



USER MANUAL

# VB9001

High-integrated low-power platform  
ideal for network firewall and router  
applications



## Copyright

Copyright ©2017-2018 VIA Technologies Incorporated. All rights reserved.

No part of this document may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language, in any form or by any means, electronic, mechanical, magnetic, optical, chemical, manual or otherwise without the prior written permission of VIA Technologies, Incorporated.

## Trademarks

All trademarks are the property of their respective holders.

## Disclaimer

No license is granted, implied or otherwise, under any patent or patent rights of VIA Technologies. VIA Technologies makes no warranties, implied or otherwise, in regard to this document and to the products described in this document. The information provided in this document is believed to be accurate and reliable as of the publication date of this document. However, VIA Technologies assumes no responsibility for the use or misuse of the information (including use or connection of extra device/equipment/add-on card) in this document and for any patent infringements that may arise from the use of this document. The information and product specifications within this document are subject to change at any time, without notice and without obligation to notify any person of such change.

VIA Technologies, Inc. reserves the right to make changes to the products described in this manual at any time without prior notice.

## Regulatory Compliance

### FCC-A Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his personal expense.

### Notice 1

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### Notice 2

Shielded interface cables and A.C. power cord, if any, must be used in order to comply with the emission limits.

### Notice 3

The product described in this document is designed for general use, VIA Technologies assumes no responsibility for the conflicts or damages arising from incompatibility of the product. Check compatibility issue with your local sales representatives before placing an order.

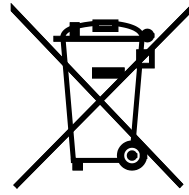


Tested To Comply  
With FCC Standards  
FOR HOME OR OFFICE USE



## Battery Recycling and Disposal

- Only use the appropriate battery specified for this product.
- Do not re-use, recharge, or reheat an old battery.
- Do not attempt to force open the battery.
- Do not discard used batteries with regular trash.
- Discard used batteries according to local regulations.



## Safety Precautions

- Always read the safety instructions carefully.
- Keep this User's Manual for future reference.
- All cautions and warnings on the equipment should be noted.
- Keep this equipment away from humidity.
- Lay this equipment on a reliable flat surface before setting it up.
- Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
- Place the power cord in such a way that people cannot step on it.
- Always unplug the power cord before inserting any add-on card or module.
- If any of the following situations arises, get the equipment checked by authorized service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated into the equipment.
  - The equipment has been exposed to moisture.
  - The equipment has not worked well or you cannot get it work according to User's Manual.
  - The equipment has dropped and damaged.
  - The equipment has obvious sign of breakage.
- Do not leave this equipment in extreme temperatures or in a storage temperature above 70°C (158°F). The equipment may be damaged.
- Do not leave this equipment in direct sunlight.
- Never pour any liquid into the opening. Liquid can cause damage or electrical shock.
- Do not place anything over the power cord.
- Do not cover the ventilation holes. The openings on the enclosure protect the equipment from overheating



## Box Contents

- 1 x VB9001 board
- 1 x SATA cable with SATA power
- 1 x VGA cable

## Ordering Information

Part Number	Description
VB9001-10E	3.5" SBC Board with 1.06GHz VIA Eden® X1 CPU, VGA, 4 USB 2.0, COM, DIO, 5 Gigabit Ethernet, SATA, CFast slot, 5V DC-in

## Optional Accessories

### Wireless Accessories

Part Number	Description
00GO27100BU2B0D0	VNT9271 IEEE 802.11 b/g/n USB Wi-Fi dongle
EMIO-5531-00A1	VAB-820-W IEEE 802.11 b/g/n USB Wi-Fi & Bluetooth module with assembly kit and antenna



## Table of Contents

<b>1. Product Overview</b>	<b>1</b>
1.1 Key Features	1
1.2 Product Specifications	2
1.3 Layout Diagram	4
1.4 Product Dimensions	5
1.5 Height Distribution	6
<b>2. External I/O Pin Descriptions and Functionality</b>	<b>7</b>
2.1 COM port	7
2.2 Gigabit Ethernet Port	7
2.3 DC-in Jack	8
<b>3. Onboard I/O</b>	<b>9</b>
3.1 USB 2.0 Pin Header	9
3.2 Front Panel Pin Header	9
3.3 SPI Connector	10
3.4 LPC Pin Header	10
3.5 GPIO Pin Header	11
3.6 VGA Pin Header	11
3.7 SATA Connector	12
3.8 SATA Power Connector	12
3.9 Fan Connector	13
3.10 CMOS Battery Connector	13
3.11 CFast Slot	14
<b>4. Onboard Jumpers</b>	<b>15</b>
4.1 Clear CMOS Jumper	16
<b>5. Hardware Installation</b>	<b>17</b>
5.1 Suggested minimum chassis dimensions	17
5.1.1 Suggested minimum chassis dimensions	17
5.1.2 Suggested minimum chassis height	18
5.1.3 Suggested keepout areas	19
<b>6. BIOS Setup Utility</b>	<b>20</b>
6.1 Entering the BIOS Setup Utility	20
6.2 Control Keys	20
6.3 Navigating the BIOS Menus	20
6.4 Getting Help	20
6.5 Main Menu	21
6.5.1 BIOS Information	21
6.5.2 Memory Information	21
6.5.3 System Language	21
6.5.4 System Date	21
6.5.5 System Time	21
6.6 Advanced Setting	22
6.6.1 S5 RTC Wake Settings	23
6.6.1.1 Wake System with Fixed Time	23
6.6.1.1.1 Wake up hour	24
6.6.1.1.2 Wake up minute	24
6.6.1.1.3 Wake up second	24
6.6.1.2 Wake system with Dynamic Time	24
6.6.2 CPU Configuration	25
6.6.3 IDE Configuration	26
6.6.4 Clock Generator Configuration	27
6.6.4.1 CPU Spread Spectrum	27
6.6.4.2 PCIe Spread Spectrum	27



6.6.5	Board Configuration .....	28
6.6.5.1	S5 Wake On LAN .....	28
6.7	Chipset Settings .....	29
6.7.1	DRAM Configuration .....	30
6.7.1.1	DRAM Clock .....	30
6.7.1.2	VGA Share Memory (Frame Buffer) .....	30
6.7.2	Watchdog Timer Control .....	31
6.7.2.1	Watchdog Timer Enable .....	31
6.7.2.2	Watchdog Timer Run/Stop .....	31
6.7.2.3	Watchdog Timer Action .....	31
6.7.2.4	Watchdog Timer Count .....	31
6.8	Boot Settings .....	32
6.8.1	Setup Prompt Timeout .....	32
6.8.2	Bootup NumLock State .....	32
6.8.3	Quiet Boot .....	32
7.	Software and Technical Support .....	33
7.1	Microsoft Windows & QNX Support .....	33
7.2	VIA Smart ETK .....	33
7.3	Technical Supports and Assistance .....	33
Appendix. A.	Installing Wireless Accessories .....	34
A.1.	Installing EMIO-5531 USB Wi-Fi & Bluetooth module .....	34

## List of Figures

Figure 1: Layout diagram of the VB9001 (back panel I/O) .....	4
Figure 2: Layout diagram of the VB9001 (right side).....	4
Figure 3: Layout diagram of the VB9001 onboard (top side) .....	4
Figure 4: Layout diagram of the VB9001 onboard (bottom side).....	4
Figure 5: Mounting holes and dimensions of the VB9001 .....	5
Figure 6: External I/O port dimensions of the VB9001 (back panel) .....	5
Figure 7: External I/O port dimensions of the VB9001 (right side) .....	5
Figure 8: Height distribution of the VB9001 (top side) .....	6
Figure 9: Height distribution of the VB9001 (bottom side) .....	6
Figure 10: COM port diagram .....	7
Figure 11: Gigabit Ethernet port .....	7
Figure 12: DC-in jack diagram .....	8
Figure 13: DC-in jack specification diagram .....	8
Figure 14: USB 2.0 pin header diagram .....	9
Figure 15: Front panel pin header diagram .....	9
Figure 16: SPI connector diagram .....	10
Figure 17: LPC pin header diagram .....	10
Figure 18: GPIO pin header diagram .....	11
Figure 19: VGA pin header diagram .....	11
Figure 20: SATA connector diagram.....	12
Figure 21: SATA power connector diagram .....	12
Figure 22: Fan connector diagram.....	13
Figure 23: CMOS battery connector diagram .....	13
Figure 24: CFast slot diagram .....	14
Figure 25: Jumper settings example.....	15
Figure 26: Clear CMOS jumper diagram .....	16
Figure 27: Suggested minimum chassis dimensions .....	17
Figure 28: Suggested minimum chassis height (top side) .....	18
Figure 29: Suggested minimum chassis height (bottom side).....	18
Figure 30: Suggested keepout top areas .....	19
Figure 31: Suggested keepout bottom areas.....	19
Figure 32: Illustration of the Main menu screen.....	21
Figure 33: Illustration of the Advanced Settings screen .....	22
Figure 34: Illustration of S5 RTC Wake Settings screen .....	23
Figure 35: Illustration of Wake System with Fixed Time screen when Enabled .....	23
Figure 36: Illustration of Wake System with Dynamic Time screen when Enabled .....	24
Figure 37: Illustration of CPU Configuration screen .....	25
Figure 38: Illustration of IDE Configuration screen .....	26
Figure 39: Illustration of Clock Generator Configuration screen .....	27
Figure 40: Illustration of board Configuration screen .....	28
Figure 41: Illustration of Chipset Settings screen .....	29
Figure 42: Illustration of DRAM Configuration screen.....	30
Figure 43: Illustration of Video Configuration screen.....	31
Figure 44: Illustration of Boot Settings screen .....	32
Figure 45: Installing EMIO-5531 to the chassis .....	34
Figure 46: Connecting USB cable Wi-Fi cable .....	34
Figure 47: Installing Wi-Fi antenna cable and antenna .....	35
Figure 48: Connecting the Wi-Fi antenna cable to the micro-RF connector .....	35



## List of Tables

Table 1:	COM port pinouts.....	7
Table 2:	Gigabit Ethernet port pinouts .....	7
Table 3:	Gigabit Ethernet port LED color definitions .....	8
Table 4:	DC-in jack pinouts .....	8
Table 5:	DC-in jack specification pinouts .....	8
Table 6:	USB 2.0 pin header pinouts.....	9
Table 7:	Front panel pin header pinouts .....	9
Table 8:	SPI connector pinouts .....	10
Table 9:	LPC pin header pinouts .....	10
Table 10:	GPIO pin header pinouts .....	11
Table 11:	VGA pin header pinouts .....	11
Table 12:	SATA connector pinouts.....	12
Table 13:	SATA power connector pinouts .....	12
Table 14:	Fan connector pinouts.....	13
Table 15:	CMOS battery connector pinouts .....	13
Table 16:	CFast slot pinouts .....	14
Table 17:	Clear CMOS jumper settings.....	16



# 1. Product Overview

Based on a highly compact 3.5" SBC form factor, the VIA VB9001 combines the advanced performance of the fanless 1.06GHz VIA Eden® X1 processor with the enhanced multimedia capabilities of the VIA VX900 media system processor. The VIA VB9001 features five Gigabit Ethernet ports, which makes it an ideal platform for network security, distributed control system (DCS), and monitoring applications.

Measuring just 146mm x 102mm, the VIA VB9001 includes 1GB DDR3 SDRAM onboard and features a unique set of I/O and connectivity options ideal for high-speed M2M and IP camera applications, including two USB 2.0 ports, five Gigabit Ethernet ports, and one COM port, as well as onboard pin headers for VGA and DIO (4 GPI + 4 GPO). The storage options include one SATA connector and one CFast slot. Wireless connectivity can be added to the VB9001 board with an optional VIA EMIO-5531 USB Wi-Fi & Bluetooth module.

The VIA VB9001 is compatible with Windows 7, Windows CE 5.0 and QNX. In addition, the VIA Smart ETK (Embedded Tool Kit) has been added which comprises of a number of APIs, including a BIOS flash tool for controlling the BIOS system, Watchdog Timer (WDT) for safeguarding against system crashes, GPIO access, and Hardware Monitoring.

