SabreCOM-VNS
Rugged Computer System

User Manual

Version 1.3

FOR TECHNICAL SUPPORT
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1. IMPORTANT SAFE HANDLING INFORMATION

WARNING!

ESD-Sensitive Electronic Equipment

Observe ESD-safe handling procedures when working with this product.

Always use this product in a properly grounded work area and wear appropriate ESD-preventive clothing and/or accessories.

Always store this product in ESD-protective packaging when not in use.

Safe Handling Precautions

The Venus SBC contains a high number of I/O connectors with connection to sensitive electronic components. This creates many opportunities for accidental damage during handling, installation and connection to other equipment. The list here describes common causes of failure found on boards returned to Diamond Systems for repair. This information is provided as a source of advice to help you prevent damaging your Diamond (or any vendor's) embedded computer boards.

ESD damage – This type of damage is usually almost impossible to detect, because there is no visual sign of failure or damage. The symptom is that the board eventually simply stops working, because some component becomes defective. Usually the failure can be identified and the chip can be replaced.

To prevent ESD damage, always follow proper ESD-prevention practices when handling computer boards.

Damage during handling or storage – On some boards we have noticed physical damage from mishandling. A common observation is that a screwdriver slipped while installing the board, causing a gouge in the PCB surface and cutting signal traces or damaging components.

Another common observation is damaged board corners, indicating the board was dropped. This may or may not cause damage to the circuitry, depending on what is near the corner. Most of our boards are designed with at least 25 mils clearance between the board edge and any component pad, and ground / power planes are at least 20 mils from the edge to avoid possible shorting from this type of damage. However these design rules are not sufficient to prevent damage in all situations.

A third cause of failure is when a metal screwdriver tip slips, or a screw drops onto the board while it is powered on, causing a short between a power pin and a signal pin on a component. This can cause overvoltage / power supply problems described below. To avoid this type of failure, only perform assembly operations when the system is powered off.

Sometimes boards are stored in racks with slots that grip the edge of the board. This is a common practice for board manufacturers. However our boards are generally very dense, and if the board has components very close to the board edge, they can be damaged or even knocked off the board when the board tilts back in the rack. Diamond recommends that all our boards be stored only in individual ESD-safe packaging. If multiple boards are stored together, they should be contained in bins with dividers between boards. Do not pile boards on top of each other or cram too many boards into a small location. This can cause damage to connector pins or fragile components.

Power supply wired backwards – Our power supplies and boards are not designed to withstand a reverse power supply connection. This will destroy each IC that is connected to the power supply (i.e. almost all ICs). In this case the board will most likely will be unrepairable and must be replaced. A chip destroyed by reverse power or by excessive power will often have a visible hole on the top or show some deformation on the top surface due to vaporization inside the package. Check twice before applying power!

Board not installed properly in PC/104 stack – A common error is to install a PC/104 board accidentally shifted by 1 row or 1 column. If the board is installed incorrectly, it is possible for power and ground signals on the bus to make contact with the wrong pins on the board, which can damage the board. For example, this can damage components attached to the data bus, because it puts the ±12V power supply lines directly on data bus lines.

Overvoltage on analog input – If a voltage applied to an analog input exceeds the design specification of the board, the input multiplexor and/or parts behind it can be damaged. Most of our boards will withstand an erroneous connection of up to ±35V on the analog inputs, even when the board is powered off, but not all boards, and not in all conditions.

Overvoltage on analog output – If an analog output is accidentally connected to another output signal or a power supply voltage, the output can be damaged. On most of our boards, a short circuit to ground on an analog output will not cause trouble.

Overvoltage on digital I/O line – If a digital I/O signal is connected to a voltage above the maximum specified voltage, the digital circuitry can be damaged. On most of our boards the acceptable range of voltages connected to digital I/O signals is 0-5V, and they can withstand about 0.5V beyond that (-0.5 to 5.5V) before being damaged. However logic signals at 12V and even 24V are common, and if one of these is connected to a 5V logic chip, the chip will be damaged, and the damage could even extend past that chip to others in the circuit.

Bent connector pins – This type of problem is often only a cosmetic issue and is easily fixed by bending the pins back to their proper shape one at a time with needle-nose pliers. The most common cause of bent connector pins is when a PC/104 board is pulled off the stack by rocking it back and forth left to right, from one end of the connector to the other. As the board is rocked back and forth it pulls out suddenly, and the pins at the end get bent significantly. The same situation can occur when pulling a ribbon cable off of a pin header. If the pins are bent too severely, bending them back can cause them to weaken unacceptably or even break, and the connector must be replaced.

2. DESCRIPTION

SabreCom-VNS is a rugged computer system designed around Diamond's Venus single-board computer (SBC) housed in a rugged enclosure. The system is available with two power options: 9-18VDC input with an integrated MIL-STD-461 filter or 9-60VDC with an integrated MIL-grade power supply featuring MIL-STD-461, -1275, and -704 compliance plus input-to-output isolation.

The system provides a standard set of I/O features found on most embedded computers, including 2 gigabit Ethernet, 4 USB 2.0, and 4 RS-232/422/485 serial ports, and it has expansion sockets to support additional I/O using PCIe minicards, PCI-104 boards, and PCIe/104 boards.. The system is available with either Windows 10 or Linux operating system and is operable over the -40 to +80C temperature range.

1.1 System features

Component	Feature	Qty
CPU	I7-7660U "Kabylake", 2.8 GHz quad core	
RAM	20GB (4GB soldered + 16GB DDR4 SODIMM)	
VGA	Up to 1920 x 1200, using DP to VGA bridge	1
Audio	HD Audio with Line In, Mic In, Line Out	1
Ethernet	1000/100/10 Mbps	2
USB	USB2.0 (4 ports USB 3.0 operating in 2.0 mode)	6
Digital I/O	3.3V / 5V compatible	16
Serial Ports	RS-232/422/485	4
RTC Battery	Power input for RTC	1
Utility	I2C, RESET	1
Expansion	2 PCIe Minicard with PCIe x1 and USB; 1 shared with mSATA PCI-104, supports up to 4 I/O boards PCIe/104 One Bank, supports up to 4 PCIe x1 boards	
Operating system	Linux - Ubuntu 20.04 kernel 64-bit Windows 10 64-bit	

1.2 Operating System Support

Windows 10
Linux – Ubuntu

1.3 Mechanical, Electrical, Environmental

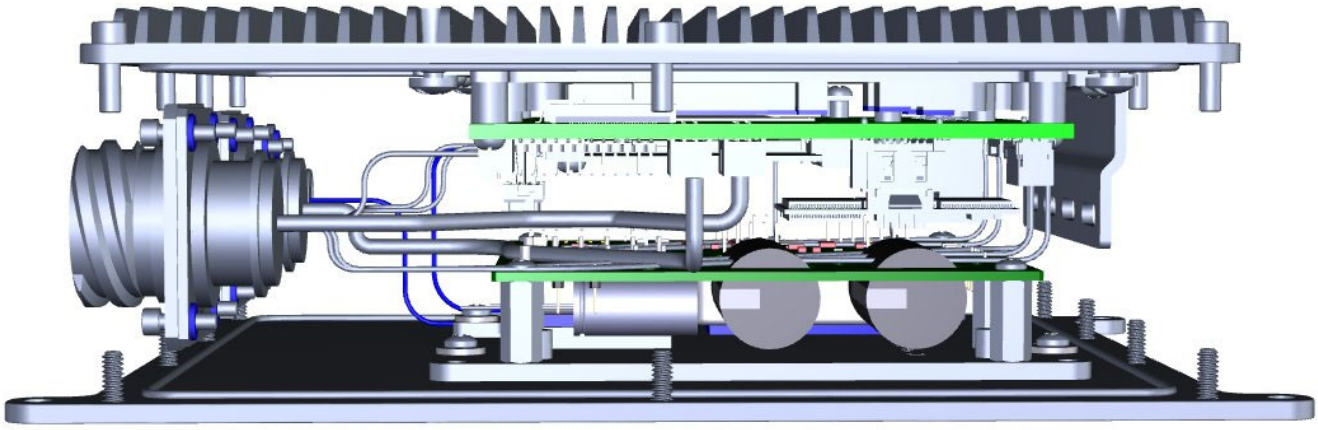
Form factor	7.76" (L) x 8.39" (W) x 2.64" (H) / 197 x 213 x 67mm
Cooling	Heat spreader Cooling
Power input	9-18VDC or 9-36VDC depending on power supply option
Operating Temp	-40°C to +80°C
Shock & Vibration	Designed to meet MIL-STD-810G w/Change 1
Weight	4.87 lb / 2.21Kg
RoHS	Compliant

