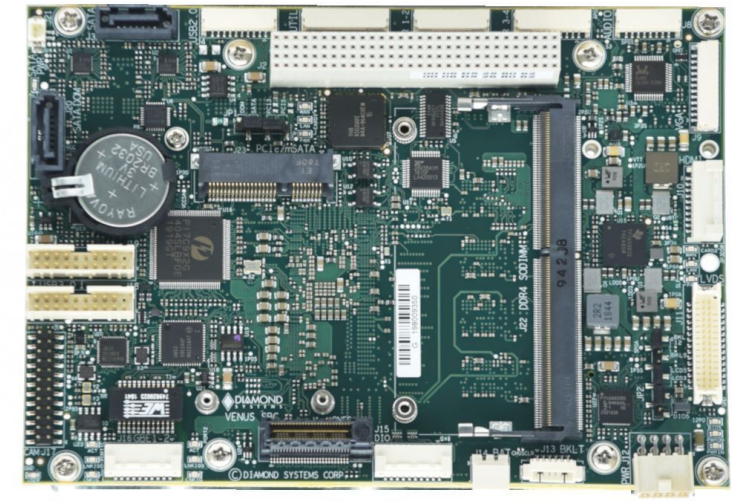
Venus

Intel Skylake or Kaby Lake 6th and 7th Generation Core Processors



Bottom view showing heat spreader and 2nd minicard/mSATA socket

FEATURES

- Intel "Skylake" 6th Gen Core i7-6600U 2.6GHz, or i5-6300U 2.4GHz

- Intel “Kaby Lake” 7th Gen Core i7-7660U 2.8GHz
- 4GB DDR4 RAM soldered on board
- Expansion socket for up to 16GB additional / 20GB total RAM
- 2x Gigabit Ethernet
- 2x SATA 3.0 ports + mSATA socket
- VGA, HDMI & dual channel LVDS with 3 simultaneous independent display support
- 4x RS-232/422/485 ports
- 6x USB 2.0 ports
- 4x USB 3.0 ports
- HD audio
- 16 GPIO lines with 3.3/ 5V logic levels
- TPM module
- CSI camera serial interface
- 2x PCIe MiniCard sockets; one socket supports mSATA
- OneBank-Plus PCIe/104 + PCI-104 expansion socket
- +9-18VDC input voltage
- 14W power consumption typical
- 3.5 inch form factor: 5.75" x 4.0" (146mm x 102mm)
- -40°C to +85°C operating temperature
- Bottom-mounted heat spreader cooling

Description

Based on the "Skylake" or “Kaby Lake” 6th and 7th generation processors, Venus offers the highest available CPU performance in a small form factor rugged SBC with modest power consumption. It incorporates a full suite of rugged features such as soldered memory, latching connectors, a thicker PCB, and true -40/+85ºC operating temperature, making it suitable for the most demanding vehicle applications. High I/O density, multiple expansion sockets, rugged design, modest power consumption of 14W, and wide temperature operation combine to make Venus an extremely attractive option for applications requiring high CPU performance or ruggedness.

Overview

Venus is a rugged, single board computer featuring the Intel Skylake or Kaby Lake 6th and 7th Generation processor in an extended "3.5-inch" form factor. Venus offers a wide range of I/O plus data acquisition functionality, meeting the majority of today’s connectivity requirements.