## 1.1 Key Features

- Compact 3.5" SBC form factor
- Powered by 1.06GHz VIA Eden® X1 CPU
- Supports integrated VIA C-9 HD DX9 3D/2D graphic video with MPEG-2, WMV9, VC1 & H.264 video decoding acceleration
- Fanless and ultra-low power consumption
- Supports 1GB DDR3 SDRAM onboard
- Supports SATA connector and CFast slot
- Supports five Gigabit Ethernet ports, COM, and two USB 2.0 pin headers for 4 ports
- Supports Digital I/O pin header (4 GPI + 4 GPO)
- Supports power by 5V DC-in
- VIA Smart ETK package
- Windows 7, Windows CE 5.0, QNX operating system

## 1.2 Product Specifications

### Processor

- 1.06GHz VIA Eden® X1 (Fanless)

### Chipset

- VIA VX900 Media System Processor

### BIOS

- AMI Aptio UEFI BIOS, 8Mbit Flash memory

### System Memory

- 1GB DDR3 SDRAM onboard

### Storage

- 1 x SATA connector
- 1 x CFast slot

### Graphic

- Integrated VIA C-9 HD DX9 3D/2D graphics with MPEG-2, WMV9, VC1 and H.264 video decoding acceleration

### LAN

- 5 Realtek RTL8111G PCIe Gigabit Ethernet controllers

### Onboard I/O

- 1 x SATA connector
- 1 x SATA power connector
- 1 x VGA pin header
- 2 x USB 2.0 pin header for 4 ports
- 1 x Digital I/O pin header (4 GPI + 4 GPO)
- 1 x Fan connector
- 1 x Power LED
- 1 x CFast slot
- 1 x CMOS battery connector
- 1 x Clear CMOS jumper

### Back Panel I/O

- 1 x COM port
- 5 x Gigabit Ethernet ports
- 1 x DC-in jack

### Power Supply

- 5V DC-in jack

### Operating System

- Windows 7, Windows CE 5.0, QNX

**VIA Smart ETK**

- BIOS flash tool, Hardware monitor, Watchdog timer, GPIO

**Operating Temperature**

- 0°C ~ 60°C

**Operating Humidity**

- 0% ~ 95% (non-condensing)

**Form Factor**

- 3.5" SBC (146mm x 102mm, 5.7" x 4")

**Compliance**

- CE
- FCC

**Note:**

As the operating temperature provided in the specifications is a result of the test performed in VIA's chamber, a number of variables can influence this result. Please note that the working temperature may vary depending on the actual situation and environment. It is highly recommended to execute a solid testing program and take all the variables into consideration when building the system. Please ensure that the system runs well under the operating temperature in terms of application.

## 1.3 Layout Diagram

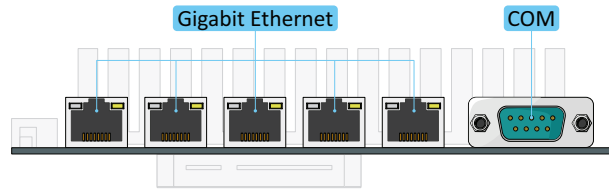


Figure 1: Layout diagram of the VB9001 (back panel I/O)

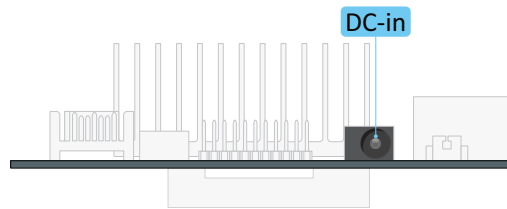


Figure 2: Layout diagram of the VB9001 (right side)

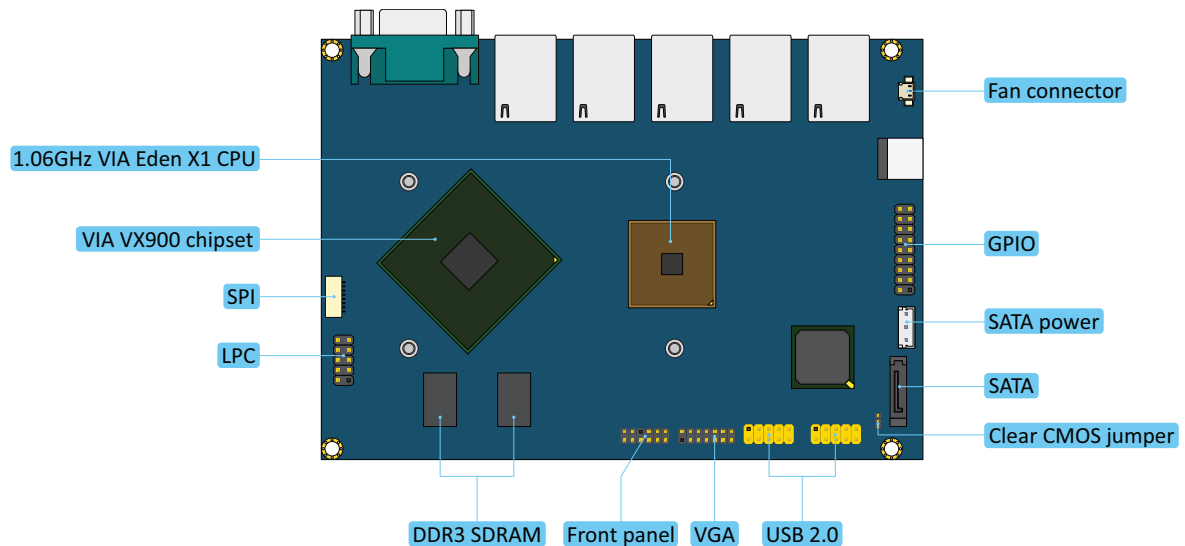


Figure 3: Layout diagram of the VB9001 onboard (top side)

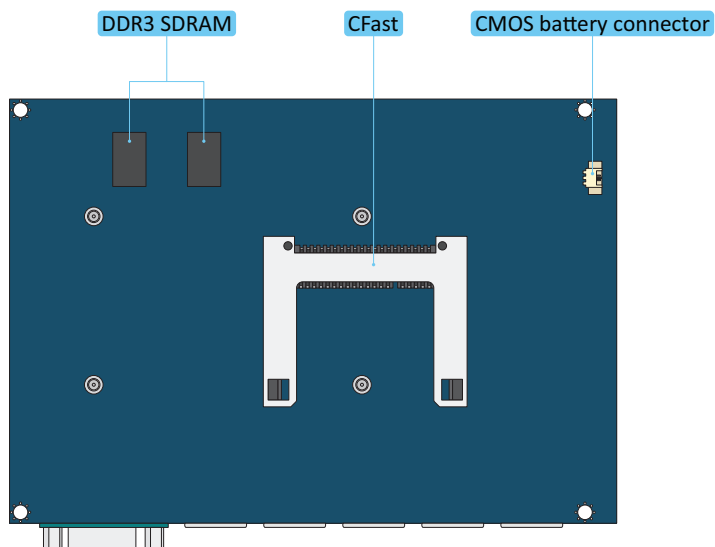


Figure 4: Layout diagram of the VB9001 onboard (bottom side)

## 1.4 Product Dimensions

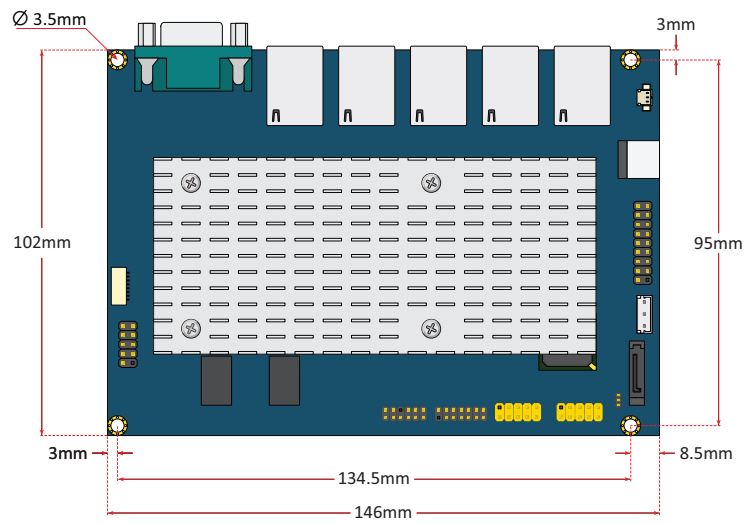


Figure 5: Mounting holes and dimensions of the VB9001

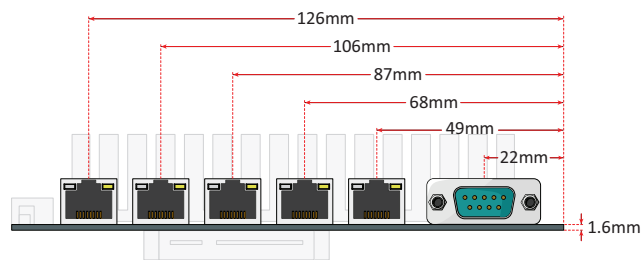


Figure 6: External I/O port dimensions of the VB9001 (back panel)

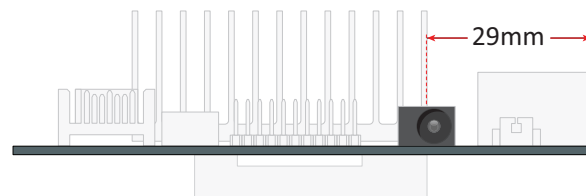
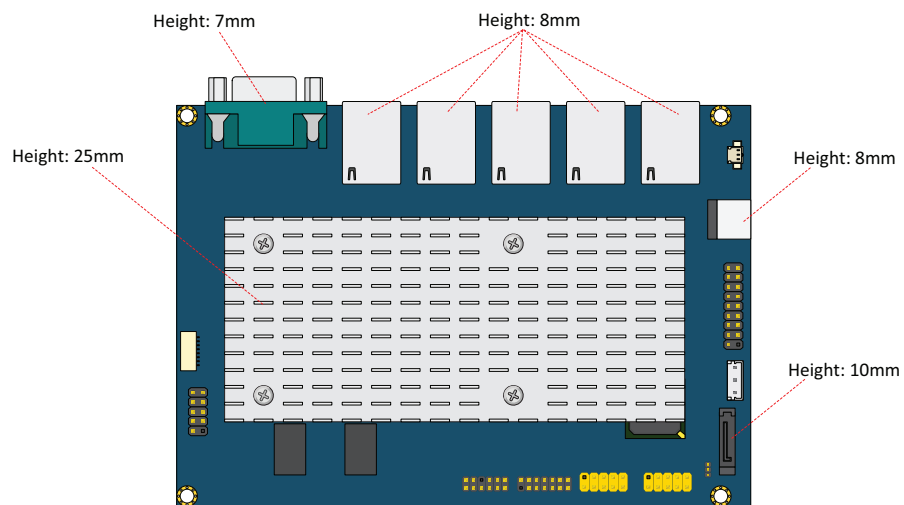
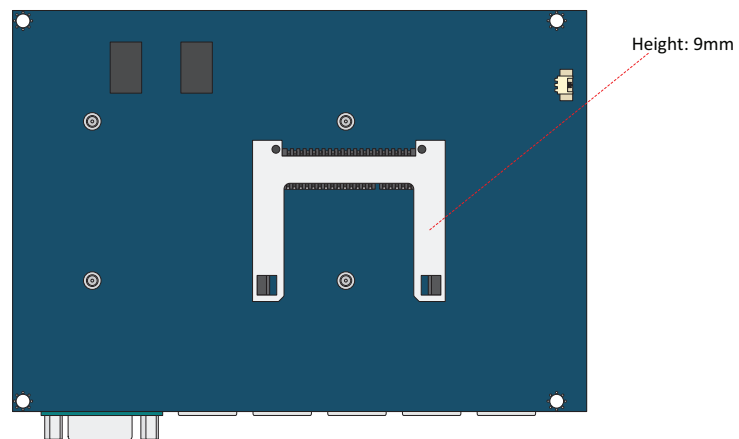


Figure 7: External I/O port dimensions of the VB9001 (right side)

## 1.5 Height Distribution



**Figure 8: Height distribution of the VB9001 (top side)**



**Figure 9: Height distribution of the VB9001 (bottom side)**

## 2. External I/O Pin Descriptions and Functionality

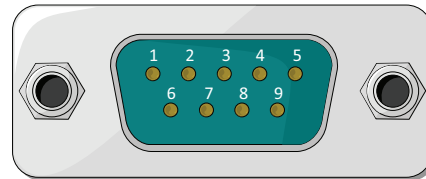
The VB9001 has a wide selection of interfaces integrated into the system. It includes a selection of frequently used ports as part of the external I/O coastline.

### 2.1 COM port

The VB9001 is equipped with a COM port which supports RS-232. The pinouts of the COM port are shown below.

Pin	Signal
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

**Table 1: COM port pinouts**



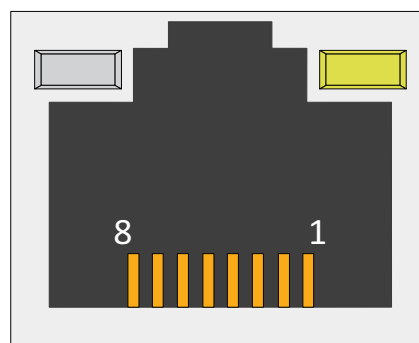
**Figure 10: COM port diagram**

### 2.2 Gigabit Ethernet Port

The VB9001 comes with five Gigabit Ethernet ports that support high-speed data transmission. Each Gigabit Ethernet port uses a 8 Position 8 Contact (8P8C) receptacle connector commonly known as RJ-45, which is fully compliant with IEEE 802.3 (10BASE-T), 802.3u (100BASE-TX), and 802.3ab (1000BASE-T) standards. The pinouts of the Gigabit Ethernet port are shown below.

Pin	Signal
1	MDI3-
2	MDI3+
3	MDI2-
4	MDI2+
5	MDI1-
6	MDI1+
7	MDI0-
8	MDI0+

**Table 2: Gigabit Ethernet port pinouts**



**Figure 11: Gigabit Ethernet port**

Each Gigabit Ethernet port has two individual LED indicators located on the front side to show its Active/Link status and Speed status.

