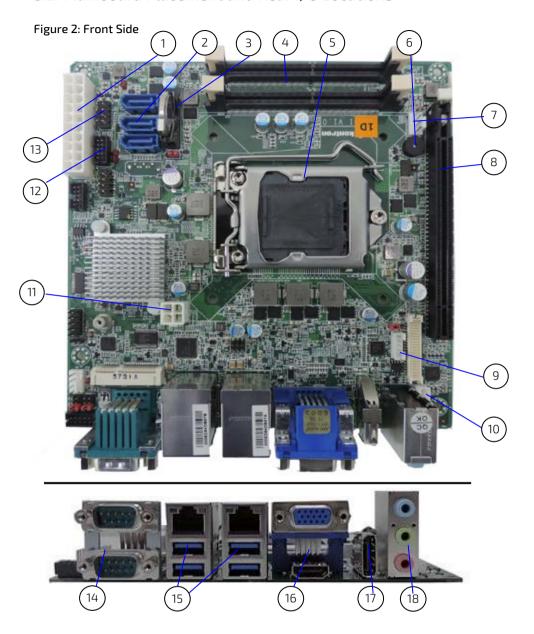
This chapter gives the definitions and shows the positions of jumpers, headers and connectors. All of the configuration jumpers on the board are in the proper position. The default settings shipped from factory are marked with an asterisk (*).

In general, jumpers on the board are used to select options for certain features. Some of the jumpers are designed to be user-configurable, allowing for system enhancement. The others are for testing purpose only and should not be altered. To select any option, cover the jumper cap over (SHORT) or remove (NC) it from the jumper pins according to the following instructions. Here, NC stands for "Not Connect".

5.1.1. Jumpers and Connectors

Jumpers	Function	Remark
CLR_CMOS1	Clear CMOS	1 x 3 header
COM9_SW1	COM2 Pin 9 Setting	2 x 3 header
COM9_SW2	COM1 Pin 9 Setting	2 x 3 header
LCD_PWR LCD	Power source selection	1 x 3 header
INTR	Case Open	1 x 3 header
Connectors	Function	Remark
CPU_FAN	CPU FAN Connector	1 x 4 wafer
SYS_FAN	SYS FAN Connector	1 x 4 wafer
FP	Front Panel Connector	2 x 5 header
USB2_P1	USB 2.0 Connector	2 x 5 header
SPK	Speaker Connector	1 x 4 wafer
GPI0	GPIO Port Connector	2 x 5 box header
LCD_CTL	LCD Backlight Control Connector	1 x 5 wafer
LVDS	LVDS Connector	2 x 20 connector
ATX	ATX Power Connector	2 x 10 Connector
PWR_CPU1	CPU Power Connector	2 x 2 Connector
MINI-PCIE	Mini PCle Connector	
PCIEx16X	PCIe x16 3.0 Connector	
SPI_SOCKET	Bios Socket	
SATA1	SATA3.0 Connector	Standard
SATA2	SATA3.0 Connector	Standard
SATA3	SATA3.0 Connector	Standard
BAT1	Battery Socket	CR2032 compatible
DIMM1	Memory Socket	Slot
DIMM2	Memory Socket	Slot

5.2. Mainboard Placement and Rear I/O Locations



- 1 ATX power interface
- 2 SATA connector
- 3 Battery holder
- 4 Memory connector
- 5 CPU socket
- 6 Buzzer
- 7 CPU Fan connector
- 8 PCle x16 Graphics
- 9 LCD Backlight control
- 10 Speaker connector

- 11 ATX-4-pin Power connector
- 12 internal COM Connector
- 13 Front Panel connector
- 14 COM-Ports
- 15 USB 3.0 4x/Ethernet 2x
- 16 HDMI/VGA
- 17 Display Port
- 18 Audio jacks

5.3. Rear Side

Figure 3: Rear Side



6/ Pin Definitions

The following sections provide pin definitions and detailed description of all on-board connectors. The connector definitions follow the following notation:

Table 5: Connector Definitions

Column Name	Description		
Pin	Shows the pin-numbers in the connector. The graphical layout of the connector definition tables is made similar to the physical connectors.		
Signal	The mnemonic name of the signal at the current pin. The notation "XX#" states that the signal "XX" is active low.		
Туре	Al: Analogue Input. AO: Analogue Output. I: Input, TTL compatible if nothing else stated. IO: Input / Output. TTL compatible if nothing else stated. IOT: Bi-directional tristate IO pin. IS: Schmitt-trigger input, TTL compatible. IOC: Input / open-collector Output, TTL compatible. IOD: Input / Output, CMOS level Schmitt-triggered. (Open drain output) NC: Pin not connected. O: Output, TTL compatible. OC: Output, open-collector or open-drain, TTL compatible. OT: Output with tri-state capability, TTL compatible. LVDS: Low Voltage Differential Signal		
	PWR: Power supply or ground reference pins.		
	Ioh: Typical current in mA flowing out of an output pin through a grounded load, while the output voltage is > 2.4 V DC (if nothing else stated). Iol: Typical current in mA flowing into an output pin from a VCC connected load, while the output voltage is < 0.4 V DC (if nothing else stated).		
Pull U/D	On-board pull-up or pull-down resistors on input pins or open-collector output pins.		
Note	Special remarks concerning the signal.		
Designation	Type and number of item described		
see Section	Number of section in this manual containing detailed description		

6.1. Processor Support

The mITX-SLK-S is designed to support the following processors:

- ▶ 6th generation Intel® Core i7, -i5, -i3 Quad Core processor
- Intel® Pentium G4400 and Celeron Core processor

Kontron has defined the board versions as listed in the following table, so far all based on Embedded CPUs.