3. PRODUCT IMAGES

Top view showing serial label location

Front view

Internal view from bottom of enclosure (bottom cover and JMM-7500 power supply removed)



3d side view showing JMM-7500 power supply mounted to bottom cover (flat exterior surface) and VNS776KL-xGD SBC mounted to the top cover (with heat sink fins).

4. KEY SUBSYSTEMS

1.4 SBC

SabreCom-Venus is based on 7th generation Intel “Kaby Lake” processor i7-7660U. The U-series processors are offered in a 1-chip platform that includes the 6th generation Intel Platform Controller Hub (PCH) die on the same package as the processor die. It is a dual core, 64 bit processor with a maximum turbo frequency of 2.8GHz.

1.5 Memory

The system employs DDR4 mixed memory configuration: 4GB Soldered down memory on memory channel 1 and 16GB SODIMM on memory channel 2.

In the standard configuration, 4GB soldered down memory is available. Users can expand the DDR4 memory upto 20GB by adding 16GB Sodmimm module on the connector provided. For rugged applications,the system supports RSODIMM which can be fixed through screws. Please contact DSC for more details.

1.6 Power Supply Subsystem

Two input voltages are available based on the internal power subsystem.

SabreCom-VNS-00x models contain a MIL-STD-461 filter. These models support the Venus SBC native input voltage range of 9-18VDC.

SabreCom-VNS-01x models contain a rugged isolated power supply featuring MIL-STD-461, -704, and -1275 compliance. These models support an input voltage range of 9-60VDC. These systems support an internal power consumption of up tp 80W (typical power consumption of a SabreCom-Venus system with no additional I/O expansion modules is 25W).

2. KEY INTERFACES

2.1 Ethernet

The system provides two Gigabit Ethernet ports. The ethernet ports are terminated on the 79-pin D38999/20KG35SN connector on the front panel.

2.2 USB

The system provides six dedicated USB 2.0 ports

Two of the six USB2.0 ports are terminated on the 66-pin D38999/20KF35SN connector on the front panel, while the remaining ports are terminated on the 79-pin D38999/20KG35SN connector on the front panel.

2.3 Video

The system offers one VGA display output terminated on the 66-pin D38999/20KF35SN connector on the front panel.

2.4 Audio

The system provides HD audio support from a ALC892 audio chip. Audio I/O signals include stereo line in, stereo line out and mono mic in.

The audio interface is terminated on the 66-pin D38999/20KF35SN connector on the front panel.

2.5 Serial Ports

The system provides 4 serial ports using the Exar XR28V384 LPC UART. RS-232/422/485 protocols are supported with Exar SP336 multiprotocol transceivers. In RS-232 mode, only signals TX, RX, RTS, and CTS are provided. The protocol selection and TX / RX 121 ohm line termination resistors for RS-422/485 are controlled using GPIO pins from the processor and are configurable via BIOS configuration screens as well as via application software.

Console redirection feature (using a serial port for keyboard input and terminal display via a link to a second computer) is provided in the BIOS on COM1.

The serial ports 1 & 2 are terminated on the 79-pin D38999/20KG35SN connector & the serial ports 3 & 4 are terminated on the 66-pin D38999/20KF35SN connector on the front panel.

2.6 Digital I/O

The system provides 16 Digital I/O signals with selectable 5V/ 3.3V logic levels, selectable pull-up/down resistors, programmable direction and buffered I/O. The digital I/Os are realized from the I2C interface of the processor using an I2C to GPIO expander.

The DIOs are terminated on the 79-pin D38999/20KG35SN connector on the front panel.

2.7 Backup Battery

The system contains an on-board RTC battery holder for placing BR-2032/BN coin battery. An external battery may be attached via the 79-pin D38999/20KG35SN connector on the front panel.

The system boots and functions properly without a backup battery installed.

2.8 I2C

The system provides access to an I2C interface directly from the processor.

This interface is terminated on the 79-pin D38999/20KG35SN connector on the front panel.

2.9 Reset

The system provides access to RESET signal to hard reset the system.

This signal is terminated on the 79-pin D38999/20KG35SN connector on the front panel.

2.10 SATA

The board offers three SATA ports, all derived from the processor. Two ports are connected to an industry-standard vertical SATA connector that accepts cables with latching connectors. One of these connectors is placed on the board in a position that allows a miniature SATA disk-on-module to be installed in it and attached with a mounting spacer and screw. The third port is routed to the combination mSATA / PCIe MiniCard socket.

2.11 TPM

The board contains Infineon's SLB 9670XQ2.0 TPM module featuring a fully TCG TPM 1.2/2.0 standard compliant module with a SPI interface. TPM can be used as a root of trust for platform integrity, remote attestation and cryptographic services.

2.12 PCIe Minicard Socket

The board has two full size (51mm length) PCIe Minicard sockets. The bottom side socket supports only PCIe minicards. The top side socket supports both PCIe Minicards and mSATA modules. A PCIe/mSATA switch is used to auto-select which interface is active based on the state of the CLKREQ# pin on the socket. This pin will be driven to the correct level by an installed mSATA module to configure the socket to mSATA.

2.13 PCI-104 and PCIe/104 OneBank Expansion

The SabreCom system main board offers I/O expansion via a PCI-104 connector and a PCIe/104 OneBank connector. Although these connectors normally can support 3 or 4 I/O boards, due to the space limitations in the enclosure a maximum of one board can be installed, and this board can be either PCI-104 or PCIe/104.

The PCI-104 bus is realized using by a PCIe to PCI bridge. It supports both 5V and 3.3V logic levels configurable with a jumper. If a PC/104-Plus I/O module is intended to be installed in the system, the ISA bus pins must be cut away, or the ISA connectors removed entirely, to avoid interference with the OneBank connector on the SBC. The configuration of PCI-104 connector without ISA connector is referred to as PCI-104, and many I/O cards may be available in this configuration, avoiding the need for ISA bus connector rework.

The board also supports installation of a PCIe/104 module using PCIe x1 link on the PCIe/104 OneBank connector. This connector is compatible with all versions of PCIe/104, including Type 1, Type 2, and OneBank.

2.14 PCIe link routing

The list below shows the PCIe lan mapping on the Venus SBC used in Sabrecom-VNS.