CPU Performance

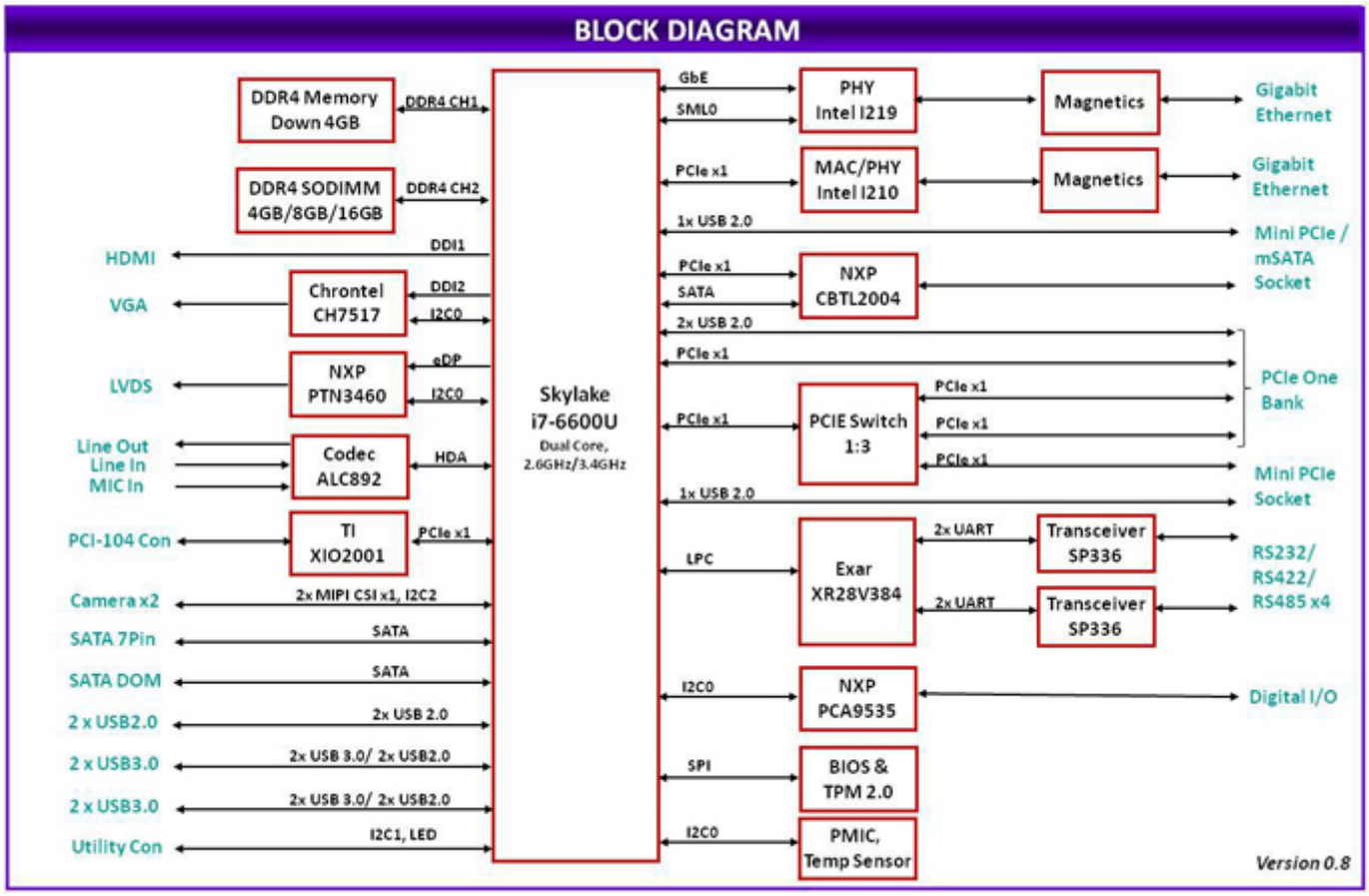
Venus is available with a choice of Intel "Skylake U" 6th generation Core i7 or i5 processors, as well as “Kaby Lake” 7th generation Core i7 processor. Enabled by Intel’s Hyper-Threading technology, The Skylake and Kaby Lake processors provide users with faster computing power and aid in multitasking, and multimedia tasks. Additionally, the larger cache (on board memory) size available on these processors help with repetitive tasks that can impact processor speed. The U series provides the full processor circuit in a single package for space savings and keeps power consumption down to a modest 14 watts for the entire board (not including attached peripherals).

- "Skylake U" i7-6600U 2.6GHz, or i5-6300U 2.4GHz
- “Kaby Lake” i7-7660U 2.8GHz
- Up to 20GB: 4GB memory down + socket for 4/8/16GB DDR4-2133 SODIMM / RSODIMM
- 3 independent displays: HDMI, VGA, and LVDS, max resolution 4096x 2304
- 4x 2.0 USB on latching connectors
- 4x 3.0 USB using Intel standard pin headers
- 4x multi-protocal serial RS-232/422/485

3 SATA interfaces:SATA DOM; Standard SATA connector mSATA supported in one MiniCard

- socket
- TPM Module
- "3.5 inch" form factor: 5.75" x 4.0" / 146 x 102mm
- Board expansion option over OneBank PCIe/104 and PCI-104 connector
- -40° to +85C° target range

Block Diagram



Display Features

Venus supports 3 simultaneous independent displays, VGA, HDMI, and dual channel LVDS LCD. The HDMI port is capable of 4K screen resolution. Mass storage options include SATA DOM, mSATA, and a connector for an external SATA drive (all ports are SATA III capable). Diamond offers a series of MLC and SLC mSATA and SATA DOM modules with wide temperature qualification for use with Venus.