Table 6: Processor Support

Name	Speed	Turbo	Embed.	Cache	Sspec	TDP / Tj
Core™ i7- 6700	3.4 GHz	4.0 GHz	Yes	8 MB	SR2L2	65 W / 71°C
Core™ i5- 6500	3.2 GHz	3.6 GHz	Yes	6 MB	SR2L6	65 W / 71°C
Core™ i3- 6100	3.7 GHz		Yes	3 MB	SR2E7	51 W / 65°C
Pentium G4400	2.9 GHz		Yes	3 MB	SR2HQ	35 W/

6.2. System Memory Support

The memory system has two DDR4 sockets. The sockets support the following memory features:

- 2x DDR4 SO-DIMM, 1.2 V
- Max up to 32 GB (2x16 GB)
- Dual channel, 260 pins, 1866/2133 MT/s (PC4-1866/PC4-2133)



If using 32 Bit OS, less than 4 GB are displayed in the system (Shared Video Memory/PCI resources is subtracted).

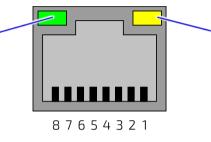
6.3. Ethernet Connectors (I/O area)

The mITX-SKL-S-H110 supports two 10/100/1000 Mbit Ethernet ports.

In order to achieve the specified performance of the Ethernet port, Category 5 twisted pair cables must be used with 10/100 MByte/s and Category 5E, 6 or 6E with 1 Gbit/s LAN networks.

Figure 4: Ethernet Connector

LED status:
Off – Link is down
Flashing Green: Link is up
and active
Steady Green: Link is up,
no activity



LED status:
Orange - 1000 Mbit/s link
established
Green - 100 Mbit/s link
established
Off - 10 Mbit/s Link
established

Table 7: Pin Assignment DP Connector

Pin	Signal	Ethernet 10 BaseT/100BaseT	Gigabit-Ethernet
1	MDI0+	TX+	D1+
2	MDIO-	TX-	D1-
3	MDI1+	RX+	D2+
4	MDI1-		D3+
5	MDI2+		D3-
6	MDI2-	RX-	D2-
7	MDI3+		D4+
8	MDI3-		D4-

Table 8: Signal Description

Signal	Description
MDI[0]+ / MDI[0]-	In MDI mode, this is the first pair in 1000Base-T, i.e. the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX.
MDI[1]+ / MDI[1]-	In MDI mode, this is the second pair in 1000Base-T, i.e. the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX.
MDI[2]+ / MDI[2]-	In MDI mode, this is the third pair in 1000Base-T, i.e. the BI_DC+/- pair. In MDI crossover mode, this pair acts as the BI_DD+/- pair.
MDI[3]+ / MDI[3]-	In MDI mode, this is the fourth pair in 1000Base-T, i.e. the BI_DD+/- pair. In MDI crossover mode, this pair acts as the BI_DC+/- pair.

6.4. USB Connectors (I/O area)

Figure 5: USB 2.0 / 3.0 socket

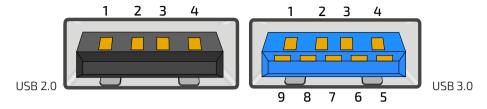


Table 9: Pin Assignment

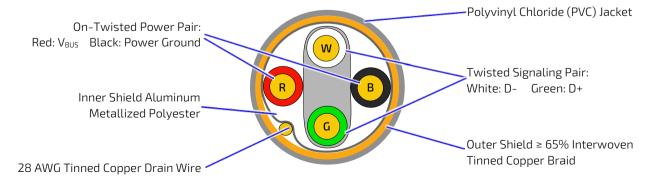
Pin	Туре	Signal	Note
1	PWR	5 V / SB 5 V	USB2.0 / 3.0
2	10	USB 3-	USB2.0 / 3.0
3	10	USB 3+	USB2.0 / 3.0
4	PWR	GND	USB2.0 / 3.0
5	10	RX 2-	USB3.0
6	10	RX 2+	USB3.0
7	PWR	GND	USB3.0
8	10	TX 2-	USB3.0
9	10	TX 2+	USB3.0

Table 10: Signal Description

Signal	Description
USBn+ USBn-	Differential pair works as serial differential receive/transmit data lines.
RXn+ RXn-	(n= 0,1,2,3)
TXn+ TXn-	
5 V / SB5 V	5 V supply for external devices.
	SB5 V is supplied during power-down to allow wakeup on USB device activity.
	Protected by resettable 1.5 A fuse covering both USB ports.

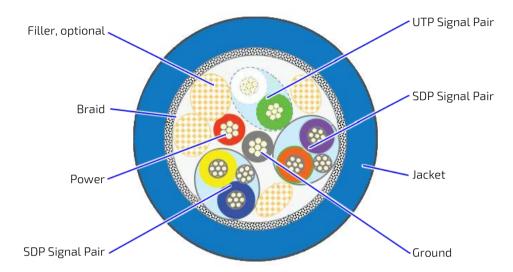
For HiSpeed rates it is required to use a USB cable, which is specified in USB2.0 standard:

Figure 6: USB 2.0 High Speed Cable



For SuperSpeed rates it is required to use a USB cable, which is specified in USB3.0 standard:

Figure 7: USB 3.0 High Speed Cable



6.5. Audio Jack Connectors (I/O area)

Figure 8: Audio Jack





Mating Audio Jack (example)

Pin Designation	Signal	Type	Note
Tip	Front_L	OA	For headphone, max 1.6 V _{RMS}
Ring	Front R	OA	For headphone, max 1.6 V _{RMS}
Sleeve	GND	PWR	

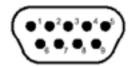
Pin Designation	Signal	Type	Note
Tip	LINE1_L	IA	1.0 V_{RMS} , 30 $k\Omega$
Ring	LINE1_R	IA	1.0 V _{RMS} , 30 kΩ
Sleeve	GND	PWR	

Pin Designation	Signal	Type	Note
Tip			
Ring			
Sleeve	GND	PWR	

Signal	Description	Note
LINE1_L	Line In signal Left	
LINE1_R	Line In signal Right	
Front_L	Line Out Left	
Front_R	Line Out Right	