Link 1: OneBank PCIe/104 connector – Lane 1

Link 2: PCIe Minicard 1

Link 3: Processor GbE

Link 4: I210 GbE

Link 5: PCIe to PCI Bridge for PCI-104 connector

Link 6: PCIe 1:3 Switch –> One bank PCIe/104 connector Lane 2, Lane 3, PCIe Minicard 2

3. SYSTEM ARCHITECTURE

Figure 1 provides an overview of the block diagrarm of the SabreCom-VNS system.

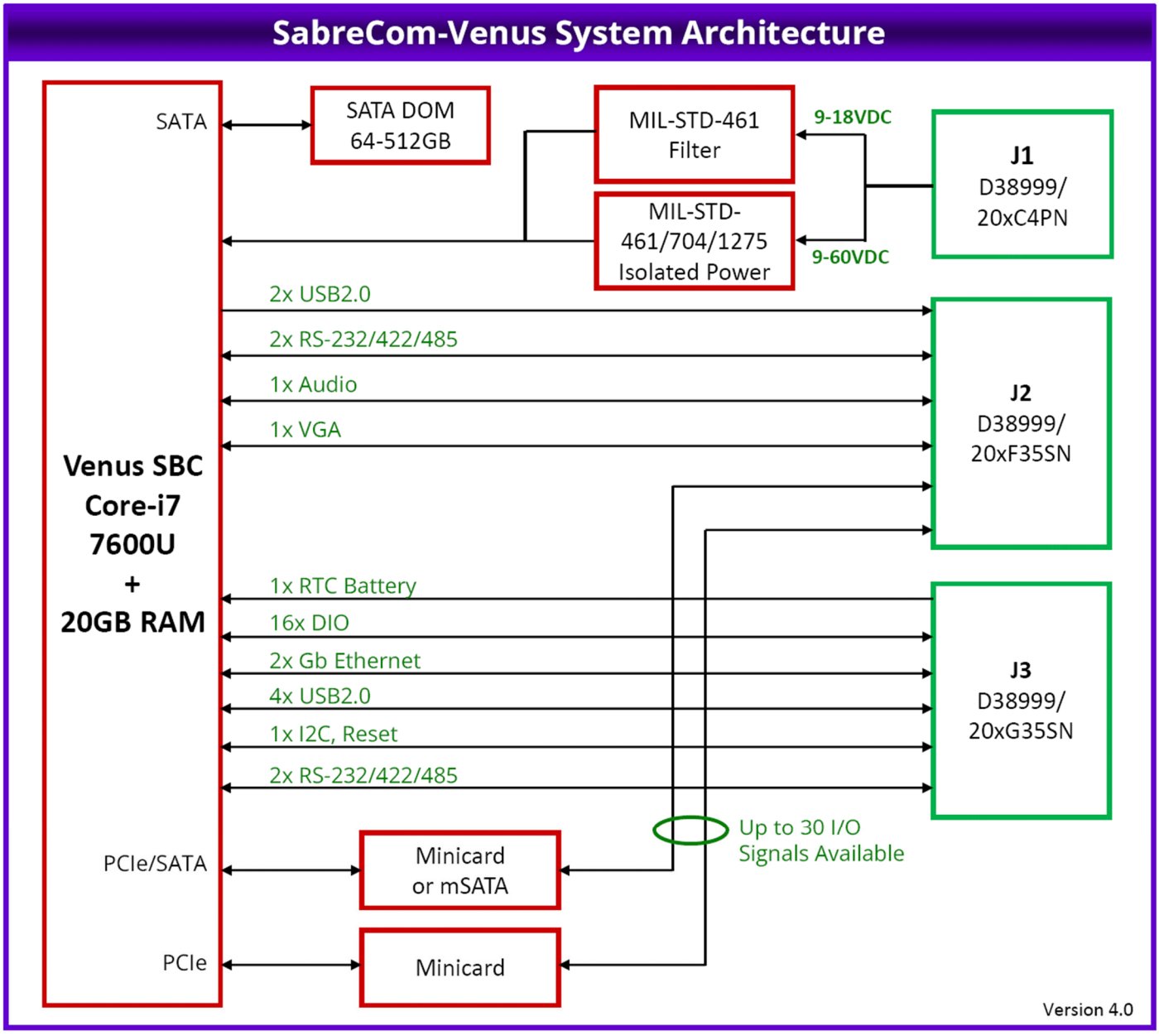
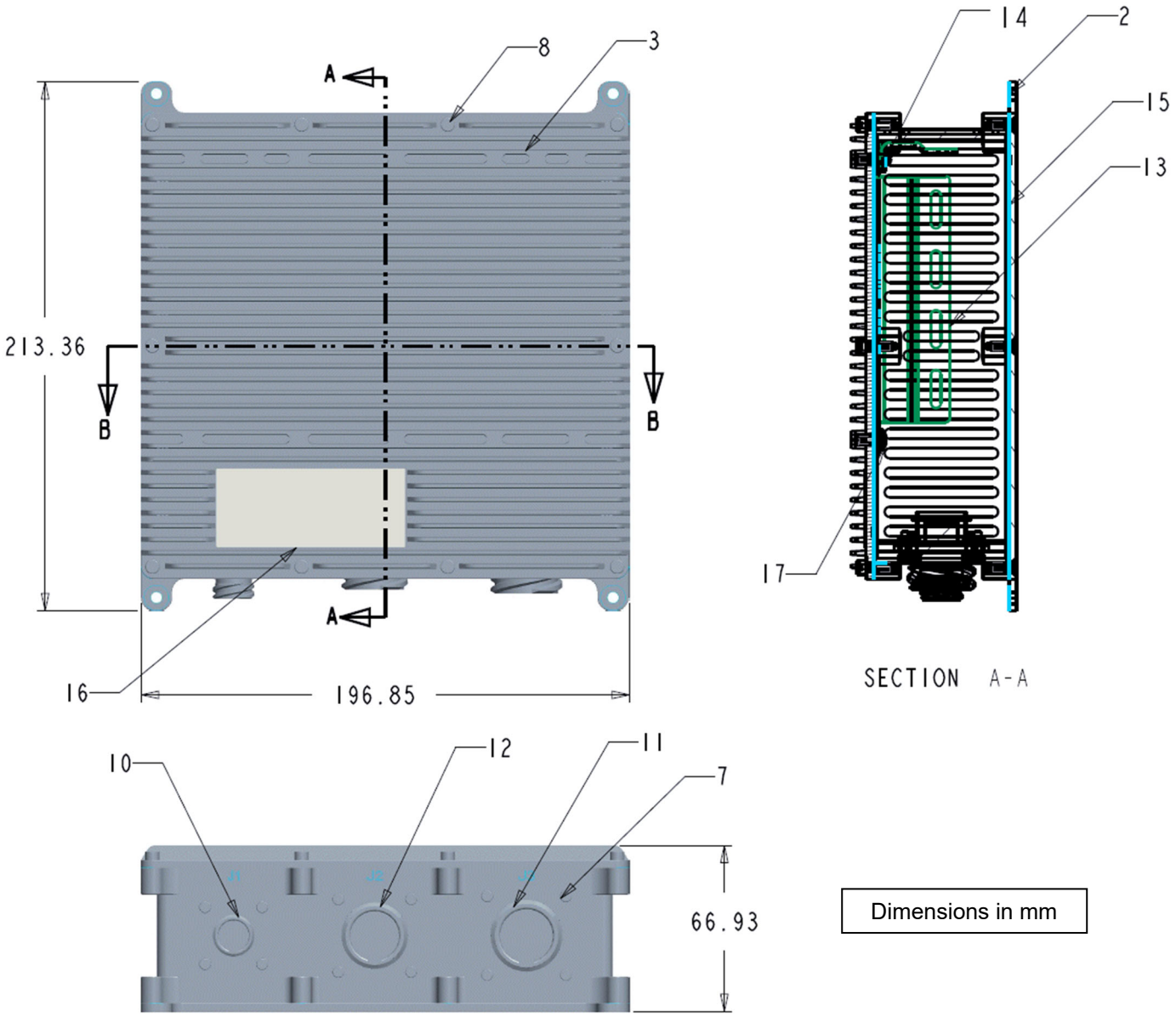