Wide Range of I/O

The 3.5 inch form factor enables Venus to include an impressive range of I/O features on a single board while retaining a small form factor profile. Connectivity includes 4 RS-232/422/485 serial ports, 6 USB ports (4 are USB 3.0 capable), dual gigabit Ethernet ports, and 16 digital I/O lines.

The 4 serial ports support RS-232, RS-422, and RS-485 protocols. Protocol selection as well as all other configurations are fully software programmable and may be configured in the BIOS for convenience or controlled via an application program. For RS-422 and RS-485, line termination resistors are also provided and are programmable.

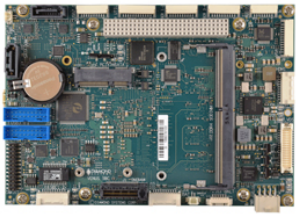
Available Models

Venus is available in three models, the higher performing models (VNS766-4GD and VNS766KL-4GD) with the Intel i7 6th Generation Core Processor, and the last with the Intel i5 6th Generation Core Processor.

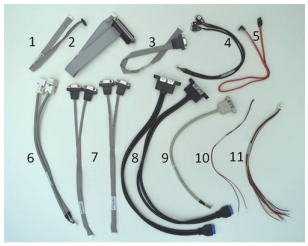
Model	Processor /Speed	Memory
VNS766KL-4GD	i7-7660U/2.8GHz	4GB DDR4
VNS766-4GD	i7-6600U/2.6GHz	4GB DDR4
VNS563-4GD	6300U/2.4GHz	4GB DDR4

Development Support

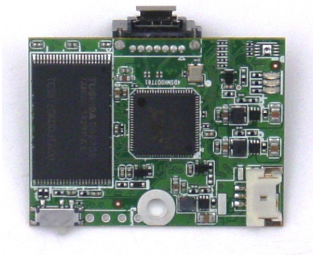
Venus is available in a complete development kit that includes a full set of I/O cables and a SATA Disk-on-Module SATA DOM) with your choice of operating system pre-installed. Available operating systems are Linux (Ubuntu 16.04), Windows 7, Windows 8, and Windows 10. Other OS support is available by consultation. For customers who already have a Venus SBC or who have multiple boards, the programmed SATA DOM is also available for individual purchase.