6.6. COM1A/COM1B (I/O area)

Figure 9: COM1A/COM1B



Pin	RS232	RS422	RS 485 Half duplex	RS 385 Full Duplex
1	DCD	Tx-	Data-	Tx-
2	RxD	Tx+	Data+	Tx+
3	TxD	Rx+		Rx+
4	DTR	Rx-		Rx-
5	GND	GND	GND	GND
6	DSR			
7	RTS			
8	DCTS			
9	RI			

Signal	Description
TxD	Transmitted Data, sends data to the communications link. The signal is set to the marking state (-12 V) on hardware reset when the transmitter is empty or when loop mode operation is initiated.
RxD	Received Data, receives data from the communications link.
DTR	Data Terminal Ready, indicates to the modem etc. that the on-board UART is ready to establish communication link.
DSR	Data Set Ready, indicates that the modem etc. is ready to establish a communications link.
RTS	Request To Send, indicates to the modem etc. that the on-board UART is ready to exchange data.
CTS	Clear To Send, indicates that the modem or data set is ready to exchange data.
DCD	Data Carrier Detect, indicates that the modem or data set has detected the data carrier.
RI	Ring Indicator, indicates that the modem has received a ringing signal from the telephone line.

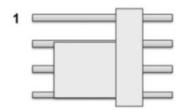
6.7. Fan Connectors (Internal)

The FANSYS (SYS_FAN) can be used to power, control and monitor a fan for chassis ventilation etc.

The FANCPU (CPU_FAN) is used for the connection of the FAN for the CPU.

The 4-pin header is recommended to be used for driving 4-wire type Fan in order to implement FAN speed control.

Figure 10: 4-pin Fan Connector



Pin	Signal	Description	Туре
1	TACHO	FAN speed sense	T
2	PWM	FAN speed control	0
3	12 V	Power +12 V	PWR
4	GND	Ground	PWR

Signal	Description	Type
GND	Power Supply GND signal	PWR
12 V	+12 V supply for fan. A maximum of 2000 mA can be supplied from this pin.	PWR
TACH0	Tacho input signal from the fan, for rotation speed supervision RPM (Rotations Per Minute).	I
PWM	PWM output signal for FAN speed control.	0

6.8. Front Panel 1 (Internal)

Figure 11: FP1 Connector



Pin	Description	Pin	Description
1	HD LED+	2	Power LED-
3	HD LED-	4	Power LED+
5	GND	6	Power Button
7	Reset Button	8	GND
9	NC		

6.9. USB1, USB2 (Internal)

Figure 12: USB Internal Connector



Pin	Description	Pin	Description
1	5V Dual	2	5V Dual
3	USBa-	4	USBb-
5	USBa+	6	USBb+
7	GND	8	GND
9		10	NC

6.10. COM2/COM3 (Internal)

Figure 13: COM2/3 Internal Connector



Pin	Description	Pin	Description
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	0 V

Signal	Description
TxD	Transmitted Data, sends data to the communications link. The signal is set to the marking state (-12 V) on hardware reset when the transmitter is empty or when loop mode operation is initiated.
RxD	Received Data, receives data from the communications link.
DTR	Data Terminal Ready, indicates to the modem etc. that the on-board UART is ready to establish communication link.
DSR	Data Set Ready, indicates that the modem etc. is ready to establish a communications link.
RTS	Request To Send, indicates to the modem etc. that the on-board UART is ready to exchange data.
CTS	Clear To Send, indicates that the modem or data set is ready to exchange data.
DCD	Data Carrier Detect, indicates that the modem or data set has detected the data carrier.
RI	Ring Indicator, indicates that the modem has received a ringing signal from the telephone line.

6.11. COM9_SW1/2 Internal

Figure 14: COM9_SW1/2 Internal Connector



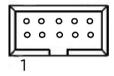
Pin	Description	Pin	Description
1	5V	2	COM pin9
3	12V	4	COM pin9
5	RI	6	COM pin9



The COM9 5V supply is fused with 2.5 A resettable fuse.

6.12. GPIO Internal

Figure 15: GPIO Internal Connector



Pin	Description	Pin	Description
1	5V	2	GPI05
3	GPI01	4	GPI06
5	GPI02	6	GPI07
7	GPIO3	8	GPI08
9	GPI04	10	GND

6.13. CASE_OPEN Internal

Figure 16: CASE_OPEN Internal Connector



Pin	Description
1	NC
2	CASE_OPEN_N
3	GND

6.14. CMOS1 Internal

Figure 17: CMOS1 Internal Connector



Pin	Description
1	3V_BATT
2	RTCRST#
3	GND

6.15. SPK Internal

Figure 18: SPK Internal Connector



Pin	Description
1	R+
2	R-
3	L+
4	L-

6.16. LCD_PWR1 Internal

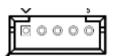
Figure 19: LCD_PWR1 Internal Connector



Pin	Description
1	5V
2	LCD_VOLTAGE
3	3.3V

6.17. LCD_CTL Internal

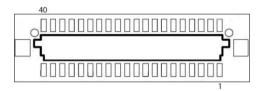
Figure 20: LCD_CTL Internal Connector



Pin	Description
1	12V
2	GND
3	LCD BACKLIGHT ENABLE
4	NC
5	GND

6.18. LVDS (internal)

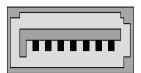
Figure 21: LVDS Connector



Pin	Description	Pin	Description
1	NC	2	NC
3	GND	4	GND
5	LA_DATAO_N	6	LA_DATA1_N
7	LA_DATA0_P	8	LA_DATA1_P
9	GND	10	GND
11	LA_DATA2_N	12	LA_CLOCK_N
13	LA_DATA2_P	14	LA_CLOCK_P
15	GND	16	GND
17	LA_DATA3_N	18	LB_DATAO_N
19	LA_DATA3_P	20	LB_DATAO_P
21	GND	22	GND
23	LB_DATA1_N	24	LB_DATA2_N
25	LB_DATA1_P	26	LB_DATA2_P
27	GND	28	GND
29	LB_CLOCK_N	30	LB_DATA3_N
31	LB_CLOCK_P	32	LB_DATA3_P
33	NC	34	GND
35	LVDS_I2C_CK	36	GND
37	LVDS_I2C_DAT	38	LCD_VOLTAGE
39	NC	40	LCD_VOLTAGE