	Link LED (Left LED on RJ-45 port)	Active LED (Right LED on RJ-45 port)
Link off LED is off LED is off	Link LED	Active LED
Speed_10Mbit	No flash	Orange Flash
Speed_100Mbit	The Green LED is on	Orange Flash
Speed_1000Mbit	The Red LED is on	Orange Flash

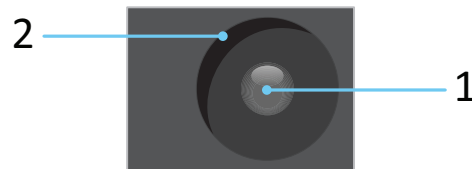
**Table 3: Gigabit Ethernet port LED color definitions**

## 2.3 DC-in Jack

The VB9001 comes with a DC-in jack that carries a 5V DC external power input. The specification and pinouts of the DC-in jack are shown below.

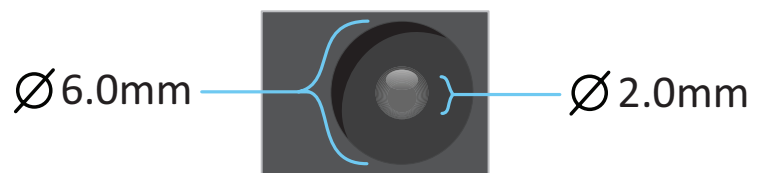
Pin	Signal
1	+5V
2	GND
3	GND

**Table 4: DC-in jack pinouts**



**Figure 12: DC-in jack diagram**

Physical Specification	
Outer Diameter	6.0mm
Inner Diameter	2.0mm
Barrel Depth	8.2mm
Electrical Specification	
Input Voltage	+5V



**Figure 13: DC-in jack specification diagram**

**Table 5: DC-in jack specification pinouts**



## 3. Onboard I/O

This chapter provides information about the onboard connector and pin headers of the VB9001 mainboard.

### 3.1 USB 2.0 Pin Header

The VB9001 comes with two USB 2.0 pin headers that enable two additional USB 2.0 ports. The pin header blocks are labeled as "USB1" and "USB2". The pinouts of the two USB 2.0 pin headers are shown below.

Pin	Signal	Pin	Signal
1	+5VUSB	2	+5VUSB
3	USB1: USB1- USB2: USB3-	4	USB1: USB0- USB2: USB3+
5	USB1: USB1+ USB2: USB3+	6	USB1: USB0+ USB2: USB3+
7	GND	8	GND
9	-	10	GND

Table 6: USB 2.0 pin header pinouts

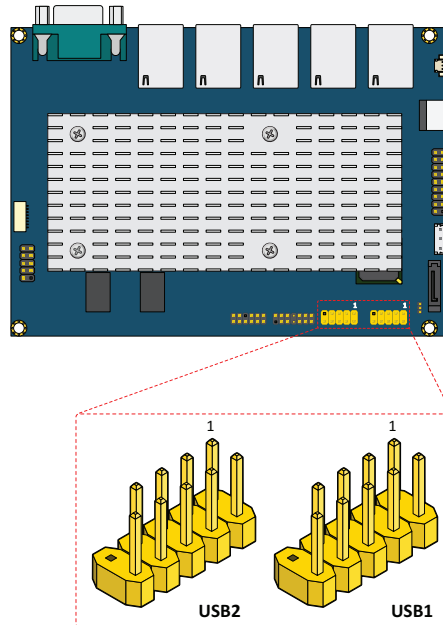


Figure 14: USB 2.0 pin header diagram

### 3.2 Front Panel Pin Header

The VB9001 comes with a front panel pin header which provides access to the system LED, HDD LED, power button and reset switch. The front panel pin header is labeled as "F\_PANEL1". The pinouts of the front panel pin header are shown below.

Pin	Signal	Pin	Signal
1	+5VSB	2	+5V
3	+5VSB	4	-HD_LED
5	PW_LED	6	PW_BTN-
7	-	8	GND
9	GND	10	RST_SW-
11	GND	12	GND

Table 7: Front panel pin header pinouts

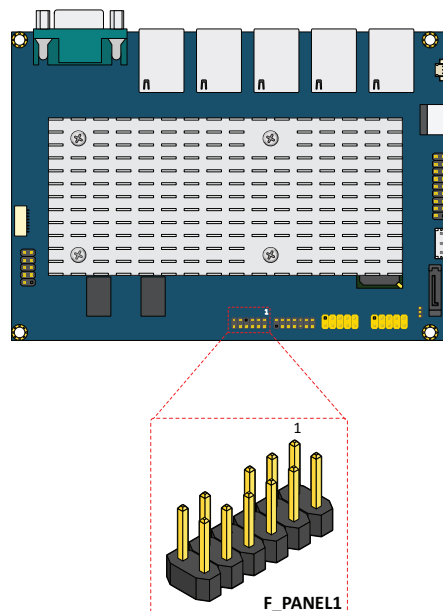


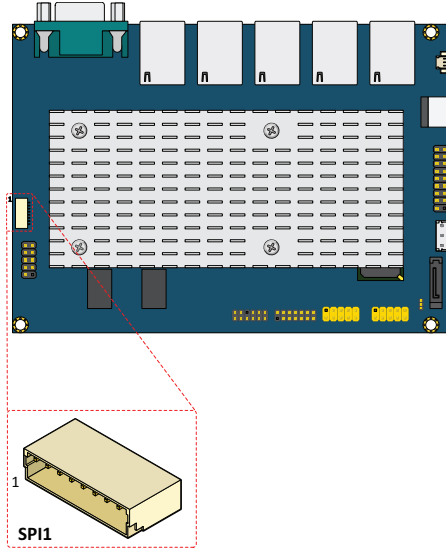
Figure 15: Front panel pin header diagram

### 3.3 SPI Connector

The VB9001 comes with a SPI flash connector which is labeled as "SPI1". The SPI (Serial Peripheral Interface) flash connector is used to connect the SPI BIOS programming fixture for updating the SPI flash ROM. The pinouts of the SPI connector are shown below.

Pin	Signal
1	NA
2	NA
3	MSPIDO
4	MSPIDI
5	MSPICLK
6	MSPISSO
7	GND
8	SPIVCC

**Table 8: SPI connector pinouts**



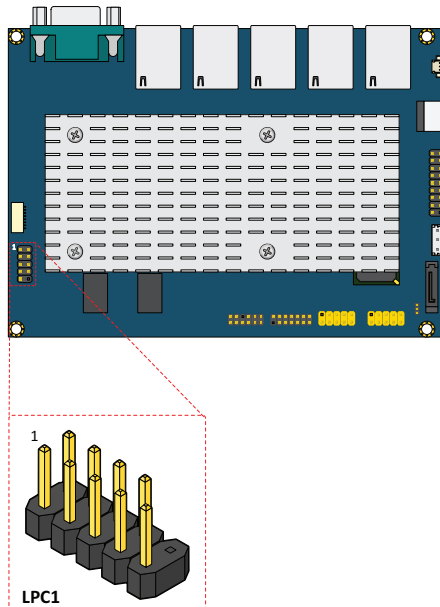
**Figure 16: SPI connector diagram**

### 3.4 LPC Pin Header

The VB9001 has one LPC pin header labeled as "LPC1" which is used for connecting LPC devices. The pinouts of the LPC pin header are shown below.

Pin	Signal	Pin	Signal
1	+3.3V	2	-LPCRST
3	PCICLK1	4	LAD0
5	-FRAME	6	LAD1
7	LAD3	8	LAD2
9	GND		

**Table 9: LPC pin header pinouts**



**Figure 17: LPC pin header diagram**

## 3.5 GPIO Pin Header

The VB9001 comes with a GPIO pin header labeled as “GPIO1” which supports up to 8 GPI and 8 GPO signals. The 8 input and 8 output signals can be programmed to read or control devices, with input or output defined. The pinouts of the GPIO pin header are shown below.

Pin	Signal	Pin	Signal
1	GPIO1	2	GPIO5
3	GPIO2	4	GPIO6
5	GPIO3	6	GPIO7
7	GPIO4	8	GPIO8
9	+5VSB	10	GND
11	+5VSB	12	GND
13	+5VSB	14	GND
15	+5VSB	16	GND
17	+3.3V	18	

Table 10: GPIO pin header pinouts

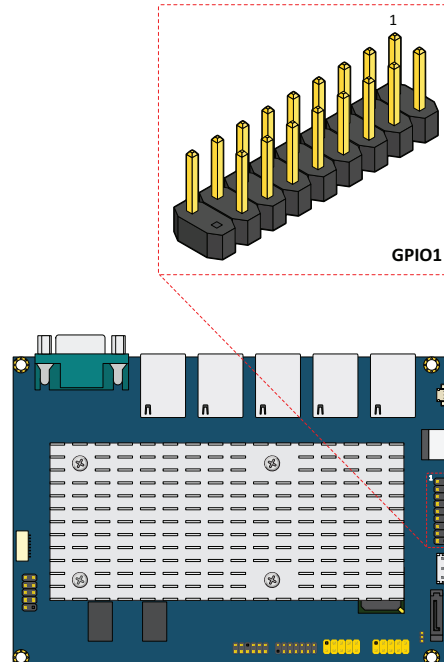


Figure 18: GPIO pin header diagram

## 3.6 VGA Pin Header

The VB9001 comes with a VGA pin header labeled as “VGA1” which uses a VGA cable connector to connect to any analog VGA monitor. The pinouts of the VGA pin header are shown below.

Pin	Signal	Pin	Signal
1	GND	2	+5V
3	RED	4	DDCDATA
5	GREEN	6	DDCCLK
7	BLUE	8	HS
9	GND	10	VS
11	GND	12	GND

Table 11: VGA pin header pinouts

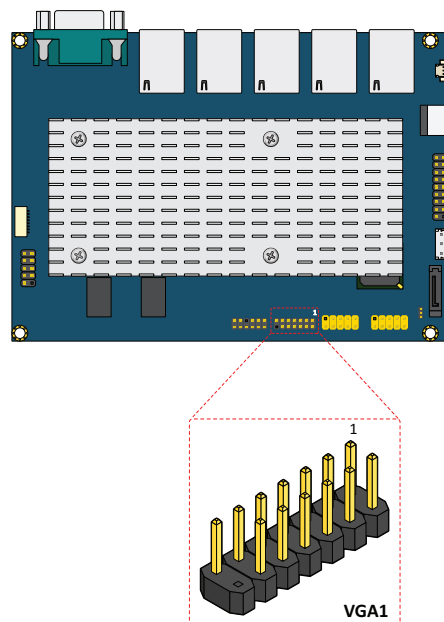


Figure 19: VGA pin header diagram

## 3.7 SATA Connector

The VB9001 comes with a SATA connector on board which supports up to 3Gb/s transfer speeds. The SATA connector is labeled as "SATA1". The pinouts of the SATA connector are shown below.

Pin	Signal
1	GND
2	STXP_0
3	STXN_0
4	GND
5	SRXN_0
6	SRXP_0
7	+5V

Table 12: SATA connector pinouts

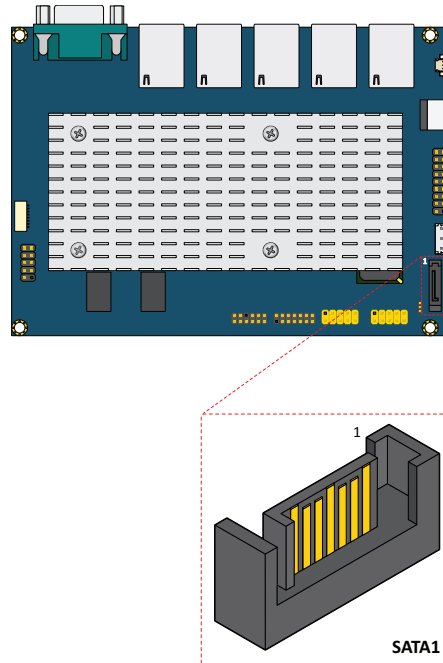


Figure 20: SATA connector diagram

## 3.8 SATA Power Connector

The VB9001 comes with a SATA power connector which is used to power the SATA hard drive. The SATA power connector is labeled as "SATA\_PWR1". The pinouts of the SATA power connector are shown below.

Pin	Signal
1	+5V
2	NA
3	GND

Table 13: SATA power connector pinouts

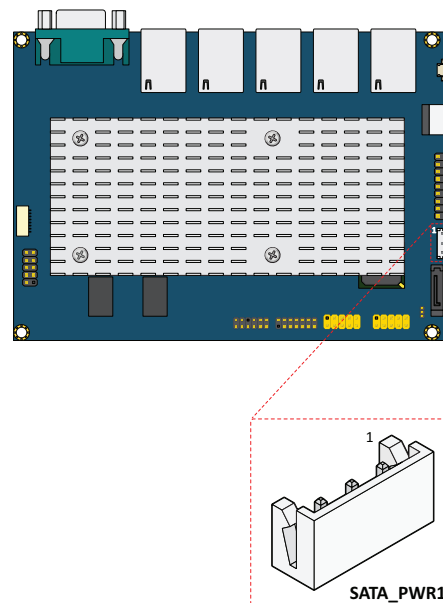


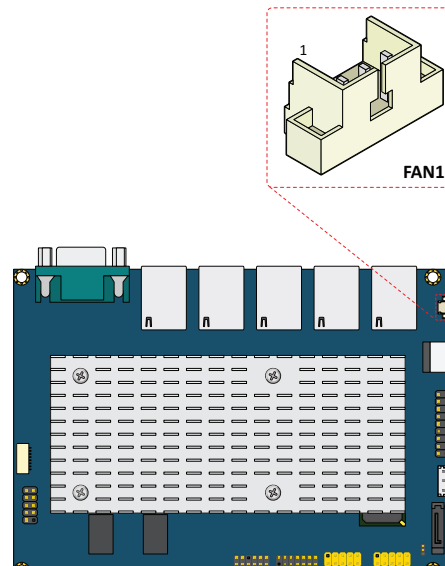
Figure 21: SATA power connector diagram

## 3.9 Fan Connector

The VB9001 comes with a fan connector labeled as “FAN1” which is used for connecting the system fan. The pinouts of the fan connector are shown below.