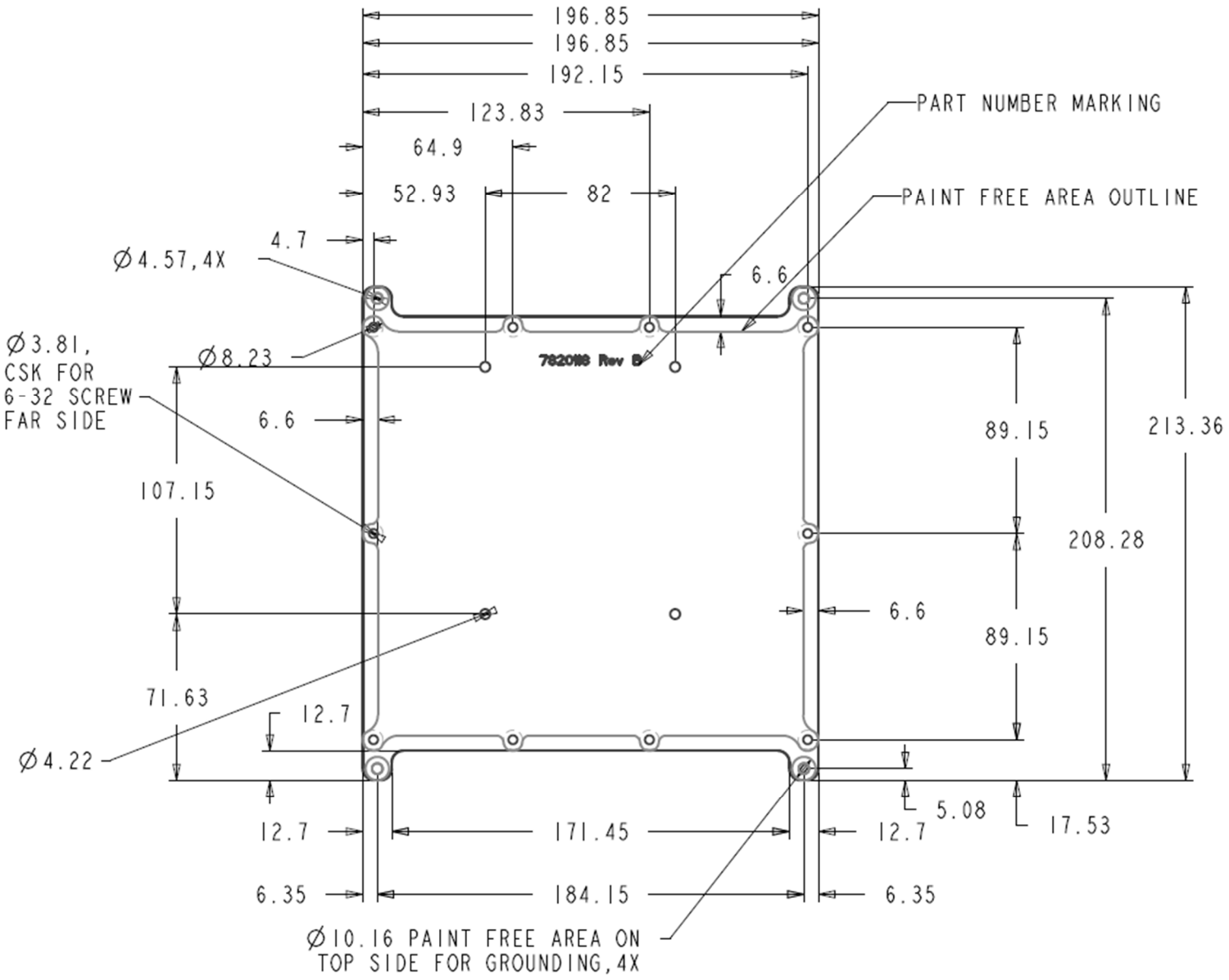
Figure 1: System Architecture of SabreCom-VNS

4. MECHANICAL DRAWINGS



Dimensions in mm

17	M3 PAN PH. HEAD SCREW
16	LABEL-TOP TYPE 3
15	SC VNS GASKET WS_1103 TYPE 3
14	#8-32 PHILLIPS HEAD SCREW
13	SC VNS CABLE MANAGE BRACKET
12	TYPE F CONNECTOR, #20KF35SN
11	TYPE G CONNECTOR, #20KG35SN
10	TYPE C CONNECTOR, #20KC4PN
9	#6-32 FLAT HEAD SCREW
8	#6-32 SOCKET CAP SCREW
7	#4-40 SOCKET CAP SCREW W/SEAL
6	F_TYPE CONNECTOR MOUNT PLATE
5	G_TYPE CONNECTOR MOUNT PLATE
4	C_TYPE CONNECTOR MOUNT PLATE
3	SC VNS A HEAT SINK LID TOP #7820117
2	SC VNS A FLAT LID BOTTOM #7820118
1	SC VNS A CASE MID BODY #7820116
SL.NO.	DESCRIPTION



Bottom plate dimensions showing mounting hole locations

5. I/O CONNECTORS

5.1 J1: Power Input

SabreCom-Venus provides a C/13-size D38999 series circular connector for power input.

Function: Power input
Enclosure location: Left

Connector Description

Internal connector	Connector type	MIL D38999/20KC4PN or 20WC4PN	
	Description	Shell type	Wall Mount Receptacle
		Material and finish	Passivated Stainless Steel
		Shell Size	C
		Insert Arrangement	C4
		Contact type	Pin
		Keying position	Normal Keying
Mating connector	Connector type	MIL D38999/26xC4SN (x = user choice of material)	
	Description	Shell type	Straight Plug
		Material and finish	Passivated Stainless Steel
		Shell Size	C
		Insert Arrangement	C4
		Contact type	Socket
		Keying position	Normal Keying
		Pins	4
Illustration	• View from exterior of case • View from terminal insertion side of mating connector		

Wiring Table:

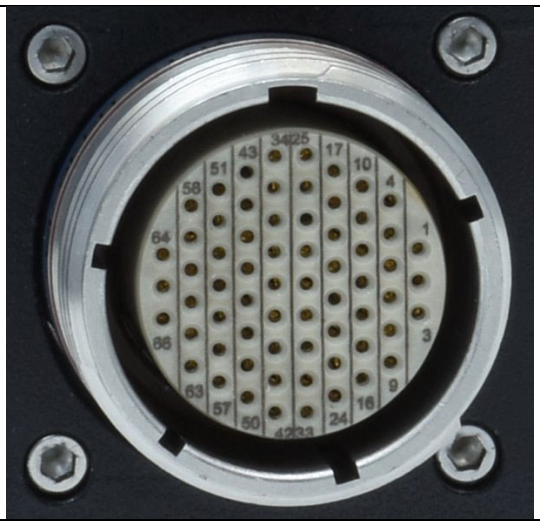
D38999 Pin no.	Signal
A	Ground
B	-
C	-
D	Vin

5.2 J2: VGA, USB Ports 3 & 4, Serial ports 3 &4, Audio

SabreCom-Venus provides 2x USB2.0, 2x Serial ports, 1x Audio & 1x VGA terminated on an F-sized D38999 series circular connector. All the above mentioned interfaces share the same connector.