6.19. SATA (Serial ATA) Disk Interfaces (internal)

Figure 22: SATA Connector



7654321

Pin	Signal	Туре	loh / Iol	Note
1	GND	PWR	-	
2	SATA* TX+			
3	SATA* TX-			
4	GND	PWR	-	
5	SATA* RX-			
6	SATA* RX+			
7	GND	PWR	-	

Signal	Description	
SATA* TX+ / TX-	Host transmitter differential signal pair	
SATA* RX+ / RX-	Host receiver differential signal pair	

[&]quot;*" specifies 0 or 1 depending on SATA port.

Figure 23: Available Cable Kit



Cable SATA 500 mm

7/ Features and Power Supply

7.1. Onboard Power Supply

The board implements an on-board Intel IMVP8 regulator for the processor core and graphics core power supply. The main feature of Intel IMVP8 regulator is that it is serial Voltage Identification Definition (VID) based. Both the processor core and graphics core Voltage Regulator (VRs) are integrated into a single package. The Serial VID interface is shared by both the CPU core and graphics core VRs.

Intel IMVP8 uses a three-wire serial interface called Serial Voltage Identification (SVID) with DATA, CLK and ALERT#, for regulating both the CPU core & Graphics core processor voltages.

Some of the main differences in the platform with the introduction of SVID are:

- SVID can be used to communicate the power states along with the VID signals. Hence signals like PSI# and DPRSLPVR which were used to indicate the power states in previous platforms, is absent in this platform.
- There is no support for on-board override mechanism as done in case of Parallel VIDs in previous platforms.

7.2. External Power Supply

The board will operate from standard ATX & BTX compliant power supplies. For example, the Sparkle Model No. FSP300-60BTVS meets this requirement and is an ATX12V 1.1 Spec compliant power supply.

NOTICE

Use an "ATX12V" 1.1 Spec compliant power supply regardless of Vendor or wattage level (an ATX12V" rating means 5 V min current =0.1A)

NOTICE

The ATX 12V specification does not clearly state a requirement for the ramp-up of the 5VSB standby voltage. However, we strongly recommend to use only PSUs where the 5VSB ramp up follows the same rules as listed for +5VDC.

This should ensure that the board behaves properly, in particular when powering up without or with a weak/empty battery.

7.3. Power Management

Processor supports ACPI 4.0a CO, C1, C1E, C3, C6, C7, C8, C9, C10 states. All power management handshakes are made on the DMI interface. None of the 'Power State' status signals can be observed on the board directly.

Table 11: Power States

State	Description
G0/S0/C0	Full On: Processor operating. Individual devices may be shut down or be placed into lower power states to save power.
G0/S0/Cx	Cx State: Cx states are processor power states within the S0 system state that provide for various levels of power savings. The processor initiates C-state entry and exit while interacting with the PCH. The PCH will base its behavior on the processor state.
G1/S3	Suspend-To-RAM (STR): The system context is maintained in system DRAM, but

State	Description
	power is shut off to non-critical circuits. Memory is retained and refreshes continued. All external clocks stop except RTC.
G1/S4	Suspend-To-Disk (STD): The context of the system is maintained on the disk. All power is then shut off to the system except for the logic required to resume.
G2/S5	Soft Off (SOFF): System context is not maintained. All power is shut off except for the logic required to restart. A full boot is required when waking.
G3	Mechanical OFF (MOFF): System context not maintained. All power is shut off except for the RTC. No Wake events are possible. This state occurs if the user removes the main system batteries in a mobile system, turns off a mechanical switch, or if the system power supply is at a level that is insufficient to power the waking logic.

7.4. Real-Time Clock

An on-board battery maintains power to the Real Time Clock (RTC) when the board is in a mechanical off state. A CR2032 battery is installed on the board.

7.5. Trusted Platform Module (TPM)

The boards include one Infineon SLB9665TT2.0FW5.00 Trusted Platform Module (TPM). The Trusted Platform Module (TPM) is a specific protected and encapsulated microcontroller security chip. He is used to defend the internal data structures against attacks. The nature of this security chip ensures that informations like keys, password and digital certificates are stored within.

8/BIOS

8.1. Starting the uEFI BIOS

The mITX-SKL-S-H110 is provided with a pre-installed and configured version of AptioV uEFI BIOS. AMI BIOS firmware based on the Unified Extensible Firmware Interface (uEFI) specification and the Intel® Platform Innovation framework for EFI. This uEFI BIOS provides functions, which fit to the hardware features of the mITX-SKL-S/H110. The uEFI BIOS comes with a Setup program which provides access to control the configuration.

To start the uEFI BIOS Setup program, follow the steps below:

- 1. Power on the board.
- 2. Wait until the first characters appear on the screen (POST messages or splash screen).
- **3.** Press the key.
- 4. If the uEFI BIOS is password-protected, a request for password will appear. Enter either the User Password or the Supervisor Password (see Security menu), press <RETURN>, and proceed with step 5.
- 5. A Setup menu will appear.

The uEFI BIOS Setup program uses a hot key-based navigation system. A hot key legend bar is located on the bottom of the Setup screens.

The following table provides information concerning the usage of these hot keys.