Pin	Signal
1	NA
2	+5V
3	GND

**Table 14: Fan connector pinouts**



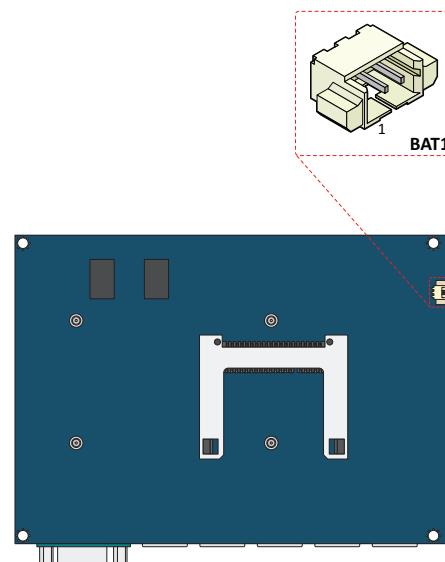
**Figure 22: Fan connector diagram**

## 3.10 CMOS Battery Connector

The VB9001 is equipped with a CMOS battery connector used for connecting the external cable battery that provides power to the CMOS RAM. If disconnected all configurations in the CMOS RAM will reset to factory defaults. The CMOS battery connector is labeled as “BAT1”. The CMOS battery connector pinouts are shown below.

Pin	Signal
1	VCC
2	GND

**Table 15: CMOS battery connector pinouts**



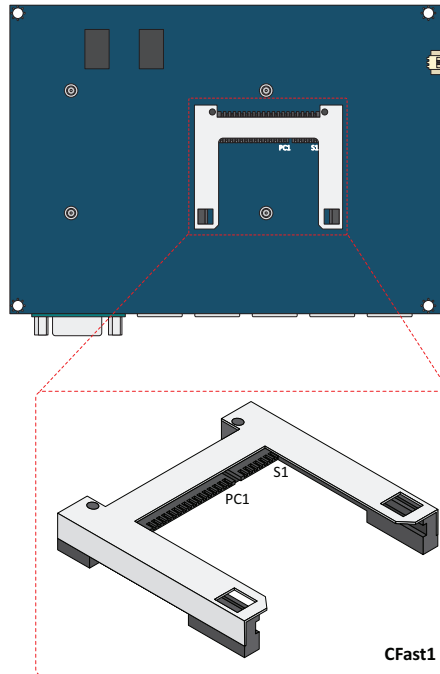
**Figure 23: CMOS battery connector diagram**

## 3.11 CFast Slot

The VB9001 comes with a CFast slot labeled as "CFast1" which is compatible with Type I and Type II CFast cards. The pinouts of the CFast slot are shown below.

Pin	Signal	Pin	Signal
S1	GND	PC1	GND
S2	STXP_1	PC2	GND
S3	STXN_1	PC3	NA
S4	GND	PC4	NA
S5	SRXN_1	PC5	NA
S6	SRXP_1	PC6	NA
S7	GND	PC7	GND
		PC8	NA
		PC9	NA
		PC10	NA
		PC11	NA
		PC12	NA
		PC13	CFAST_PWR
		PC14	CFAST_PWR
		PC15	GND
		PC16	GND
		PC17	-LID

**Table 16: CFast slot pinouts**



**Figure 24: CFast slot diagram**

## 4. Onboard Jumpers

### Jumper Description

A jumper consists of a pair of conductive pins used to close in or bypass an electronic circuit to set up or configure a particular feature using a jumper cap. The jumper cap is a small metal clip covered by plastic. It performs like a connecting bridge to short (connect) the pair of pins. The usual colors of the jumper cap are black/red/blue/white/yellow.

### Jumper Setting

There are two settings of the jumper pin: “Short and Open”. The pins are “Short” when a jumper cap is placed on the pair of pins. The pins are “Open” if the jumper cap is removed.

In addition, there are jumpers that have three or more pins, and some pins are arranged in series. In case of a jumper with three pins, place the jumper cap on pin 1 and pin 2 or pin 2 and 3 to Short it.

Some jumpers size are small or mounted on a crowded location on the board that makes it difficult to access. Therefore, using a long-nose plier in installing and removing the jumper cap is very helpful.

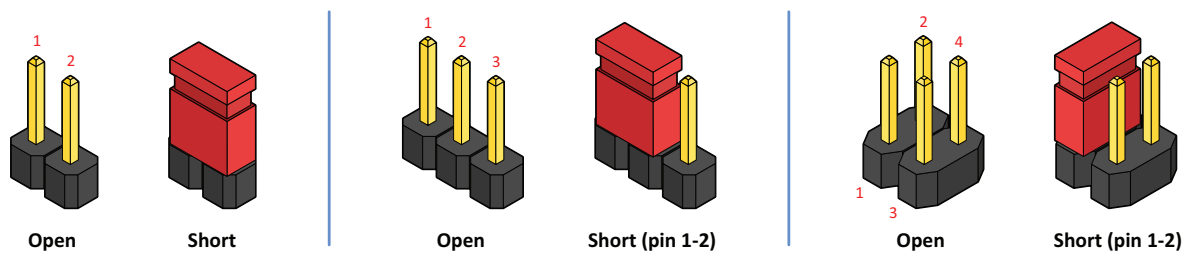


Figure 25: Jumper settings example



#### Caution:

Make sure to install the jumper cap on the correct pins. Installing it on the wrong pins might cause damage and malfunction.

## 4.1 Clear CMOS Jumper

The VB9001 comes with a Clear CMOS jumper. The onboard CMOS RAM stores system configuration data and has an onboard battery power supply. To reset the CMOS settings, set the jumper on pins 2 and 3 while the system is off, then return the jumper to pins 1 and 2 afterwards. Setting the jumper while the system is on will damage the mainboard. The default settings are on pins 1 and 2.

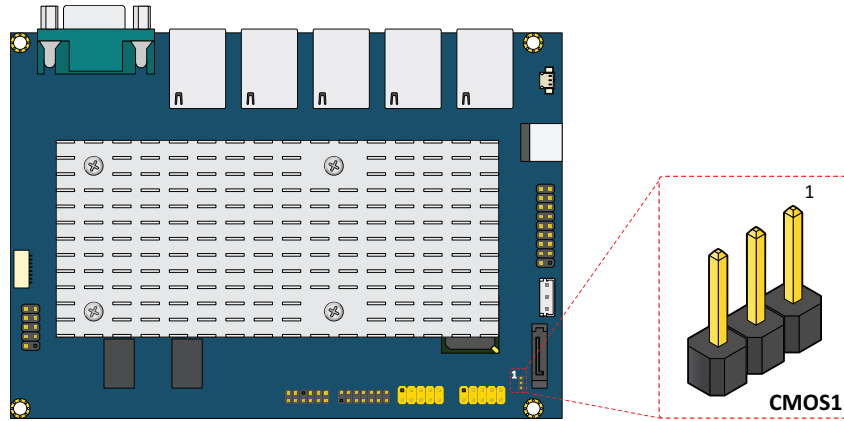


Figure 26: Clear CMOS jumper diagram

Setting	Pin 1	Pin 2	Pin 3
Normal	Short	Short	Open
Clear CMOS	Open	Short	Short

Table 17: Clear CMOS jumper settings



**Note:**

Except when clearing the RTC RAM, never remove the cap from the CLEAR\_CMOS jumper default position. Removing the cap will cause system boot failure. Avoid clearing the CMOS while the system is on; it will damage the mainboard.



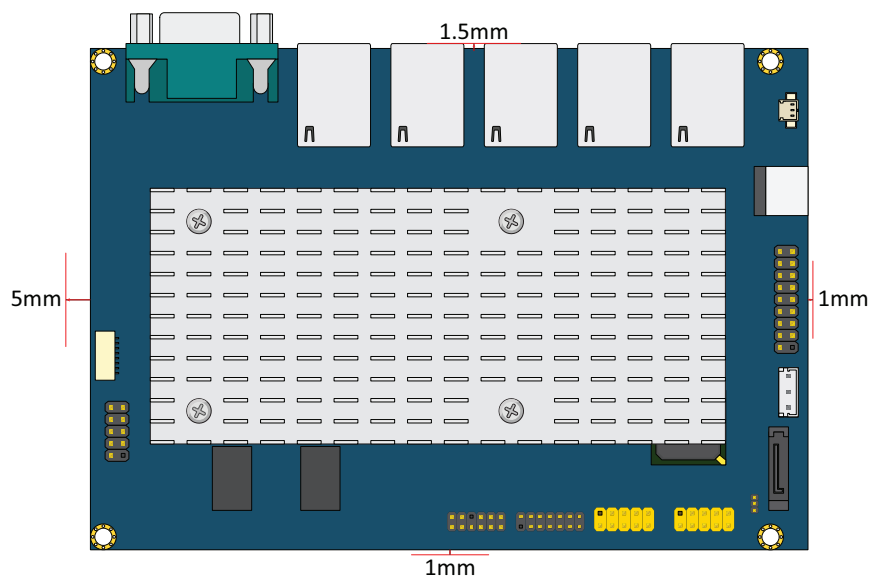
## 5. Hardware Installation

### 5.1 Suggested minimum chassis dimensions

The VB9001 can be fitted into any chassis that has mounting holes compatible with the standard SBC mounting hole locations. Additionally, the chassis must meet the minimum height requirements for specified areas of the mainboard.

#### 5.1.1 Suggested minimum chassis dimensions

The figure below shows the suggested minimum space requirements that a chassis should have in order to work well with the VB9001.



**Figure 27: Suggested minimum chassis dimensions**

Each side of the mainboard should have a buffer zone from the internal wall of the chassis. The side of the mainboard that accommodates the I/O coastline should have a buffer of 1.5mm; it's comprised of one COM port, and five Gigabit Ethernet ports. The side on the opposite end of the I/O coastline should have a buffer of at least 1mm. The right side of the I/O coastline should have a buffer of 1mm and it's only comprised of a DC-in jack. The left side of the I/O coastline should have a buffer of at least 5mm.

## 5.1.2 Suggested minimum chassis height

The figure below shows the suggested minimum height requirements for the internal space of the chassis. It is not necessary for the internal ceiling to be evenly flat. What is required is that the internal ceiling height must be strictly observed for each section that is highlighted.

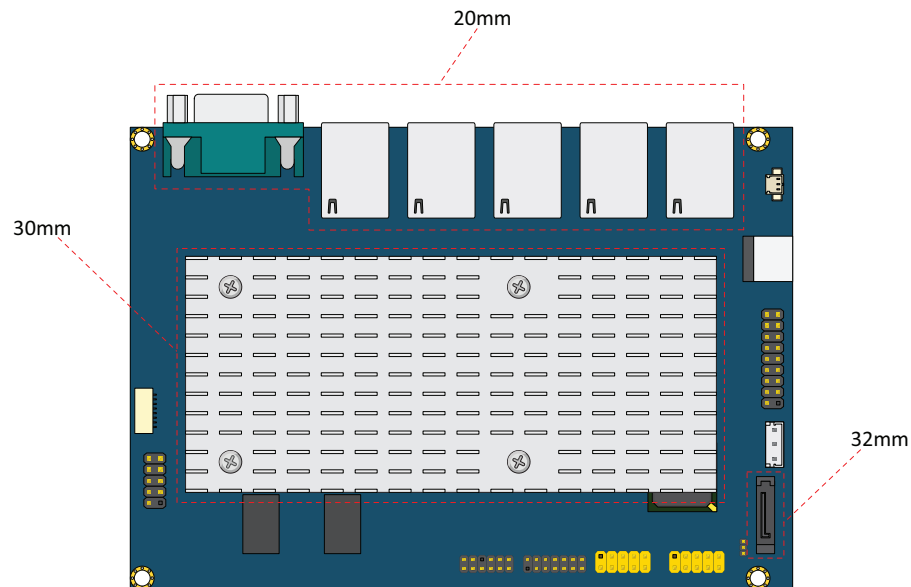


Figure 28: Suggested minimum chassis height (top side)

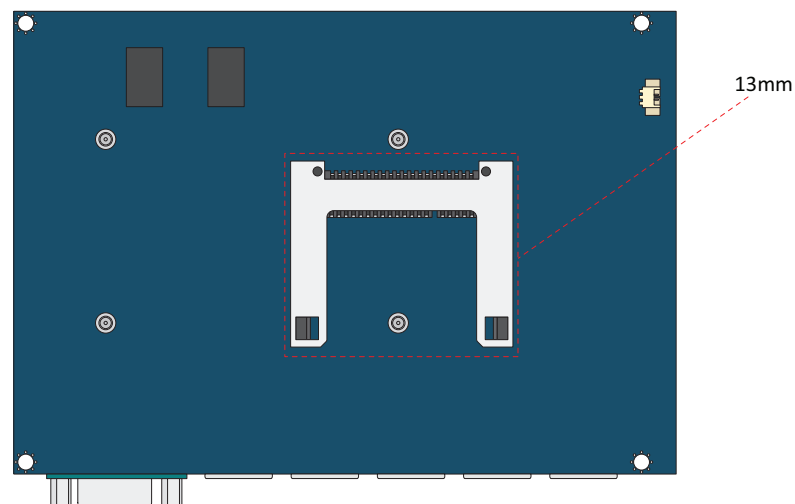


Figure 29: Suggested minimum chassis height (bottom side)

### 5.1.3 Suggested keepout areas

The figure below shows the areas of the mainboard that we recommend should be left unobstructed. The figures below are the top view and the bottom view.