Venus



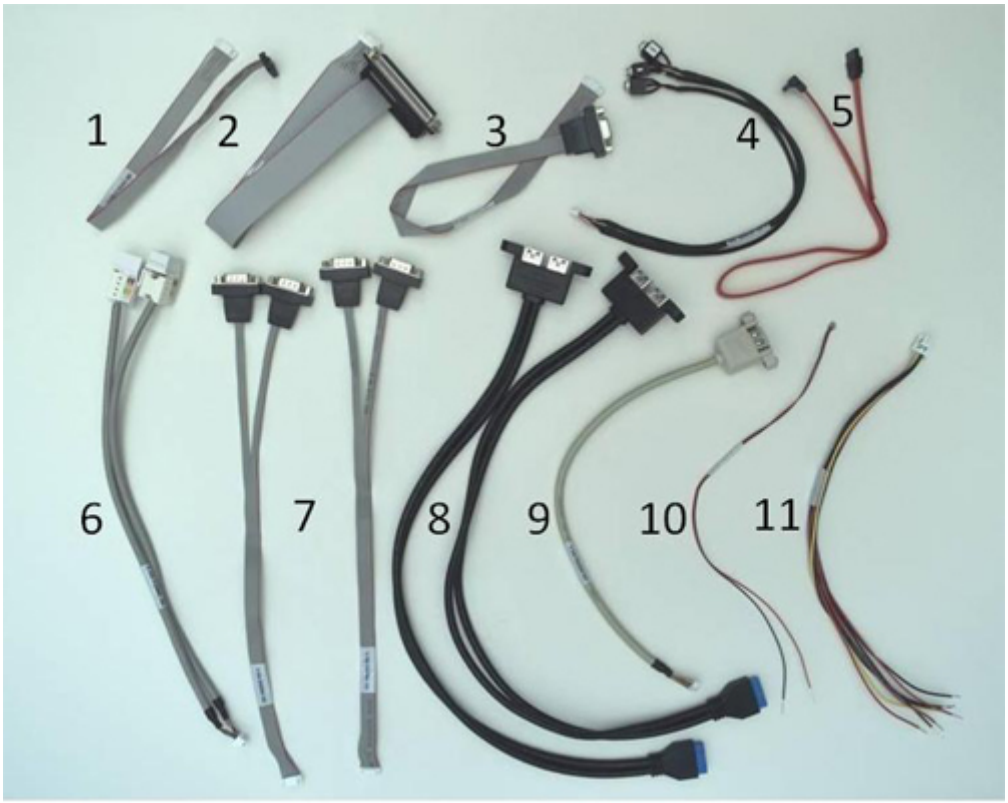
Venus Cable kit



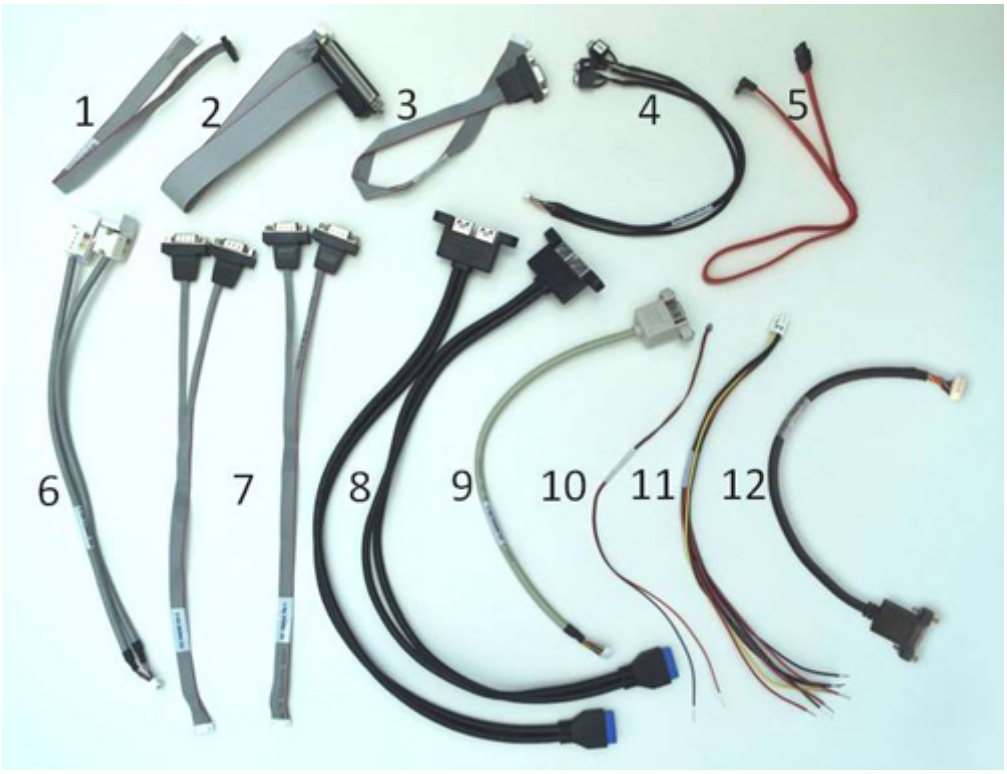
SATA DOM

CK-VNS-01, CK-VNS-02: Cable kits for Venus

CK-VNS-01



CK-VNS-02



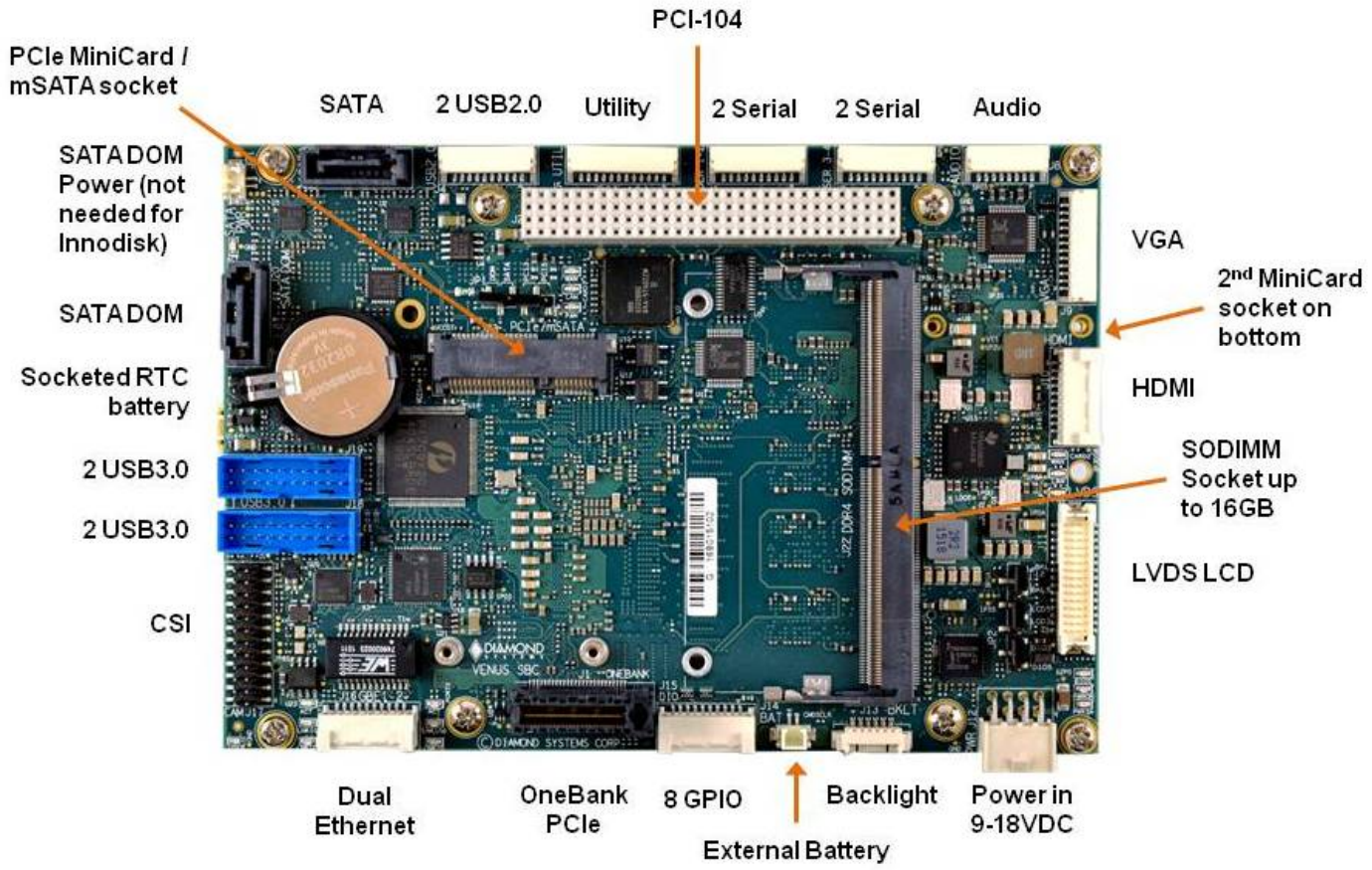
Cable kits include the following cables:

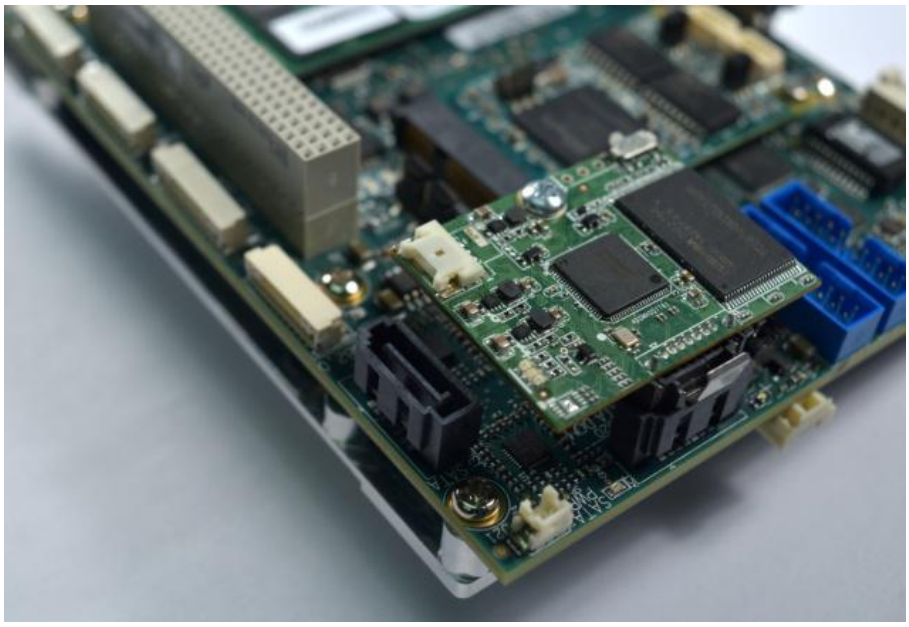
No.	Cable	Description	Drawing	CK-VNS-01	CK-VNS-02
1	6980514	Cable, Utility, 2x6 2mm IDC Socket	**Show**	1	1
2	6980517	Cable, GHDR-20V-S to DB-37F	**Show**	1	1
3	6980507	Cable, VGA, 1.25mm Con DE15 Female	**Show**	1	1
4	6980508	Cable, Audio, 1.25mm 2X 3.5mm	**Show**	1	1
5	6989101	SATA Cable, 7-Pin Data, Straight to Right Angle, 500mm	**Show**	1	1
6	6980513	Cable, Dual Ethernet, 2x10 1.25mm	**Show**	1	1
7	6980500	Cable 1.25mm to 2x DV9M Serial	**Show**	2	2
8	6980100	Dual USB 2.0/3.0 type A	-	2	2
9	6980503	Cable, 2xUSB 2.0, 1.25 Con	**Show**	1	1
10	6980524	Cable, External Battery, Molex Spox	**Show**	1	1
11	6980512	Cable Power, 2x4 0.1" Latching	**Show**	1	1
12	6980519	Cable, HDMI, 2x10 1.25mm	-	-	1