Function: USB2 Ports 3 & 4, Serial ports 3 & 4, Audio, VGA
Enclosure location: Middle

Connector description

Internal connector	Connector type	MIL D38999/ 20KF35SN or 20WF35SN
	Description	Shell type: Wall Mount Receptacle Material and finish: Passivated Stainless Steel Shell Size: F Insert Arrangement: F35 Contact type: Socket Keying position: Normal Keying
Mating connector	Connector type	MIL D38999/26xF35PN (x = user choice of material)
	Description	Shell type: Wall Mount Receptacle Material and finish: Passivated Stainless Steel Shell Size: F Insert Arrangement: F35 Contact type: Pin Keying position: Normal Keying
Illustration	• View from exterior face of system connector	

Pinout Table

Number of contacts in connector: 66

Number of contacts used: 35

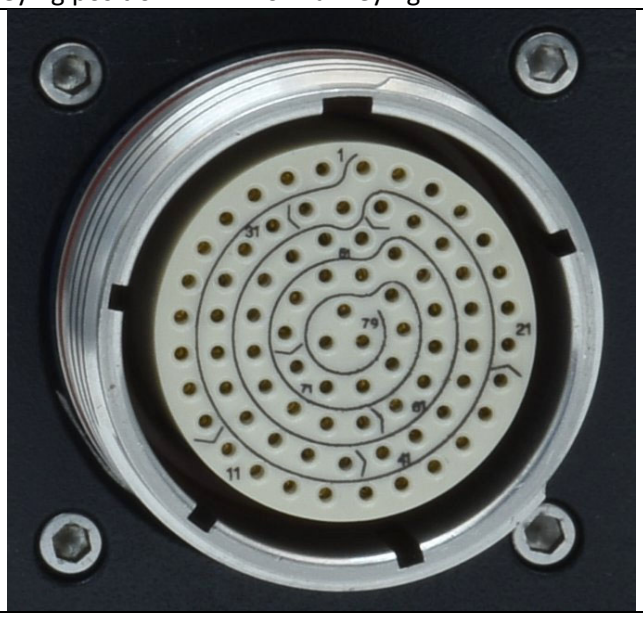
1	Expansion	**23**	USB-3D-	**45**	VGA-G
2	USB-4D-	**24**	Expansion	**46**	VGA-GGND
3	USB-4D+	**25**	Expansion	**47**	LINE-OUT-L
4	Expansion	**26**	Expansion	**48**	SER3-GND
5	Expansion	**27**	Expansion	**49**	SER4-RX
6	USB-4PWR	**28**	Expansion	**50**	SER4-TX
7	Expansion	**29**	Expansion	**51**	VGA-B
8	Expansion	**30**	Expansion	**52**	VGA-BGND
9	Expansion	**31**	Expansion	**53**	VGA-HSYNC
10	Expansion	**32**	Expansion	**54**	LINE-OUT-R
11	Expansion	**33**	Expansion	**55**	AUDIO-GND
12	Expansion	**34**	Expansion	**56**	SER4-GND
13	USB-4GND	**35**	Expansion	**57**	SER4-RTS
14	Expansion	**36**	Expansion	**58**	VGA-DDCDAT
15	Expansion	**37**	Expansion	**59**	VGA-DDCCLK
16	USB-3GND	**38**	Expansion	**60**	VGA-VSYNC
17	Expansion	**39**	SER3-CTS	**61**	LINE-IN-L
18	Expansion	**40**	SER3-RTS	**62**	LINE-IN-R
19	Expansion	**41**	SER3-RX	**63**	SER4-CTS
20	Expansion	**42**	SER3-TX	**64**	VGA-GND
21	Expansion	**43**	VGA-R	**65**	AUDIO-GND
22	USB-3D+	**44**	VGA-RGND	**66**	MIC-IN

5.3 J3: Ethernet, USB2.0, Serial, DIO ports, RTC battery, Utility

SabreCom-Venus provides 4x USB2.0, 2x Serial ports, 16x DIOs & 1x External RTC battery input, 1x I2c & RESET signals terminated on a G-sized D38999 series circular connector. All the above mentioned interfaces share the same connector.

Function: USB2.0, Utility, Serial ports 1 & 2, RTC battery, DIO, Ethernet
Enclosure location: Right

Cable description

Internal connector	Connector type	MIL D38999/20KG35SN	
	Description	Shell type	Wall Mount Receptacle
		Material and finish	Passivated Stainless Steel
		Shell Size	G
		Insert Arrangement	G35
		Contact type	Socket
		Keying position	Normal Keying
Mating connector	Connector type	MIL D38999/ 26KG35PN	
	Description	Shell type	Wall Mount Receptacle
		Material and finish	Passivated Stainless Steel
		Shell Size	G
		Insert Arrangement	G35
		Contact type	Pin
		Keying position	Normal Keying
Illustration	• View from exterior face of system connector		

Pinout Table

Number of contacts in connector: 79

Number of contacts used: 68

1	ETH0 DA+	**21**	USB-1 D-	**41**	SER1 CTS	**61**	SER2 CTS
2	ETH0 DA-	**22**	No Connect	**42**	SER2 RTS	**62**	USB-2 D+
3	ETH1 DA+	**23**	No Connect	**43**	RESET-	**63**	USB-2 PWR
4	ETH1 DA-	**24**	No Connect	**44**	DGND	**64**	USB-2 GND
5	ETH1 DB+	**25**	No Connect	**45**	USB-1 PWR	**65**	USB-5 PWR
6	ETH1 DB-	**26**	No Connect	**46**	USB-1 GND	**66**	USB-6 D+
7	Dgnd	**27**	No Connect	**47**	USB-5 GND	**67**	USB-6 D-
8	DIO A0	**28**	USB-6 GND	**48**	No Connect	**68**	ETH0 DD+
9	DIO A1	**29**	No Connect	**49**	No Connect	**69**	ETH0 DD-
10	DIO A2	**30**	ETH0 DB+	**50**	No Connect	**70**	DIO B5
11	DIO A3	**31**	ETH0 DB-	**51**	USB-6 PWR	**71**	DIO B6
12	VBAT	**32**	ETH1 DC-	**52**	ETH0 DC-	**72**	DIO B7
13	DGND	**33**	ETH1 DC+	**53**	ETH0 DC+	**73**	SER2 GND
14	SER1 TX	**34**	DGND	**54**	ETH1 DD+	**74**	USB-2 D-
15	SER1 RX	**35**	DIO A4	**55**	ETH1 DD-	**75**	USB-5 D-
16	SER2 TX	**36**	DIO A5	**56**	DIO B1	**76**	USB-5 D+
17	SER2 RX	**37**	DIO A6	**57**	DIO B2	**77**	USB-5/6 ID
18	I2CCLK	**38**	DIO A7	**58**	DIO B3	**78**	VIO
19	I2CDAT	**39**	DIO B0	**59**	DIO B4	**79**	No Connect
20	USB-1 D+	**40**	SER1 RTS	**60**	SER1 GND		

6. JUMPER CONFIGURATION

6.1 Jumpers on Venus Carrier Board

The Jumper blocks on the Venus COM carrier board can be configured to enable/disable or alter the default signal routing settings on the circuit, using Jumper shunts. These jumpers are all configured during the assembly process. In most cases they will not need to be changed. This information is provided for completeness.