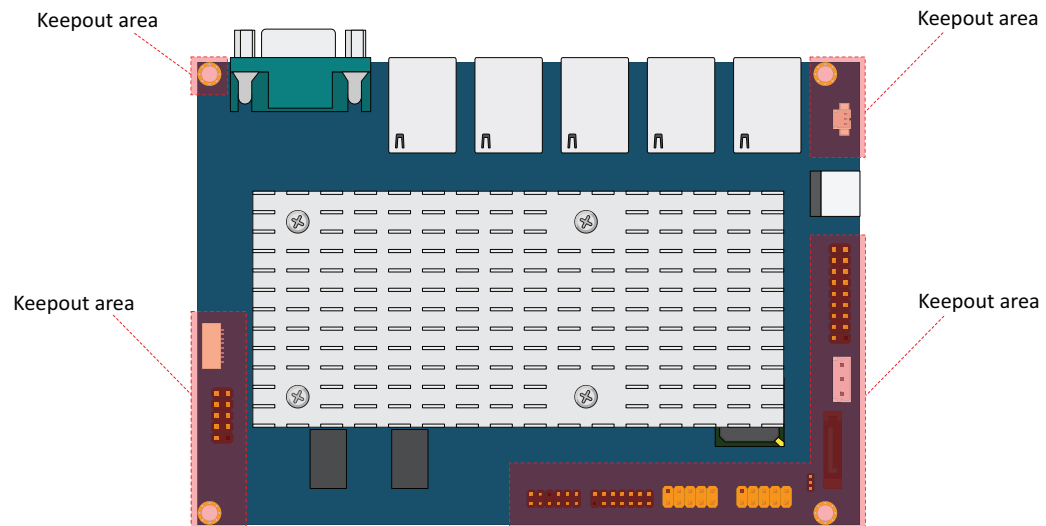


Figure 30: Suggested keepout top areas

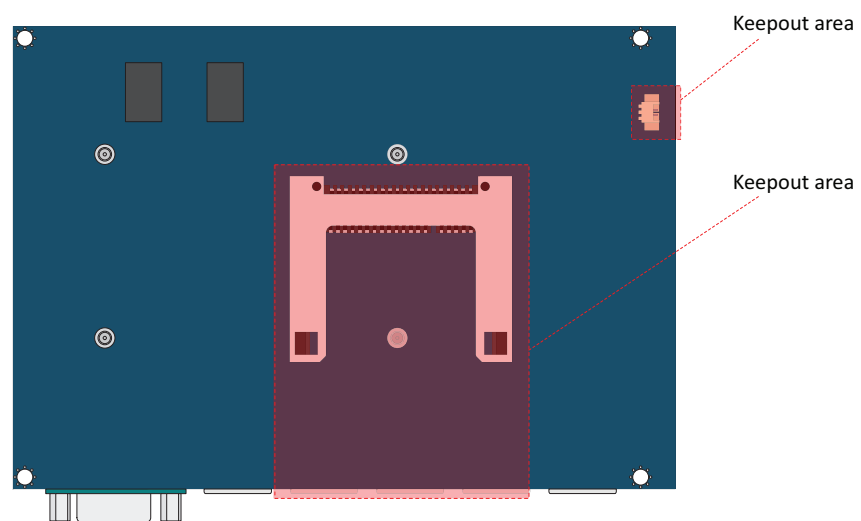


Figure 31: Suggested keepout bottom areas

## 6. BIOS Setup Utility

### 6.1 Entering the BIOS Setup Utility

Power on the computer and press **Delete** during the beginning of the boot sequence to enter the BIOS Setup Utility. If the entry point to the BIOS setup utility has passed, restart the system and try again.

### 6.2 Control Keys

<b>Up</b>	Move up one row
<b>Down</b>	Move down one row
<b>Left</b>	Move to the left in the navigation bar
<b>Right</b>	Move to the right in the navigation bar
<b>Enter</b>	Access the highlighted item / Select the item
<b>Esc</b>	Jumps to the Exit screen or returns to the previous screen
<b>Page up / +<sup>1</sup></b>	Increase the numeric value
<b>Page down / -<sup>1</sup></b>	Decrease the numeric value
<b>F1</b>	<b>General help<sup>2</sup></b>
<b>F2</b>	<b>Restore the previous CMOS value</b>
<b>F3</b>	<b>Load optimized defaults</b>
<b>F4</b>	<b>Save all the changes and exit</b>



Note:

1. Must be pressed using the 10-key pad.
2. The General help contents are only for the Status Page and Option Page setup menus.

### 6.3 Navigating the BIOS Menus

The main menu displays all the BIOS setup categories. Use the <Left>/<Right> and <Up>/<Down> arrow keys to select any item or sub-menu. Descriptions of the selected/highlighted category are displayed at the bottom of the screen.

The small triangular arrowhead symbol next to a field indicates that a sub-menu is available (see figure below). Press <Enter> to display the sub-menu. To exit the sub-menu, press <Esc>.

### 6.4 Getting Help

The BIOS Setup Utility provides a “**General Help**” screen. This screen can be accessed at any time by pressing **F1**. The help screen displays the keys for using and navigating the BIOS Setup Utility. Press **Esc** to exit the help screen.

## 6.5 Main Menu

The System Overview screen is the default screen that is shown when the BIOS Setup Utility is launched. This screen can be accessed by traversing the navigation bar to the “Main” label.

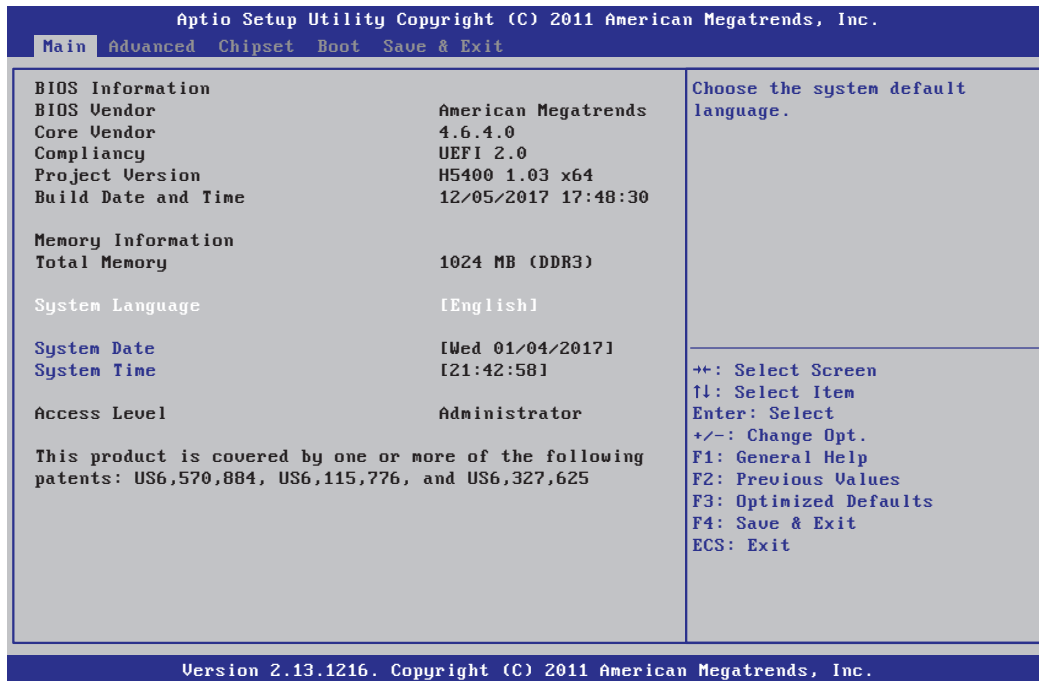


Figure 32: Illustration of the Main menu screen

### 6.5.1 BIOS Information

The content in this section of the screen shows the information about the vendor, the Core version, UEFI specification version, the project version and date & time of the project build.

### 6.5.2 Memory Information

This section shows the amount of memory that is installed on the hardware platform.

### 6.5.3 System Language

This option allows the user to configure the language that the user wants to use.

### 6.5.4 System Date

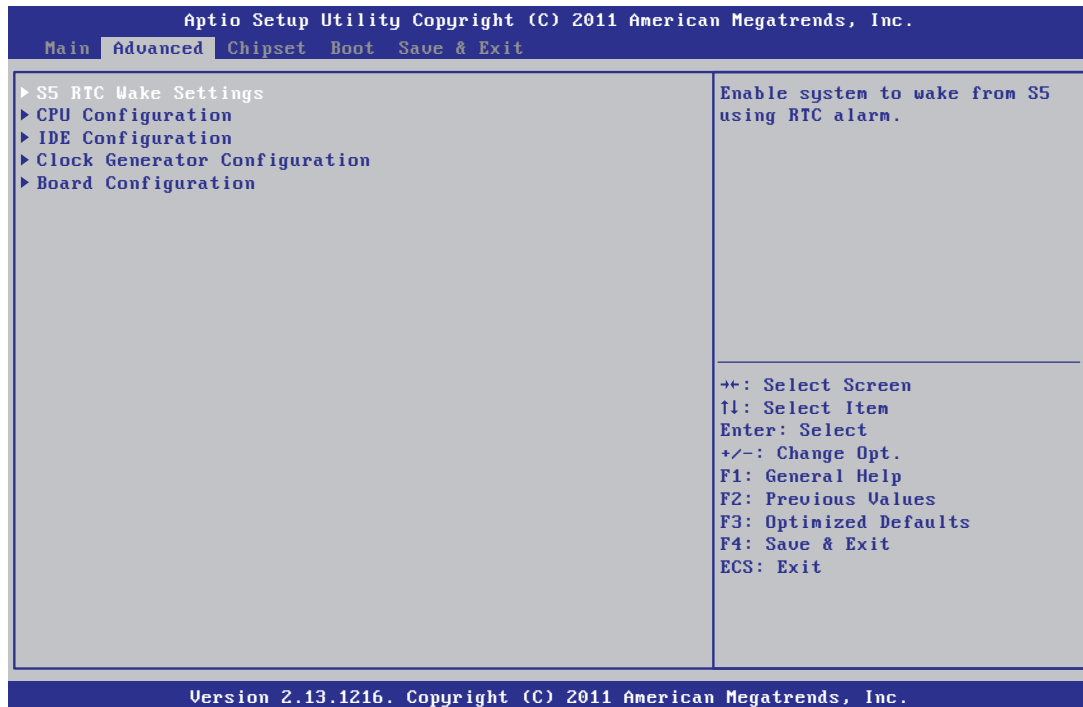
This section shows the current system date. Press Tab to traverse right and Shift+Tab to traverse left through the month, day, and year segments. The + and - keys on the number pad can be used to change the values. The weekday name is automatically updated when the date is altered. The date format is [Weekday, Month, Day, Year].

### 6.5.5 System Time

This section shows the current system time. Press Tab to traverse right and Shift+Tab to traverse left through the hour, minute, and second segments. The + and - keys on the number pad can be used to change the values. The time format is [Hour : Minute : Second].

## 6.6 Advanced Setting

The Advanced Settings screen shows a list of categories that can provide access to a sub-screen. The Sub-screen links can be identified by the preceding right-facing arrowhead.



**Figure 33: Illustration of the Advanced Settings screen**

The Advanced Settings screen contains the following sub screen links:

- S5 RTC Wake Settings
- CPU Configuration
- IDE Configuration
- Clock Generator Configuration
- Board Configuration

## 6.6.1 S5 RTC Wake Settings

This section enables the S5 RTC Wake system to wake from S5 using RTC alarm.