I/O Features

Venus has a SATA DOM socket and a second SATA connector. All ports are SATA III compliant.

A multi-use MiniCard socket auto-selects for either a PCIe MiniCard or mSATA flashdisk. This dual function socket can be used to add compact additional I/O or mass storage to your system. The dedicated SATA connector can be used with off-board SATA devices and also supports use of a board-mounted miniature SATA disk-on-module for a smaller overall system envelope with less cables. Most I/O on Venus utilizes latching I/O connectors for enhanced ruggedness and reliability. Venus has a SATA DOM socket and a second SATA connector. All ports are SATA III compliant.





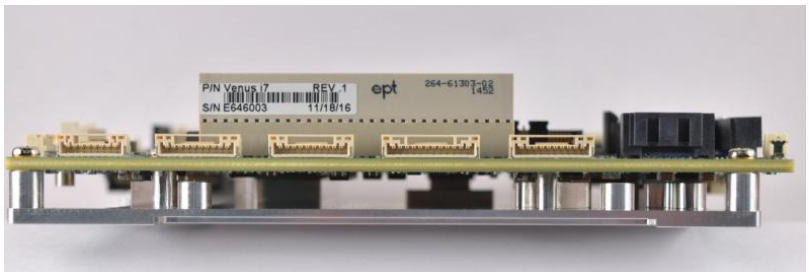
Venus provides 4 RS-232/422/485 ports using multiprotocol transceivers, one per port. All configuration features are fully programmable as well as configurable in the BIOS screens, including protocol and line termination for RS-422/485. In RS-458 mode, both echo and no-echo modes are supported. The expansion connectors use 22mm stacking height to provide more clearance for installed minicards.

Venus supports two 10/100/1000 high speed Gigabit Ethernet ports derived from Intel I210IT PCIe Gigabit Ethernet controllers. A latching connector is used to bring these ports off board instead of RJ-45 jacks, optimizing space on the board and increasing ruggedness. Activity status of the Ethernet ports can be read from LEDs.

Expansion Capability

In addition to the already high level of onboard I/O, Venus also provides great expansion flexibility, including both a OneBank Plus (PCIe/104 + PCI-104) socket and 2 full-size MiniCard sockets.

The compact OneBank expansion connector provides high performance PCIe expandability in a stacking format. The expansion connectors use 22mm stacking height to provide more clearance for installed minicards. It supports up to 3 PCIe/104 Type 1 and Type 2 add-on modules along with PCIe/104 OneBank I/O modules with PCIe x1 host interface, while conserving board space and reducing total system cost. The companion PCI-104 connector supports PCI-104 modules for compatibility with an even greater array of I/O modules. (Use of PC/104-Plus modules will require removing the PC/104 ISA connector to avoid interference with the OneBank connector.)



The top side MiniCard socket supports full-size PCIe and USB MiniCards as well as mSATA Disk-on-Modules. The bottom side socket supports full-size and half-size PCIe MiniCards.