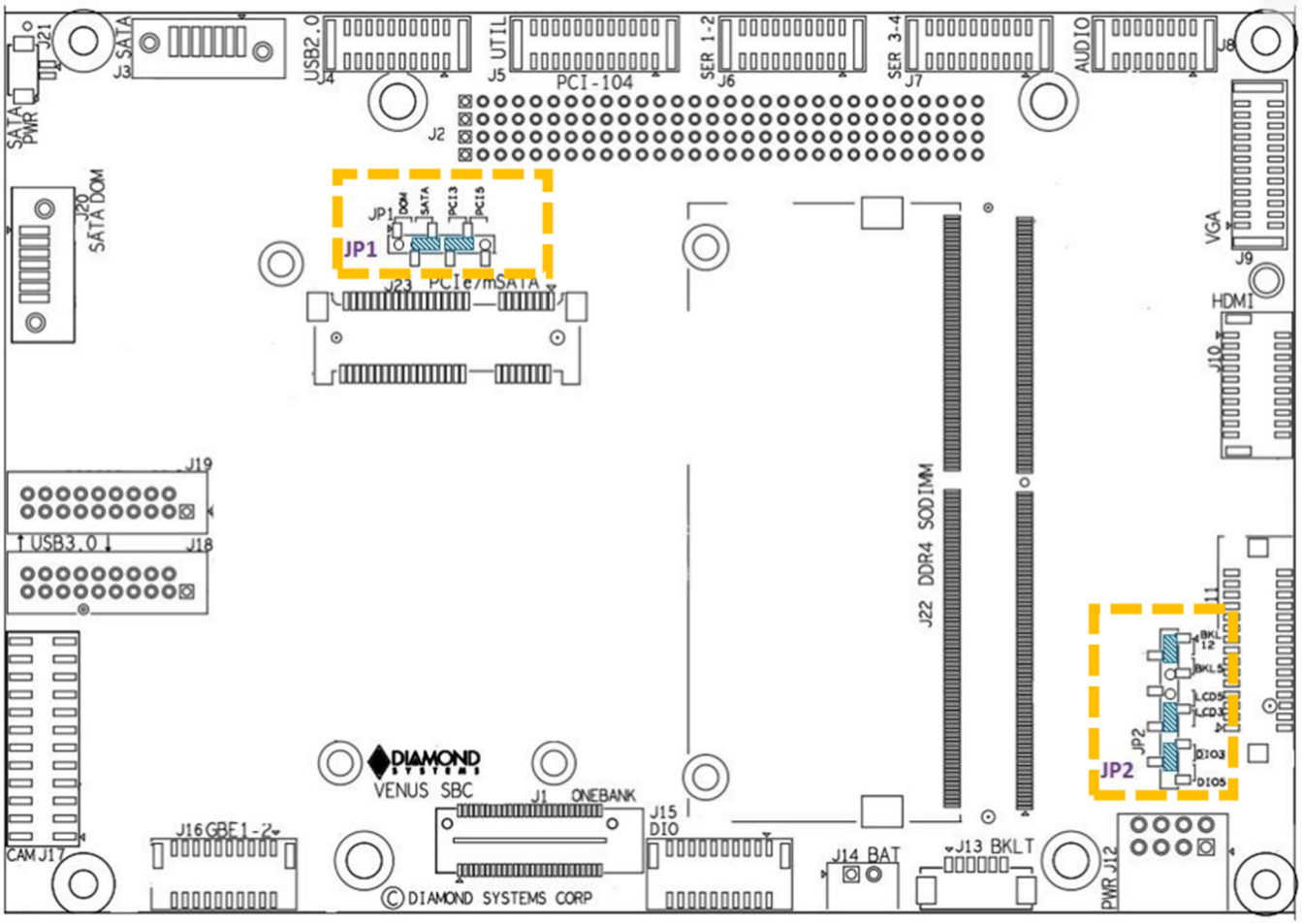


Figure 2: Jumper Blocks on Venus Carrier Board

Jumper Block Functions

Name	Function
JP1	SATA DOM Power, PCI VIO
JP2	LVDS LCD VCC and Backlight

6.2 Jumper Block JP1 - SATA DOM Power and PCI VIO

The 7th pin of the SATA connector J20 can be configured for SATA DOM or for SATA cable. If a jumper is installed in the DOM position (jumper connecting pins 1 and 2), 5V power is applied to pin 7 to provide power for an installed SATA DOM (disk on module). In the SATA position (jumper across pins 2 and 3, default setting), pin 7 is connected to ground to enable J20 to be used with a cable connecting to an external SATA disk. In SabreCom-VNS, the mass storage may be provided wither with a SATA DOM or an mSATA disk, and this jumper will be preset at the factory.

The IO voltage of PCI data/address lines on the PCI-104 connector can be configured for 3.3V or 5V. A jumper in the PCI3 position (across pins 4 and 5) selects 3.3V, while a jumper in the PCI5 position (across pins 5 and 6) selects 5V. If a PCI-104 I/O board is installed in a SabreCom-VNS system, this jumper will be set by the factory according to the I/O board's requirements..

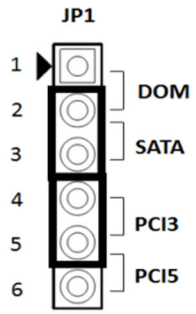


Figure 3: Jumper Block JP1

6.3 Jumper Block JP2 - LVDS Backlight and LVDS VDD

Jumper block JP2 configures the voltage supply for the LCD backlight, LVDS VDD and DIO Voltage. LCD signals are not available on SabreCom systems, so the LCD jumpers are not applicable.

For DIO, available options are 5V and 3.3V. By default, DIO voltage is configured for 3.3V operation.

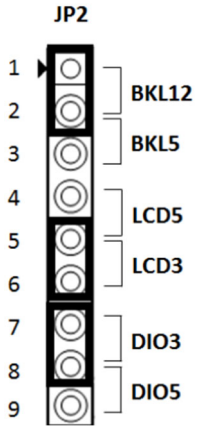


Figure 4: Jumper Block JP2

The following table shows different combinations of jumper locations on JP2.

1-2	2-3	4-5	5-6	LVDS Backlight	LVDS VDD
In	Out	In	Out	12V	5V
In	**Out**	**Out**	**In**	**12V**	**3.3V**
Out	In	In	Out	5V	5V
Out	In	Out	In	5V	3.3V

7-8	8-9	DIO Voltage
In	***Out***	***3.3V***
Out	In	5V

Note: Do not install a jumper across pins 3 & 4 or across pins 6 & 7.

7. BIOS KEY FEATURES

The Venus BIOS provides the following user configurable and controllable features:

- Boot from LAN (PXE) as well as USB and SATA ports
- Free boot sequence configuration to allow different boot sequences as first, second and third boot devices
- Support multi display mode. HDMI, VGA and LVDS can be active simultaneously
- Console (display and keyboard) redirection to a COM port
- Custom default settings can be saved without a battery
- Customizable splash screen
- Quiet boot option
- Enable/disable for individual COM ports.
- Protocol selection for each of the COM ports
- 120 ohm line termination control for serial ports in RS-422/485 protocol
- IRQ sharing for COM ports
- Enable/ disable Digital I/O ports A and B
- Direction control (Input/ Output) for Digital I/O ports A and B
- Wake on LAN for on-board Ethernet and minicard socket
- BIOS LED to indicate successful BIOS initialization
- Supports standard BIOS hotkey. This includes DEL key to enter BIOS menu; F3 key to load BIOS default settings etc.
- Password protection
- Field upgradable via a DOS/Shell utility

To achieve the maximum constant CPU speed which is 2.81 GHz, use the following BIOS settings:

Advanced -> CPU Configuration -> Intel (R) Speed Shift Technology - Disabled

Advanced -> CPU Configuration -> Intel (R) SpeedStep (tm) - Disabled

Advanced -> CPU Configuration -> Configurable TDP Boot Mode - Up

Turbo mode does not operate reliably on this board. Do not attempt to configure the CPU for turbo mode.