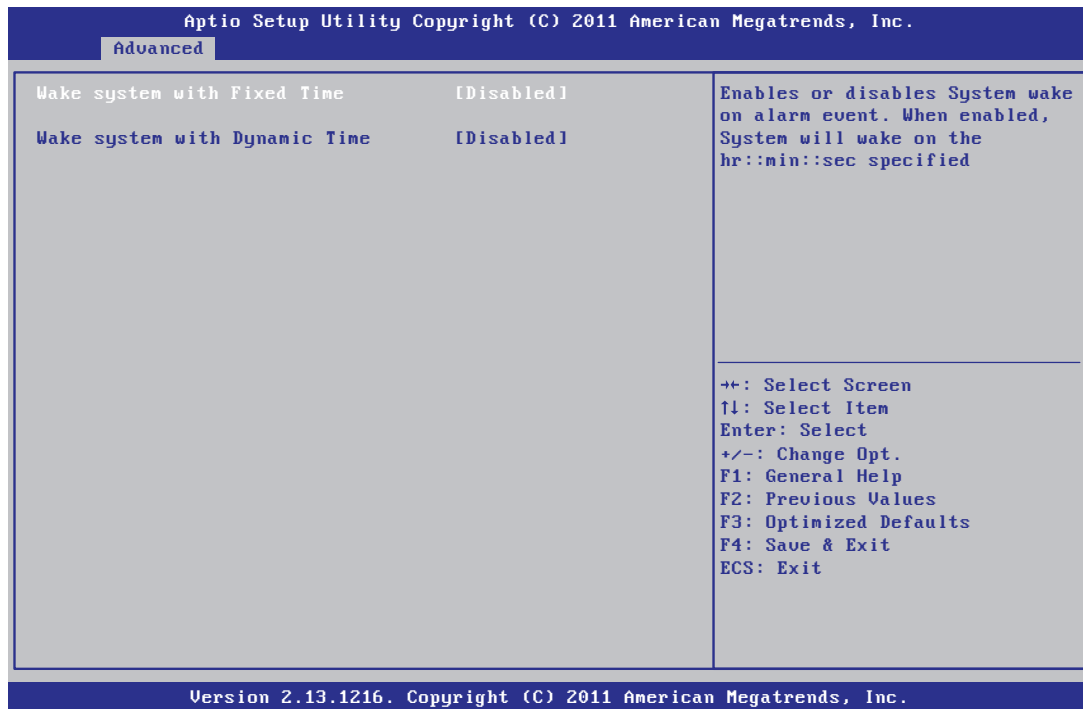


Figure 34: Illustration of S5 RTC Wake Settings screen

### 6.6.1.1 Wake System with Fixed Time

This feature has 2 options: Enable or Disable system wake on the alarm event. When enabled, the system will wake on the hr:min:sec specified.

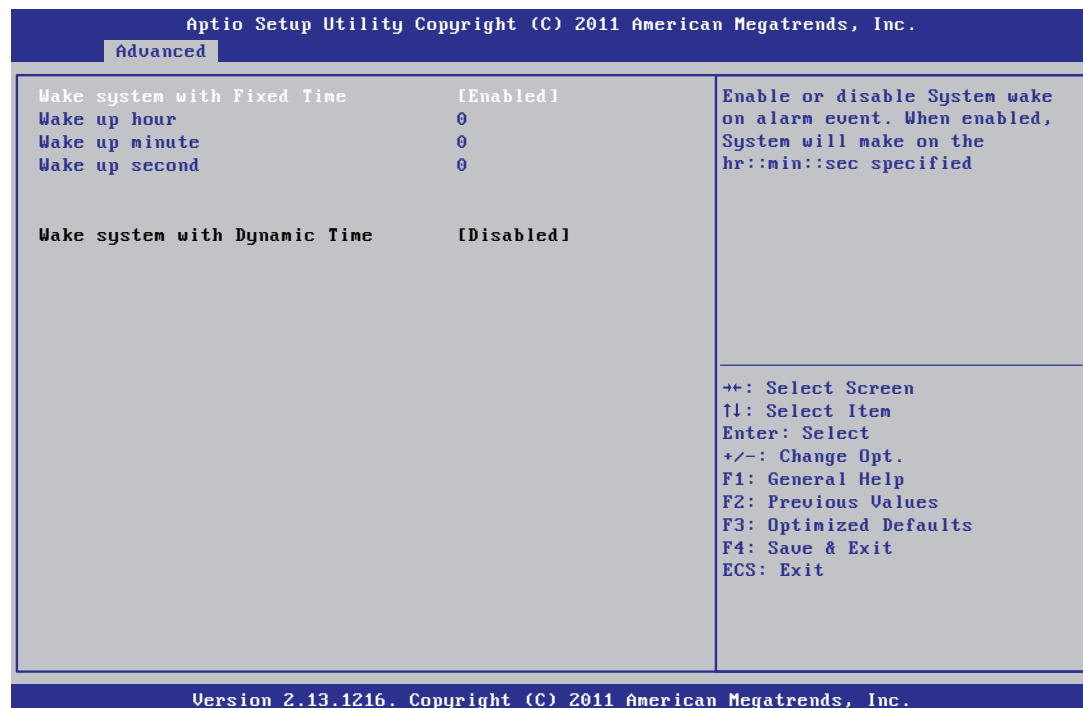


Figure 35: Illustration of Wake System with Fixed Time screen when Enabled

#### 6.6.1.1.1 Wake up hour

Select 0-23. For example: Enter 3 for 3am and 15 for 3pm

#### 6.6.1.1.2 Wake up minute

Select 0-59 for minutes.

#### 6.6.1.1.3 Wake up second

Select 0-59 for seconds.

### 6.6.1.2 Wake system with Dynamic Time

This feature has 2 options: Enable or Disable system wake on the alarm event. When enabled, the system will wake on the current time + increase minute(s). The time value inputted is from 1 to 5 minutes.

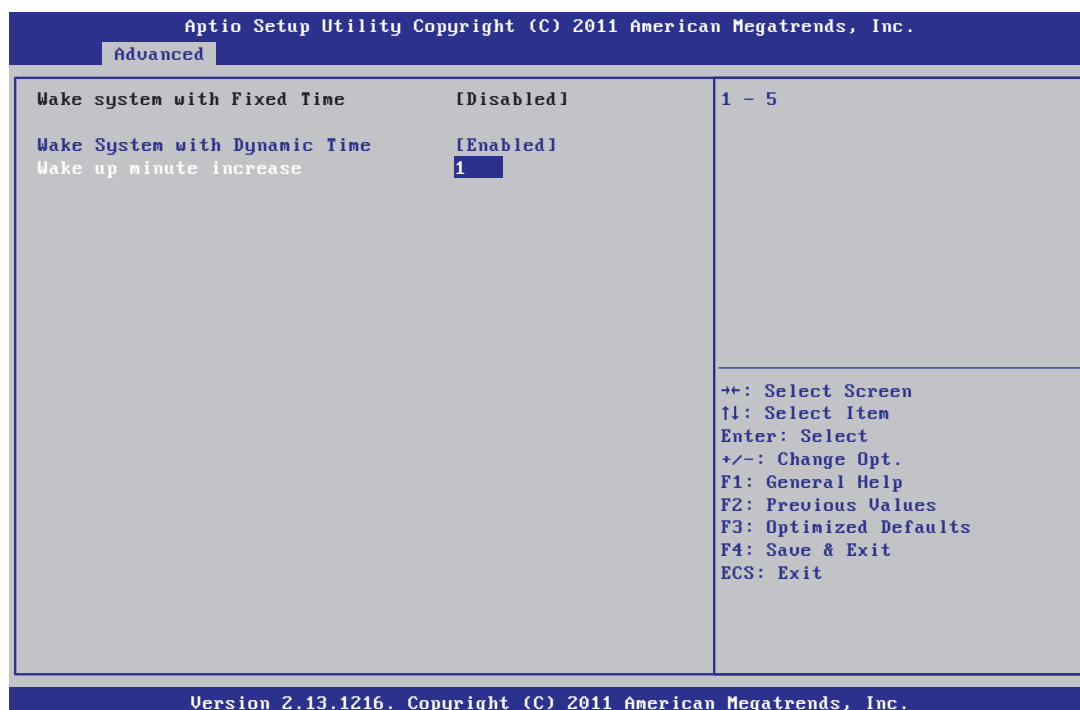


Figure 36: Illustration of Wake System with Dynamic Time screen when Enabled



## 6.6.2 CPU Configuration

The CPU Configuration screen shows detailed information about the built-in processor.

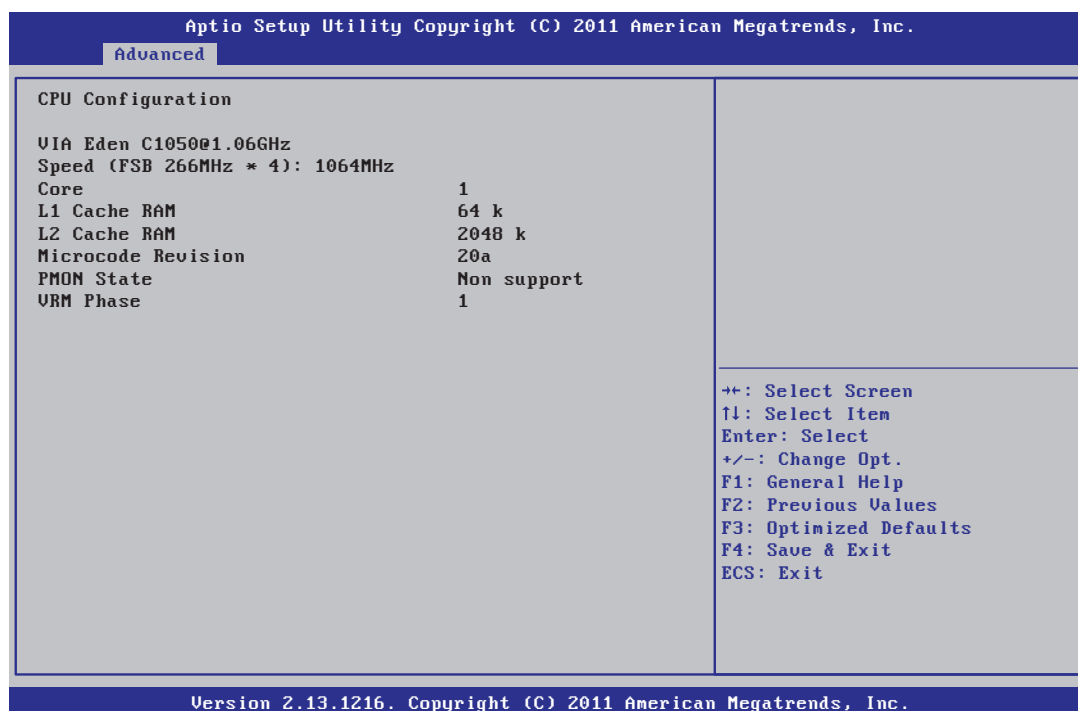


Figure 37: Illustration of CPU Configuration screen

### 6.6.3 IDE Configuration

The IDE Configuration screen allows the user to view and configure the settings of the IDE Configuration.

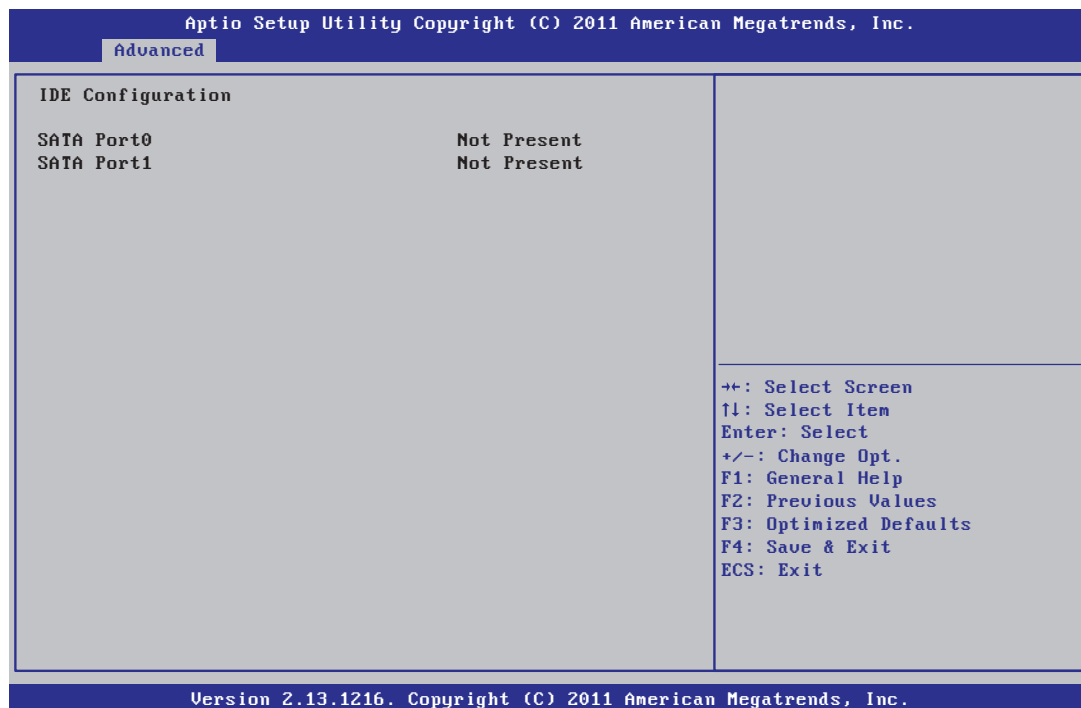


Figure 38: Illustration of IDE Configuration screen

## 6.6.4 Clock Generator Configuration

The Clock Generator Configuration screen enables access to the Spread Spectrum Setting feature.