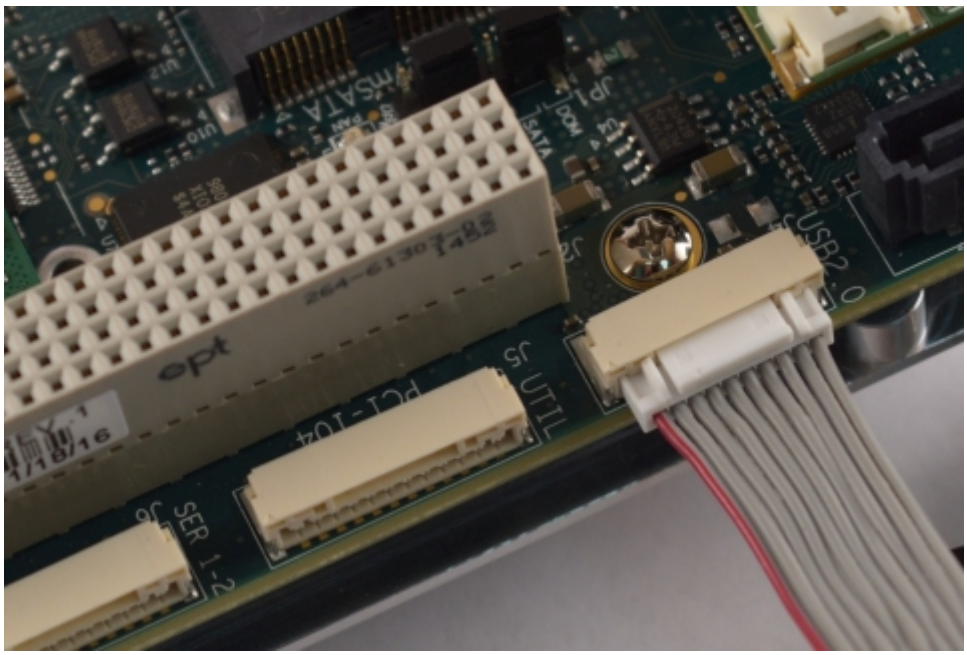
Second MiniCard socket available on bottom

Venus is equipped with latches on the serial ports for added protection in harsh environments.

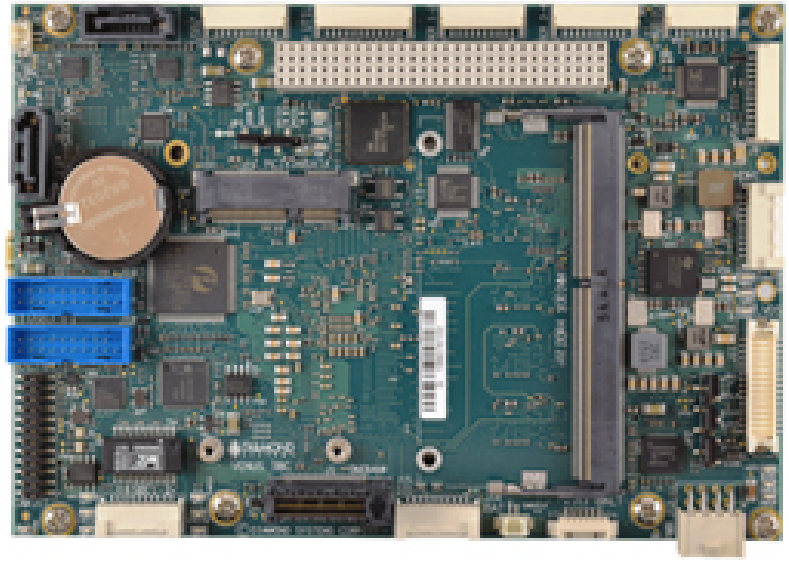
Rugged Features

Venus incorporates a full suite of rugged features such as latching connectors, a thicker PCB, and soldered memory, making it suitable for the most demanding vehicle applications.

Most I/O connectors use a true locking design to ensure reliable operation in high vibration environments. The 50% thicker PCB along with 8 mounting points provides greater rigidity to minimize the possibility of solder joint failure from vibration.



The 4GB soldered memory may be upgraded to as high as 20GB using Diamond's unique RSODIMM rugged memory modules, which are designed to withstand MIL-STD-202G shock and vibration specifications. Standard DDR4 SODIMM modules may also be used for convenience.

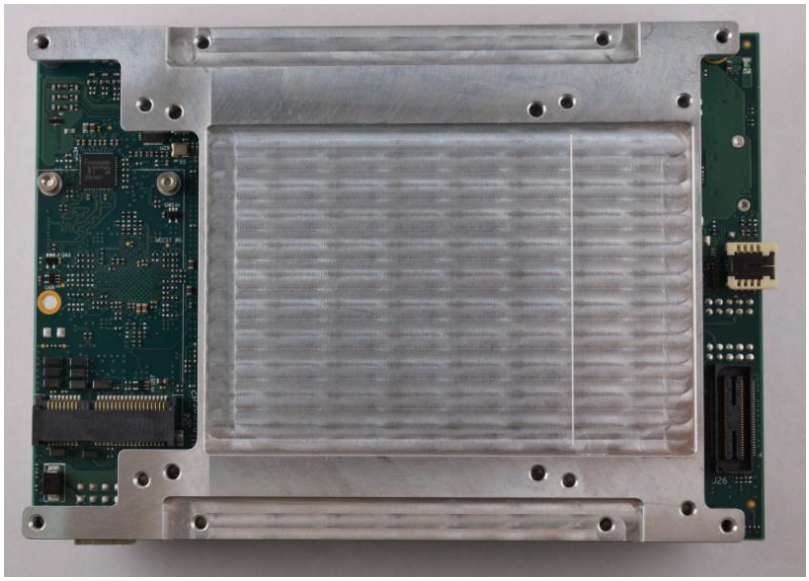


Socket on top of board provides easy access for adding RSODIMM rugged memory modules.