The BIOS on Venus provides access to many valuable features. These instructions show how to enter the BIOS and set up features.

7.1 Entering the BIOS

The BIOS may be entered during startup by pressing the DEL key on an attached keyboard. Press the key repeatedly soon after a power-on or reset until the BIOS screen appears. After a specific period during startup (generally a few seconds), the BIOS will ignore the DEL key. If the system does not respond expectedly after pressing the DEL key, user can simply reset the board (or power down) and try again.

7.2 Restoring Default BIOS Settings

While making changes to the BIOS settings, the new settings are stored in SPI flash internal in the DX3 processor. If the user wants to restore the BIOS settings to default state, follow the procedure listed below.

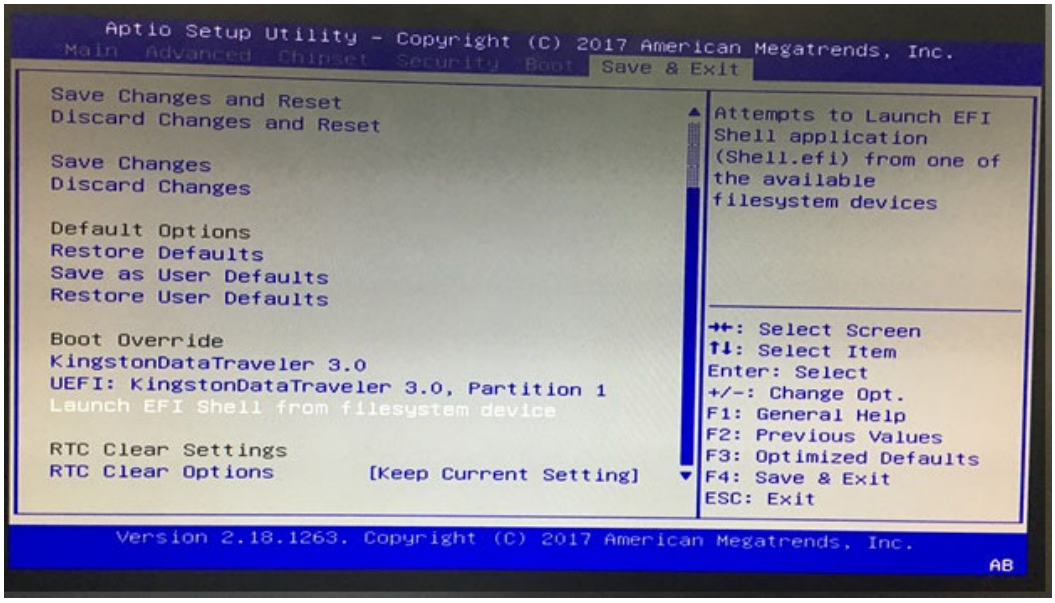
1. Connect a keyboard to the USB keyboard port or PS/2 keyboard port and connect a monitor.
2. Reboot the CPU (reset or power-down and power-up).
3. Hold down the F3 key while the CPU is booting.
4. The board will boot up normally. The BIOS settings will be reset to their defaults.

End key functionality also works in BIOS menu. When the BIOS menu is displayed press the end key.

7.3 Upgrading BIOS using SHELL Utility

Please follow the below steps for BIOS programming through SHELL Utility.

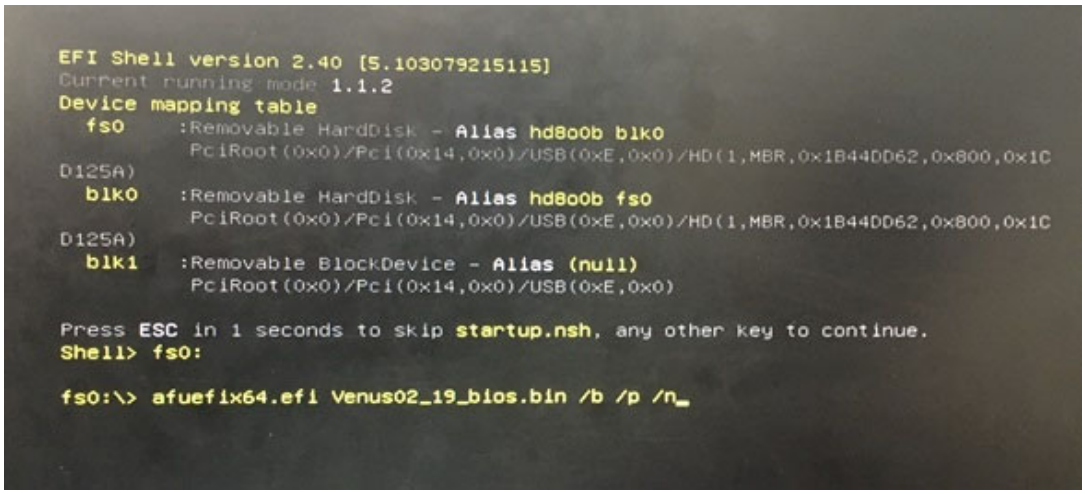
1. Copy the provided shell.efi and shellx64.efi, afuefix64.efi, FWUpdLcl.efi to USB flash disk root file. Make sure that this is not inside any folder.
2. Make sure that USB keyboard, Mouse and one of the display is connected.
3. Connect the USB flash disk to Venus board and Power on the board and boot to BIOS by pressing the DEL key.
4. In BOOT menu, enter launch shell based file systems to boot to shell as shown below.



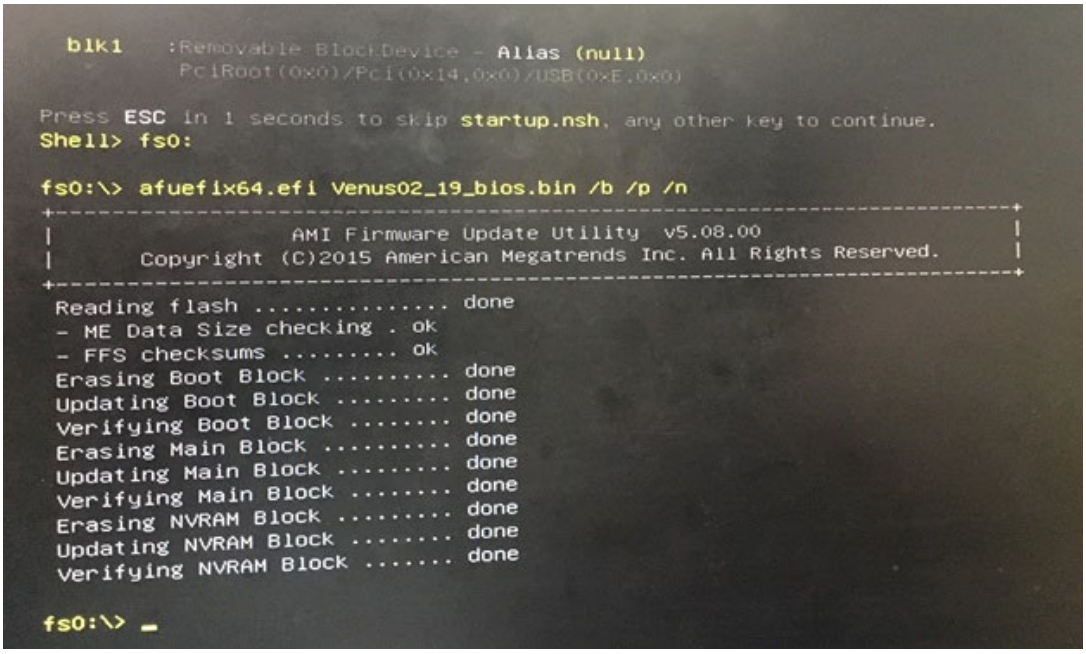
5. Once booted to shell, identify which is the file system for USB flash disk. It can be fs0 or fs1 or fs2. You can check this by pressing page up button.
6. Assuming it is fs0:, follow the below commands.

   fs0:

   afuefix64.efi <BIOS_filename>.bin /b /p /n



7. After this BIOS will be programmed and status is displayed. Wait for 100% completion.



8. If in case Soft strap update is required follow the below command. Note that is this only for special case. Otherwise ignore this step.