Table 12: Navigation

Hotkeys	Description
<f1></f1>	The <f1> key is used to invoke the General Help window.</f1>
<->	The <minus> key is used to select the next lower value within a field.</minus>
<+>	The <plus> key is used to select the next higher value within a field.</plus>
<f2></f2>	The <f2> key is used to load previous values.</f2>
<f3></f3>	The <f3> key is used to load optimized defaults.</f3>
<f4></f4>	The <f4> key is used to Save and Reset.</f4>
<→> or <←>	The <left right=""> arrows are used to select major Setup menus on the menu bar. For example: Main screen, Advanced screen, Security screen, etc.</left>
<^> or <↓>	The <up down=""> arrows are used to select fields in the current menu. For example a Setup function or a sub-screen.</up>
<esc></esc>	The <esc> key is used to exit a major Setup menu and enter the Exit Setup menu. Pressing the <esc> key in a sub-menu causes the next higher menu level to be displayed.</esc></esc>
<return></return>	The <return> key is used to execute a command or select a submenu.</return>

8.2. Setup Menus

The Setup utility features shows six menus in the selection bar at the top of the screen:

- Main
- Advanced
- Chipset
- Security
- Boot
- Save & Exit

The Setup menus are selected via the left and right arrow keys. The currently active menu and the currently active uEFI BIOS Setup item are highlighted in white. Each Setup menu provides two main frames. The left frame displays all available functions. Functions that can be configured are displayed in blue. Functions displayed in gray provide information about the status or the operational configuration. The right frame displays an Item Specific Help window providing an explanation of the respective function.

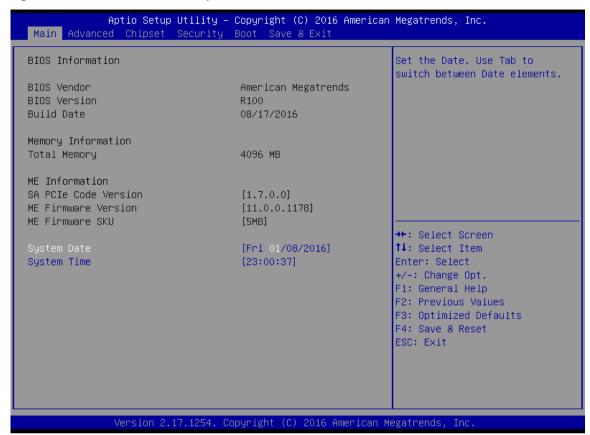
8.2.1. Main Setup Menu

Upon entering the uEFI BIOS Setup program, the Main Setup menu is displayed. This screen lists the Main Setup menu sub-screens and provides basic system information. Additionally functions for setting the system time and date are offered.

Table 13: Main Setup Menu Sub-Screens and Functions

Funtion	Description	
BIOS Information	Read only field. Displays information about the system BIOS	
Memory Information	Read only field. Displays information about total memory	
ME Information	Read only field. Displays information about Intel Management Engine (ME) version	
TXE Information	Read only field. Displays information about TXE information	
Firmware information	Code version and firmware information	
System Date	Set System Date	
System Time	Set System Time	

Figure 24: BIOS Main Menu Screen System Date and Time



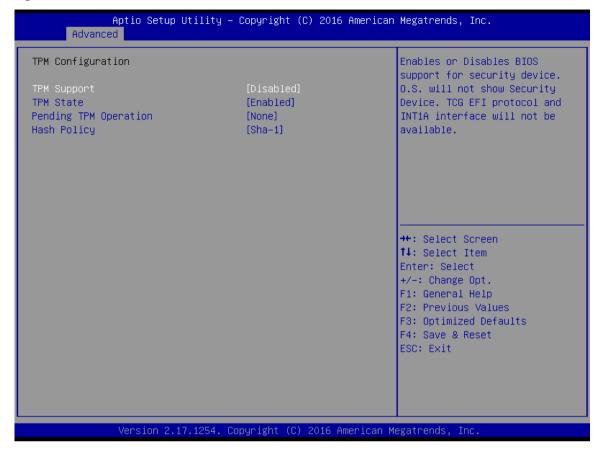
FEATURE	OPTIONS	DESCRIPTION
System Date	[dd/mm/yyyy]	Set the Date. Use Tab to switch between Data elements.
System Time	[hh:mm:ss]	Set the Time. Use Tab to switch between Time elements.

Figure 25: BIOS Advanced Menu Screen ACPI



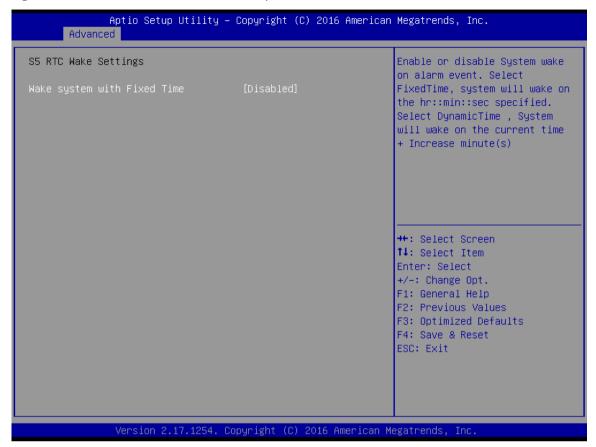
FEATURE	OPTIONS	DESCRIPTION
ACPI Sleep State	[Suspend Disabled], [S3 only(Suspend to RAM)]	Select the highest ACPI sleep state the system will enter when the Suspend button is pressed.
Restore AC Power Loss	[Power On], [Power Off]	Select AC power state when power is re-applied after a power failure.
Watch Dog function	[Disabled] , [Enabled]	Enable / Disable WDT function