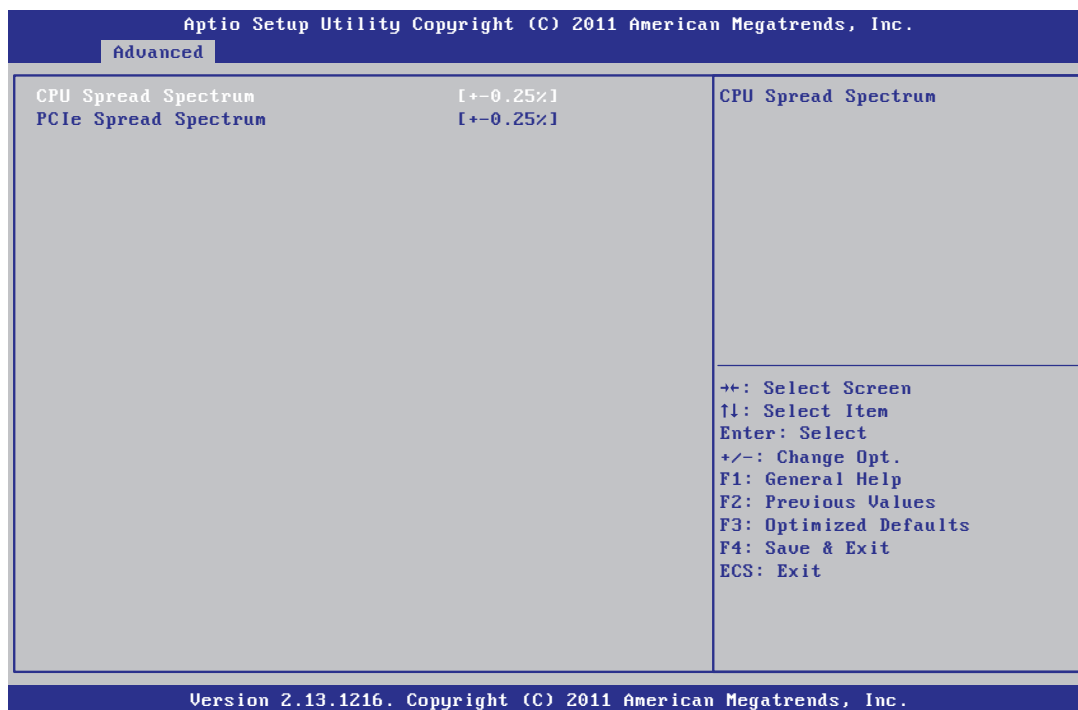


Figure 39: Illustration of Clock Generator Configuration screen

### 6.6.4.1 CPU Spread Spectrum

The Spread Spectrum Setting feature enables the BIOS to modulate the clock frequencies originating from the mainboard. The settings are in percentages of modulation. The Higher percentages result in greater modulation of the clock frequencies. This feature has 3 options: Disabled, +-0.25% and -0.5%.

### 6.6.4.2 PCIe Spread Spectrum

When selecting the PCIe Spread Spectrum feature, three options will be available: Disabled, +-0.25% and -0.5%.

## 6.6.5 Board Configuration

The Board Configuration screen below shows the main setting of the S5 Wake On LAN functions.

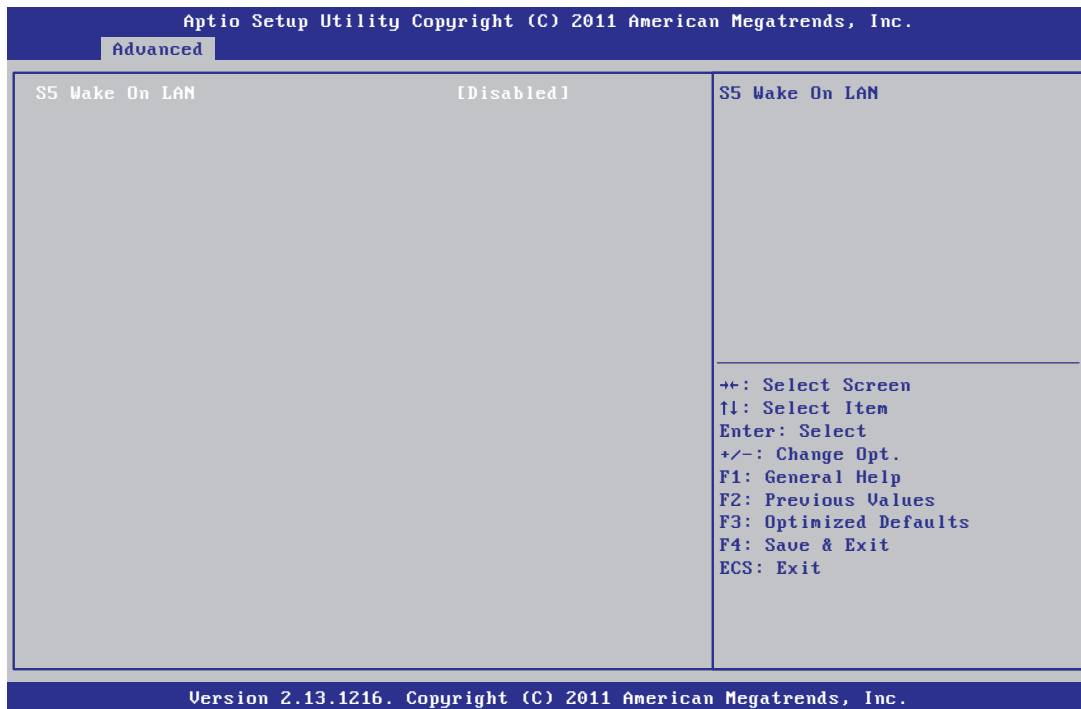


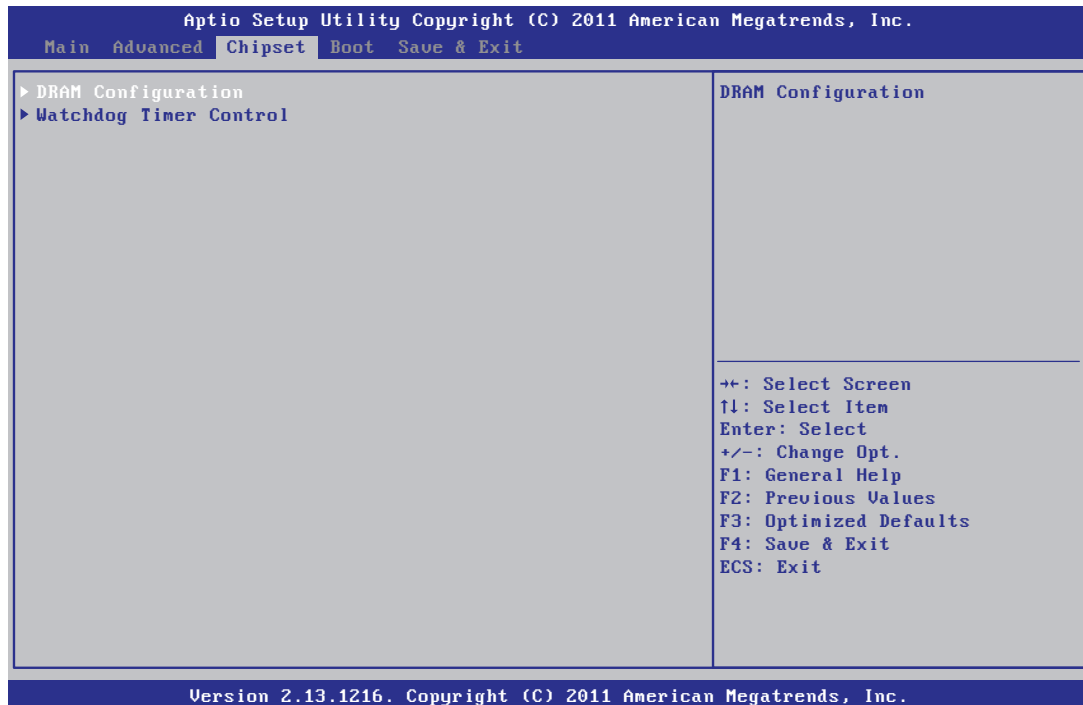
Figure 40: Illustration of board Configuration screen

### 6.6.5.1 S5 Wake On LAN

The available options of the S5 Wake on LAN are enable or disable.

## 6.7 Chipset Settings

The Chipset Settings screen shows a list of categories that can provide access to a sub-screen. The sub-screen links can be identified by the preceding right-facing arrowhead.



**Figure 41: Illustration of Chipset Settings screen**

The Chipset Settings screen contains the following sub-screen links:

- DRAM Configuration
- Watchdog Timer Control

## 6.7.1 DRAM Configuration

The DRAM Configuration screen has two features for controlling the system DRAM. All other DRAM features are automated and cannot be accessed.

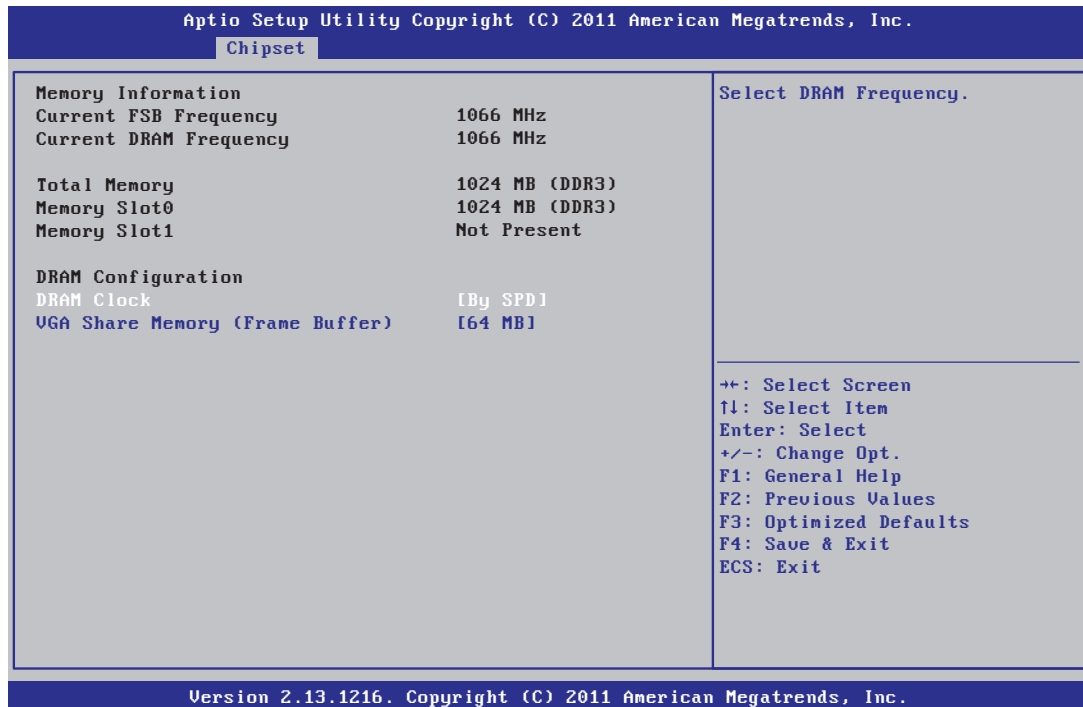


Figure 42: Illustration of DRAM Configuration screen

### 6.7.1.1 DRAM Clock

The DRAM Clock option enables the user to determine how the BIOS handles the memory clock frequency. The memory clock can either be dynamic or static. This feature has four options.

#### By SPD

By SPD option enables the BIOS to select a compatible clock frequency for the installed memory.

#### 266 MHz

The 266 MHz option enables the BIOS to be fixed at 532MHz for the DDR3 memory modules.

#### 333 MHz

The 333 MHz option enable the BIOS to be fixed at 666MHz for the DDR3 memory modules.

#### 400 MHz

The 400 MHz option forces the BIOS to be fixed at 800MHz for the DDR3 memory modules.

#### 533 MHz

The 533 MHz option forces the BIOS to be fixed at 1066MHz for the DDR3 memory modules.

### 6.7.1.2 VGA Share Memory (Frame Buffer)

The VGA Share Memory feature enables the user to choose the amount of the system memory to reserve for use by the integrated graphics controller. The selections of memory amount that can be reserved are 64MB, 128MB and 512MB.

## 6.7.2 Watchdog Timer Control

The Watchdog timer control screen has features for controlling the Watchdog timer. The sub-screen links can be identified by the preceding right-facing arrowhead.