   FWUpdcl.efi -allowsv -f <ME_filename>.bin

9. Turn-off the board and power on again to confirm the programming by checking BIOS version in BIOS menu.

7.4 Setting the Date and Time

To set the date and time in the BIOS, select Main menu, then enter the date and time at the top of the screen. This screen also displays the CPU speed and memory capacity of the board.

7.5 Boot Priority

To select Boot devices and priority, go to the **Boot** menu and select **Boot Device Priority**. Only devices which are connected to the board will appear in the list of options. Therefore, if the user wants to select a hard drive or USB device as the boot device, CPU should be connected first, then boot up and enter the BIOS, then select it as a boot device. If this menu option does not appear on the screen, it means that the on-board flash drive is not enabled, and either no boot devices are attached or the CPU does not recognize any attached boot devices. User can change the boot devices priority in this screen.

7.6 LED

A green BIOS LED has been provided to indicate that the board has been booted to BIOS GUI. The location of the BIOS LED is being shown in the Board Layout Section.

7.7 Quiet / Quick Boot / Splash Screen

Quiet boot replaces the system status and configuration screen that appears during startup with a blank screen or custom splash screen (if available). Quick boot turns off memory test during startup to save time. To enable these features, go to the Boot menu, then select Boot Settings Configuration. Diamond can provide custom splash screens upon request from an image file.

7.8 Serial Port Configuration

Venus SBC supports 4 serial ports. All the 4 ports support RS-232/422/485 functionalities. The functionality can be configured from the BIOS GUI. In BIOS setup go to advanced menu then Serial/Parallel port configuration. Select the appropriate mode for the Serial Ports.

8. GETTING STARTED

This section describes the steps needed to get Venus SBC up and running, and assumes that user also has a Venus Development Kit or Venus Cable Kit. The Cable Kit includes all cables needed for the I/O, except the LCD and backlight. The Development Kit includes the Cable Kit, an AC adapter to power the board, a SATA hard drive, and the hard drive programmer board.

8.1 Quick Setup

1. Attach VGA cable 6980507 and USB cables 6980503 as needed.

2. Attach display, keyboard, and mouse (if needed) to the cables.

3. Connect the jumpers as mentioned in Section 8 for a default settings or can be changed as desired by the user.

4. Connect power (12V) to power input connector J12 using external power supply with power cable 6980512. The input connector and cable keyed to prevent incorrect connection. WARNING: Attaching the power connector incorrectly will destroy the Venus SBC!

5. For a quick verification that the system is set up and working properly, if no boot device is attached, the system will boot to BIOS mode.

8.2 Boot Device Options

Venus can boot from SATA or any of the available USB ports or PXE (10/100 Ethernet Port only). Either a board powered SATA DOM or an externally powered SATA HDD can be connected to the SATA port. DSC will provide a flash-disk (SATA DOM or mSATA) with pre-loaded OS.

WARNING: It is possible to destroy the Venus SBC by connecting a SATA cable incorrectly (reverse orientation or offset from correct position). Always use keyed cables to avoid connection errors.

The Boot device selection and priority are configured in the BIOS Boot menu. Only devices which are connected to the SBC will appear in the list of options. Therefore if user wants to select a hard drive or USB device as the boot device, the SBC should be connected first, then boot up and enter the BIOS, then select it as a boot device.

The following are a few example boot scenarios.

- Install an externally powered SATA hard drive directly on the SATA connector (J3).
- Attach a SATA DOM on the SATA connector (J20) (the Venus SBC will provide power to the SATA DOM over Jumper JP1 1-2)
- Attach a mSATA device on the Mini PCIe socket (J23)
- Attach a bootable USB device to one of the USB ports (J4,J18,J19).
- PXE boot over Ethernet (J16)

8.3 Installing OS and Booting

Ensure that SATA data cable and power cable are connected to SATA HDD.

Follow below steps to install Windows 8.1/10 operating system in SATA HDD.

- Connect a USB pen drive to a USB port of (J4) Venus board having Windows 10 installation image.
- Boot the Venus board to BIOS. The SATA HDD and USB device should be detected in BIOS under boot devices.
- Under boot priorities, set highest priority for USB.
- Save BIOS settings and restart.
- Windows 10 installer would start running. Follow the instructions in the installer.
- Upon successful installation, boot to Windows 10 and install the necessary drivers.
- For installing Windows 7 OS, special instructions need to be followed. Please contact DSC for the same.

9. VIDEO FEATURES

Venus SBC offers three video output options: 2 DDI and one eDP.

The DDI ports are configurable for either HDMI 1.4, DP 1.1a, or eDP. All the three outputs can be active at any time.

DDI port 1 is configured as HDMI 1.4 and supports a maximum resolution of 1920 x 1080 x 60Hz x 24bpp.

DDI port 2 is used for VGA and VGA is realized using DP to VGA converter. Maximum resolution of VGA is 1920 x 1200 x 60Hz x 24bpp.

An eDP to LVDS converter provides a dual-channel LVDS LCD output. Maximum LVDS resolution is 1920 x 1080 x 60Hz x 24bpp. The LCD backlight control is provided by a PWM circuit. LCD backlight power and control are on a separate latching connector.

BIOS will support option for selecting Single channel /Dual Channel, Color Depth, resolution and brightness control.

By default, BIOS will support 7 EDID configuration Emulation as shown in below table. Correct resolution need to be selected based on the LCD used. Please contact DSC for the EDID values OR one can use PTN3460 DPCD utility for changing the configuration.

EDID N0	Resolution	EDID Description
0	1024 x 768 @60Hz	NXP Generic
1	1920 x 1080 @60Hz	NXP Generic
2	1920 x 1080 @60Hz	NXP Generic
3	1600 x 900 @60Hz	Samsung LTM200K
4	1920 x 1080 @60Hz	Samsung LTM200K
5	1366 x 768 @60Hz	NXP Generic
6	1600 x 900 @60Hz	ChiMei M215HGE

10. SERIAL PORTS AND SYSTEM CONSOLE

10.1 Configuration

Venus SBC supports total 4 serial ports. All the 4 ports support RS-232/422/485 modes. The modes can be configured in BIOS. Both TX and RX termination selection option are available under BIOS menu.

10.2 Console redirection

Connect any of the Venus serial ports to PC. In BIOS menu, go to Advanced settings menu, then in Remote Access Configuration enable the Remote access feature. Then select the serial port. User should see the BIOS setup menu in the PC console.