Figure 26: BIOS Advanced Menu Screen TPM



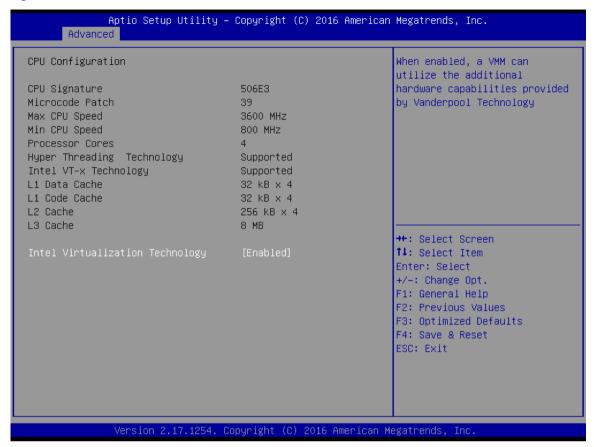
FEATURE	OPTIONS	DESCRIPTION
Trusted Platform Module (TPM) Support	[Disabled] , [Enabled]	Enables or Disables BIOS support for security device. OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
TPM State	[Enabled] , [Disabled]	Enable/Disable Security Device. NOTE: Your Computer will reboot during restart in order to change State of the Device.
Pending TPM 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.
Hash Policy	[Sha-1] , [Sha-2]	Select the Hash policy to use. SHA-2 is most secure but might not be supported by all Operating Systems

Figure 27: BIOS Advanced Menu Screen Wake system



FEATURE	OPTIONS	DESCRIPTION
Wake system with Fixed Time	[Disabled], [Enabled]	Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime: System will wake on the current time + Increase minute(s)

Figure 28: BIOS Advanced Menu Screen IVT



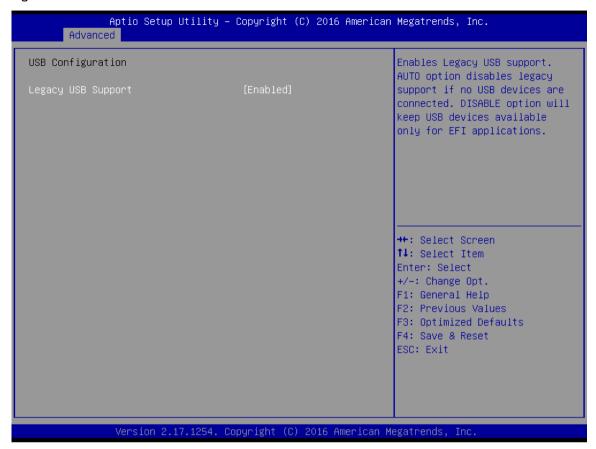
FEATURE OPTIONS DESCRIPTION

Intel
Virtualization
Technology

DESCRIPTION

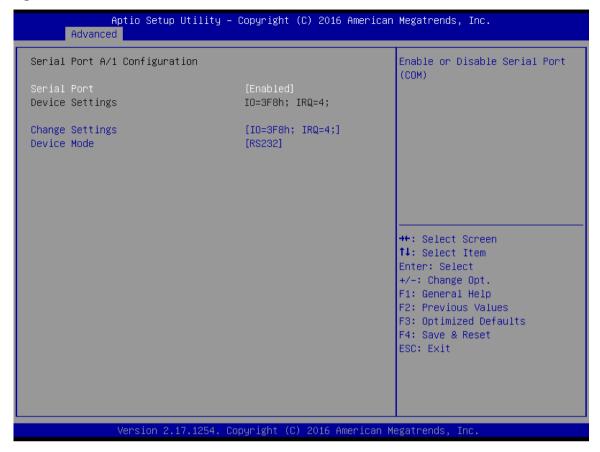
When enabled, a Virtual Machine Monitor (VMM) can utilize the additional hardware capabilities provided by Vanderpool Technology.

Figure 29: BIOS Advanced Menu Screen USB



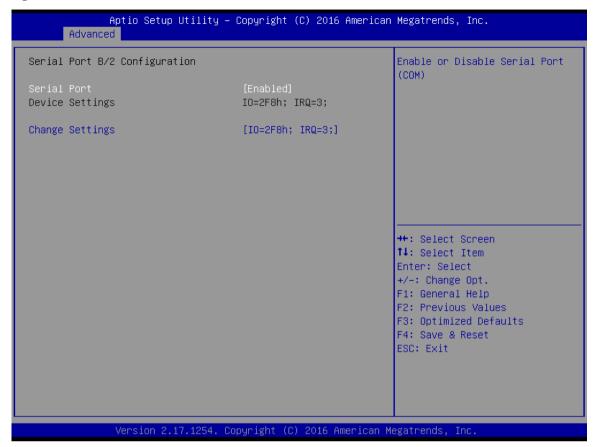
FEATURE	OPTIONS	DESCRIPTION
Legacy USB Support	[Enabled] , [Disabled]	Enables Legacy USB support. Auto option disables legacy support if no USB devices are connected. Disable option will keep USB devices available only for EFI applications.

Figure 30: BIOS Advanced Menu Screen Serial Port



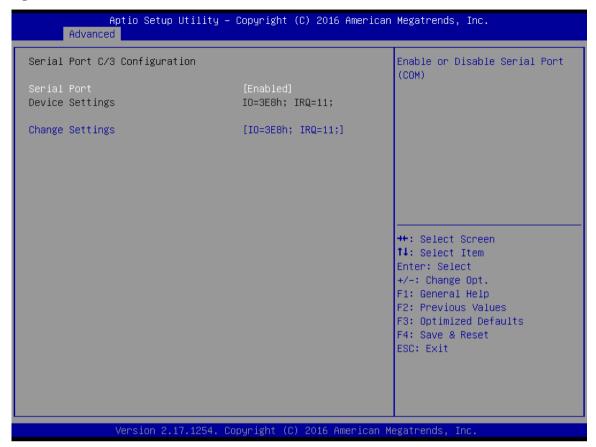
FEATURE	OPTIONS	DESCRIPTION
Serial Port	[Enabled] , [Disabled]	Enable or Disable Serial Port (COM)
Change Settings	[IO=3F8h; IRQ=4;], [IO=2F8h; IRQ=4;], [IO=3E8h; IRQ=4;], [IO=2E8h; IRQ=4;]	Select an optimal settings for Super IO Device
Device Mode	[RS232], [RS485], [RS422]	
RS485 Mode	[Input], [Output]	