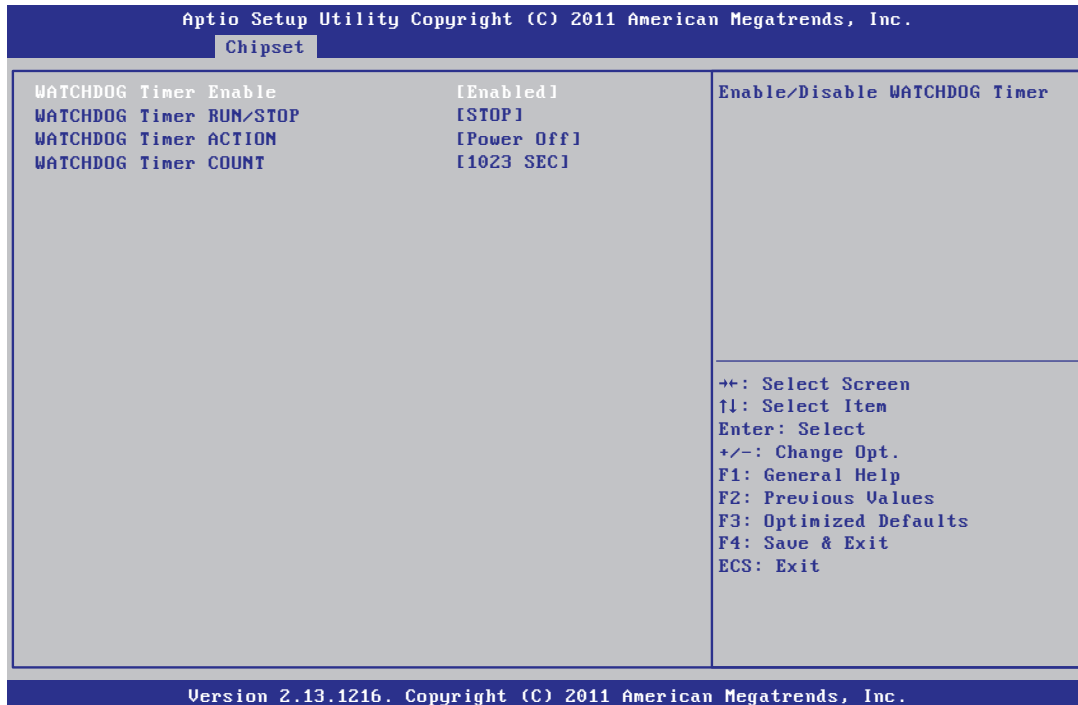


Figure 43: Illustration of Video Configuration screen

### 6.7.2.1 Watchdog Timer Enable

The Watchdog timer enable has two optional features which are used to enable or disable the Watchdog timer control.

### 6.7.2.2 Watchdog Timer Run/Stop

This feature has two options which are used to stop and run the Watchdog timer control.

### 6.7.2.3 Watchdog Timer Action

This feature has two options which are used to reset and power off the Watchdog timer control.

### 6.7.2.4 Watchdog Timer Count

This feature has four options (72sec, 389sec, 706sec & 1023sec) which are used to count down the time on the Watchdog timer control.

## 6.8 Boot Settings

The Boot Settings screen has a single link that goes to the Boot Configuration and Boot Option Priorities screens.

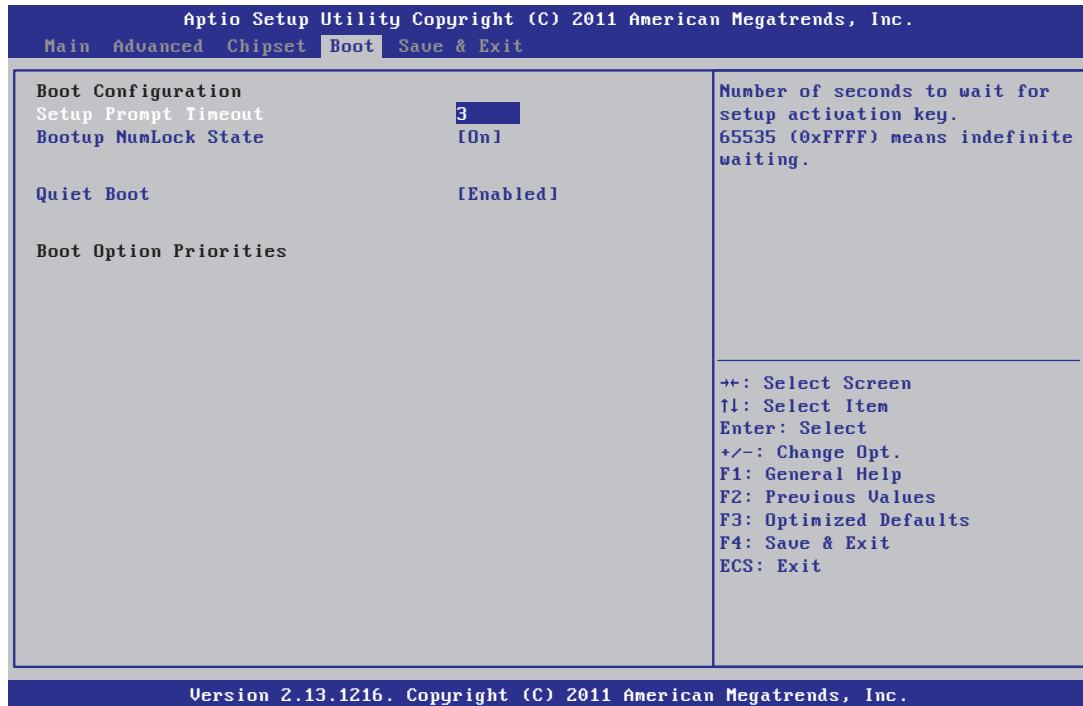


Figure 44: Illustration of Boot Settings screen

### Boot Configuration

The Boot Settings Configuration screen has several features that can be run during the system boot sequence.

### 6.8.1 Setup Prompt Timeout

The number of seconds to wait for the setup activation key is 65535(0xFFFF) which means indefinite waiting.

### 6.8.2 Bootup NumLock State

Select the keyboard NumLock state from On and Off.

### 6.8.3 Quiet Boot

This feature has 2 options: enable and disable.

### Boot Option priorities

The Boot option priorities screen lists all boot table devices.



## 7. Software and Technical Support

### 7.1 Microsoft Windows & QNX Support

The VB9001 features a complete software evaluation image featuring Microsoft Windows 7, Windows CE 5.0 and QNX operating system.

### 7.2 VIA Smart ETK

The VB9001 features a complete software evaluation image featuring VIA Smart ETK.

### 7.3 Technical Supports and Assistance

- For utilities downloads, latest documentation and new information about the VB9001, please visit our website at <https://www.viatech.com/en/boards/3-5-inch-sbc/vb9001/>
- For technical support and additional assistance, always contact your local sales representative or board distributor, or go to <https://www.viatech.com/en/support/driver-support-faq/technical-support/> for technical support.
- For OEM clients and system integrators developing a product for long term production, other code and resources may also be made available. Please visit our website at <https://www.viatech.com/en/about/contact/> to submit a request.

## Appendix.A. Installing Wireless Accessories

This chapter provides you with information on how to install the EMIO module into the VB9001 board. It is recommended to use a grounded wrist strap before handling computer components. Electrostatic discharge (ESD) can damage some components.

### A.1. Installing EMIO-5531 USB Wi-Fi & Bluetooth module

#### Step 1

Mount the EMIO-5531 to the prepared standoff in the chassis. Align the two mounting holes on the EMIO-5531 module with the mounting holes on the standoffs, then secure the EMIO-5531 module in place with two screws.

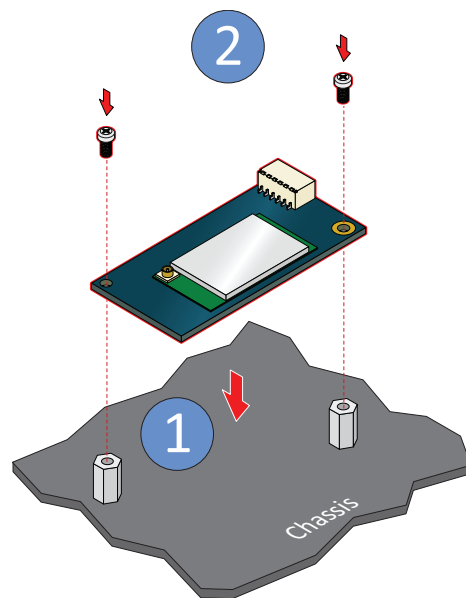


Figure 45: Installing EMIO-5531 to the chassis

#### Step 2

Connect one end of the USB Wi-Fi cable to pin 1, 3, 5, and 7 of the onboard USB 2.0 pin header (USB1 or USB2) on the VB9001 board, and then connect the other end of the cable to the EMIO-5531 module.

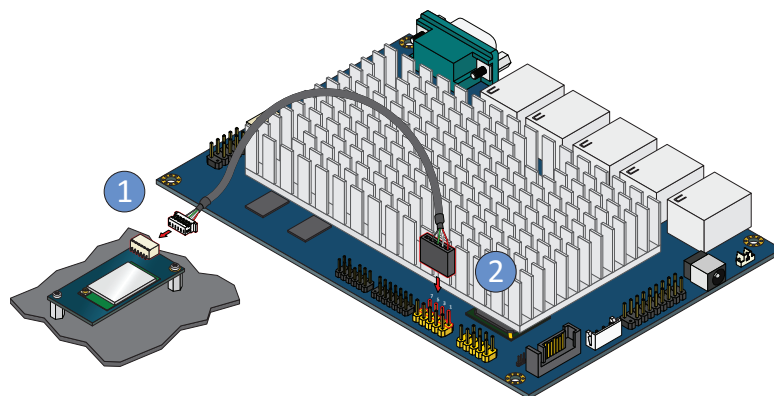


Figure 46: Connecting USB cable Wi-Fi cable

### Step 3

Insert the Wi-Fi antenna cable into the antenna hole from the inside of the panel I/O plate. Insert the toothed washer, fasten it with the nut, and install the external antenna.

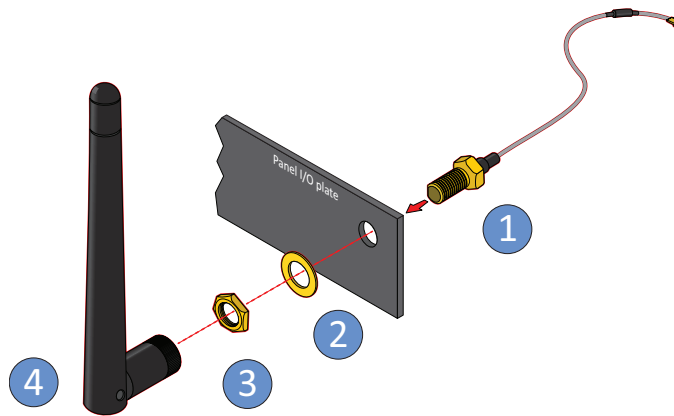


Figure 47: Installing Wi-Fi antenna cable and antenna

### Step 4

Connect the other end of the Wi-Fi antenna cable to the micro-RF connector labeled "I-PEX" on the EMIO-5531 module.

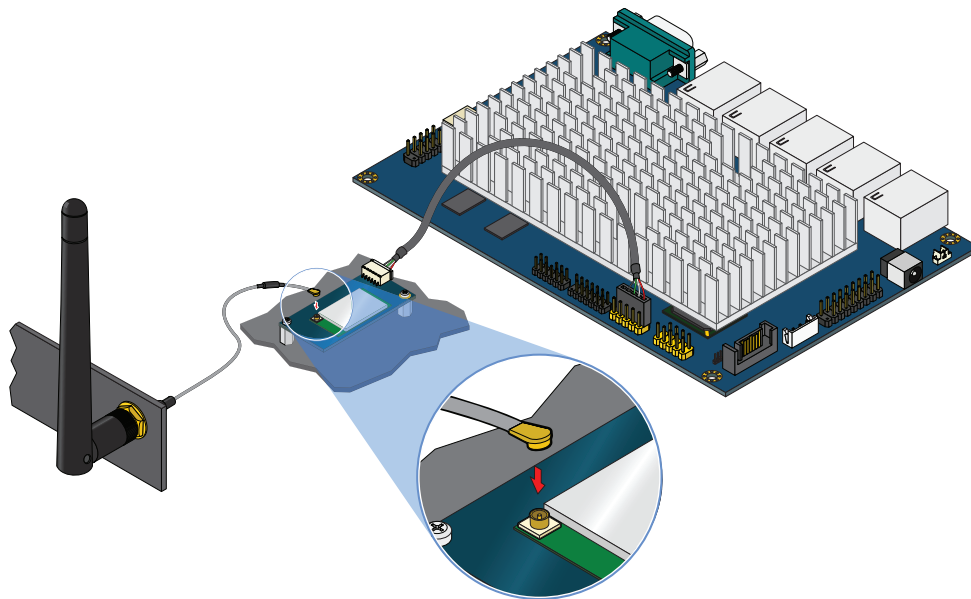


Figure 48: Connecting the Wi-Fi antenna cable to the micro-RF connector



#### **Taiwan Headquarters**

1F, 531 Zhong-zheng Road,  
Xindian Dist., New Taipei City 231  
Taiwan

Tel: 886-2-2218-5452  
Fax: 886-2-2218-9860  
Email: [embedded@via.com.tw](mailto:embedded@via.com.tw)



#### **USA**

940 Mission Court  
Fremont, CA 94539,  
USA

Tel: 1-510-687-4688  
Fax: 1-510-687-4654  
Email: [embedded@viatech.com](mailto:embedded@viatech.com)



#### **Japan**

3-15-7 Ebisu MT Bldg. 6F,  
Higashi, Shibuya-ku  
Tokyo 150-0011  
Japan

Tel: 81-3-5466-1637  
Fax: 81-3-5466-1638  
Email: [embedded@viatech.co.jp](mailto:embedded@viatech.co.jp)



#### **China**

Tsinghua Science Park Bldg. 7  
No. 1 Zongguancun East Road,  
Haidian Dist., Beijing, 100084  
China

Tel: 86-10-59852288  
Fax: 86-10-59852299  
Email: [embedded@viatech.com.cn](mailto:embedded@viatech.com.cn)



#### **Europe**

Email: [embedded@via-tech.eu](mailto:embedded@via-tech.eu)