Figure 31: BIOS Advanced Menu Screen Serial Port



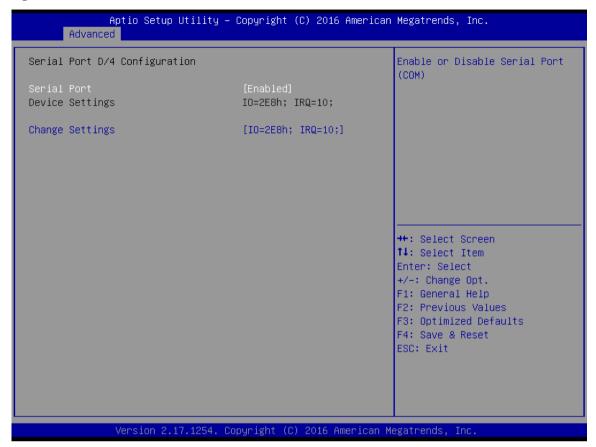
FEATURE	OPTIONS	DESCRIPTION
Serial Port	[Enabled], [Disabled]	Enable or Disable Serial Port (COM)
Change Settings	[IO=2F8h; IRQ=3;], [IO=3F8h; IRQ=3;], [IO=3E8h; IRQ=3;], [IO=2E8h; IRQ=3;]	Select an optimal settings for Super IO Device

Figure 32: BIOS Advanced Menu Screen Serial Port



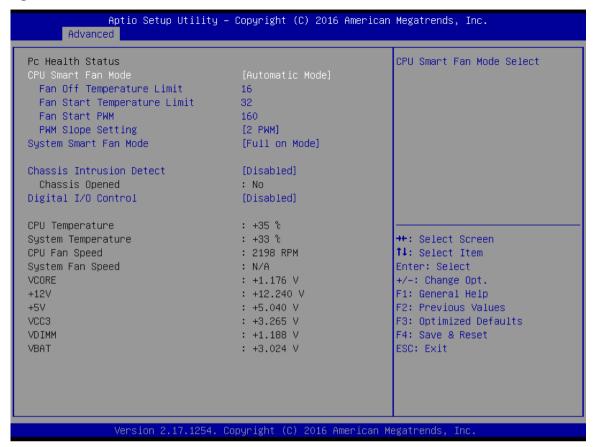
FEATURE	OPTIONS	DESCRIPTION
Serial Port	[Enabled] , [Disabled]	Enable or Disable Serial Port (COM)
Change Settings	[IO=3E8h; IRQ=11;], [IO=2E8h; IRQ11;], [IO=2F0h; IRQ=11;], [IO=2E0h; IRQ=11;]	Select an optimal settings for Super IO Device

Figure 33: BIOS Advanced Menu Screen Serial Port



FEATURE	OPTIONS	DESCRIPTION
Serial Port	[Enabled] , [Disabled]	Enable or Disable Serial Port (COM)
Change Settings	[IO=2E8h; IRQ=10;], [IO=3E8h; IRQ10;], [IO=2F0h; IRQ=10;], [IO=2E0h; IRQ=10;]	Select an optimal settings for Super IO Device

Figure 34: BIOS Advanced Menu Screen CPU Fan Mode



FEATURE	OPTIONS	DESCRIPTION
CPU Smart Fan Mode	[Automatic Mode] , [Full on Mode] , [Manual Mode]	
Fan Off Temperature Limit	[16]	Fan will off when temperature lower than this limit.
Fan Start Temperature Limit	[32]	Fan will work when temperature higher than this limit.
Fan Start PWM	[160]	Fan will start with this PWM value.
PWM Slope Setting	[2 PWM], [0.125 PWM], [0.25 PWM], [0.5 PWM], [1 PWM], [4 PWM], [8 PWM], [15.875 PWM]	PWM Slope Selection
System Smart Fan Mode	[Full on Mode] , [Automatic Mode] , [Manual Mode]	
Chassis Intrusion Detect	[Disabled], [Enabled]	
Clear Chassis Open Status	[No], [Yes]	
Chassis Open Alarm Type	[Message], [Beep], [Both]	
Digital I/O Control	[Disabled] , [Enabled]	

Figure 35: BIOS Chipset Menu Screen Boot Display



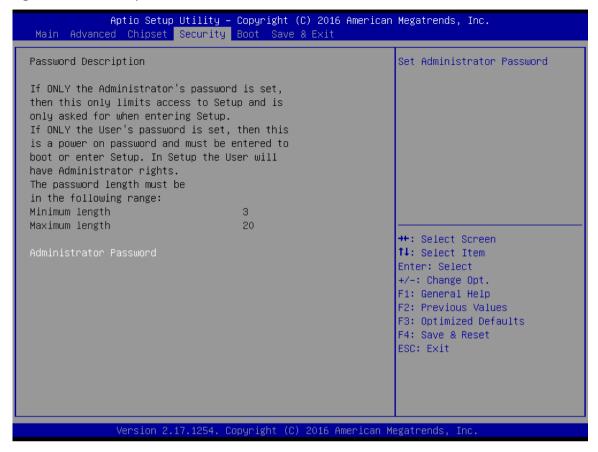
FEATURE	OPTIONS	DESCRIPTION
VT-D	[Enabled] , [Disabled]	VT-d capability
PCIe x16 Slot	[Auto], [Enabled], [Disabled]	
Launch Video OpROM	[Legacy], [UEFI], [Disabled]	Controls the execution of UEFI and Legacy Video OpROM
Primary Boot Display	[CRT], [LVDS], [Display], [HDMI]	Select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display
Secondary Boot Display	[HDMI], [CRT], [LVDS], [Display]	Select Secondary Display Device
LVDS Panel Type	[Inn-G150XGE-L05 1024x768], [AU0-G104STN01.0 800x600], [AU0-G121XTN01.0 1024x768], [AU0-G156XW01.3 1366x768], [AU0-G170ETN01_V0 1280x1024], [AU0-G185XW01 V2 1366x768], [AU0-G190ETN01.2 1280x1024]	Select LVCD panel used by Internal Graphics Device by selecting the appropriate setup item.
LVDS Color Depth	[8 bit], [6 bit]	

Figure 36: BIOS Chipset Menu Screen LAN



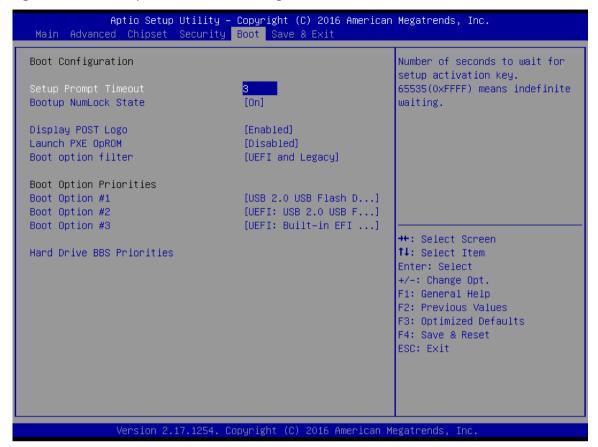
FEATURE	OPTIONS	DESCRIPTION
LAN 1 Controller	[Enabled] , [Disabled]	Enable or disable onboard NIC.
LAN 2 Controller	[Enabled] , [Disabled]	
Azalia HD Audio	[Enabled] , [Disabled]	Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled Auto = HDA will be enabled if present, disabled otherwise.

Figure 37: BIOS Security Menu Screen Password



FEATURE	OPTIONS	DESCRIPTION
Administrator Password		
Set Administrator Password		

Figure 38: BIOS Security Menu Screen Boot Configuration



FEATURE	OPTIONS	DESCRIPTION
Setup Prompt Timeout	[3]	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	[On], [Off]	Select the keyboard NumLock state.
Display POST Logo	[Enabled] , [Disabled]	Enables or disables Quiet Boot option.
Launch PXE OpROM	[Disabled] , [Enabled]	Controls the execution of Legacy PXE OpROM.
Boot option filter	[UEFI and Legacy] , [Legacy only] , [UEFI only]	This option controls Legacy/UEFI ROMs priority.
Save Changes and Reset		Reset the system after saving the changes.
Discard Changes and Reset		Reset system setup without saving any changes.
Restore Defaults		Restore/Load Default values for all the setup options.
Launch EFI Shell from device		Attempts to Launch EFI Shell application (Shell.efi) from one of the available filesystem devices

9/ Technical Support

For technical support contact our Support department:

E-mail: support@kontron.com Phone: +49-821-4086-888

Make sure you have the following information available when you call:

Product ID Number (PN), Serial Number (SN)



The serial number can be found on the Type Label, located on the product's rear side.

Be ready to explain the nature of your problem to the service technician.

9.1. Warranty

Due to their limited service life, parts that by their nature are subject to a particularly high degree of wear (wearing parts) are excluded from the warranty beyond that provided by law. This applies to the CMOS battery, for example.



If there is a protection label on your product, then the warranty is lost if the product is opened.

9.2. Returning Defective Merchandise

All equipment returned to Kontron must have a Return of Material Authorization (RMA) number assigned exclusively by Kontron. Kontron cannot be held responsible for any loss or damage caused to the equipment received without an RMA number. The buyer accepts responsibility for all freight charges for the return of goods to Kontron's designated facility. Kontron will pay the return freight charges back to the buyer's location in the event that the equipment is repaired or replaced within the stipulated warranty period. Follow these steps before returning any product to Kontron.

1. Visit the RMA Information website: http://www.kontron.com/support-and-services/support/rma-information

Download the RMA Request sheet for **Kontron Europe GmbH** and fill out the form. Take care to include a short detailed description of the observed problem or failure and to include the product identification Information (Name of product, Product number and Serial number). If a delivery includes more than one product, fill out the above information in the RMA Request form for each product.

2. Send the completed RMA-Request form to the fax or email address given below at Kontron Europe GmbH. Kontron will provide an RMA-Number.

Kontron Europe GmbH RMA Support

Phone: +49 (0) 821 4086-0 Fax: +49 (0) 821 4086 111 Email: service@kontron.com

3. The goods for repair must be packed properly for shipping, considering shock and ESD protection.



Goods returned to Kontron Europe GmbH in non-proper packaging will be considered as customer caused faults and cannot be accepted as warranty repairs.

4. Include the RMA-Number with the shipping paperwork and send the product to the delivery address provided in the RMA form or received from Kontron RMA Support.

List of Acronyms

ECC	Error Checking and Correction
HD	Hard Disk
mITX	Mini ITX
PCIe	PCI-Express
PECI	Platform Environment Control Interface
RTC	Real Time Clock
SELV	Safety Extra Low Voltage
SPI	Serial Peripheral Interface
TPM	Trusted Platform Module
UEFI	Unified Extensible Firmware Interface
VMM	Virtual Machine Monitor



About Kontron

Kontron is a global leader in Embedded Computing Technology (ECT). As a part of technology group S&T, Kontron offers a combined portfolio of secure hardware, middleware and services for Internet of Things (IoT) and Industry 4.0 applications. With its standard products and tailor-made solutions based on highly reliable state-of-the-art embedded technologies, Kontron provides secure and innovative applications for a variety of industries. As a result, customers benefit from accelerated time-to-market, reduced total cost of ownership, product longevity and the best fully integrated applications overall.

For more information: http://www.kontron.com/



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