Innovative Conduction Cooling

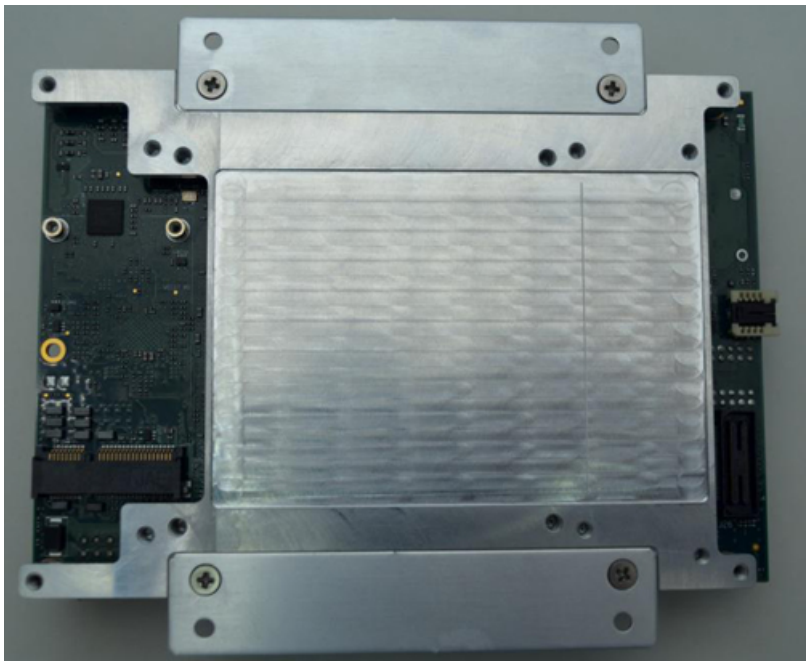
The bottom side heat spreader on Venus provides the most efficient cooling solution in a weight-optimized design, enabling Venus to run reliably at up to 85ºC. The heat spreader conducts heat directly to the system chassis for maximum heat dispersion to the ambient environment and minimum radiation into the enclosure interior. By reducing the interior temperature, Venus helps to improve overall system reliability. In addition the bottom side heat spreader leaves the entire top side of the board free for expansion and memory modules, simplifying system configuration and maintenance.

The Venus heat spreader includes a number of innovations to provide system designers with flexibility and confidence. The bottom side contains a depression for an included thermal pad for optimum thermal contact with the enclosure surface. A series of English and Metric mounting holes are available for installation. A mounting tab accessory kit enables convenient installation from the inside of the enclosure to eliminate concerns of violating the enclosure’s environmental integrity.

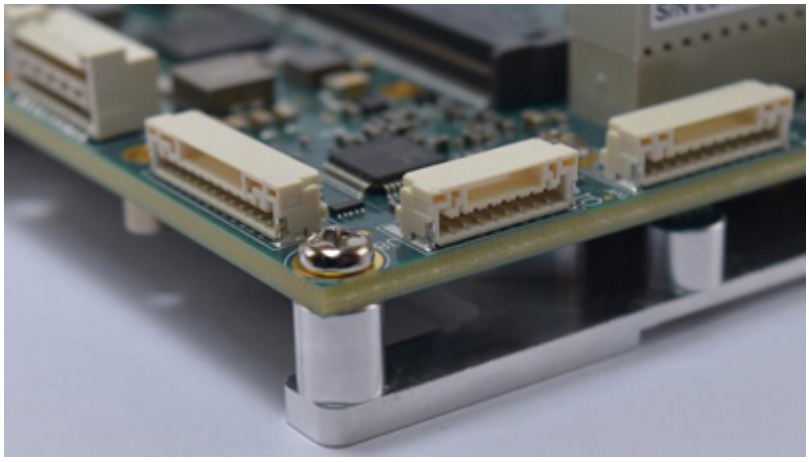


Bottom of Venus SBC with heat spreader shown

Bottom of Venus SBC showing easy access to optional inserted PCI minicard in the cutaway portion of the heat spreader.



Bottom of Venus showing heat spreader with optional mounting tabs.



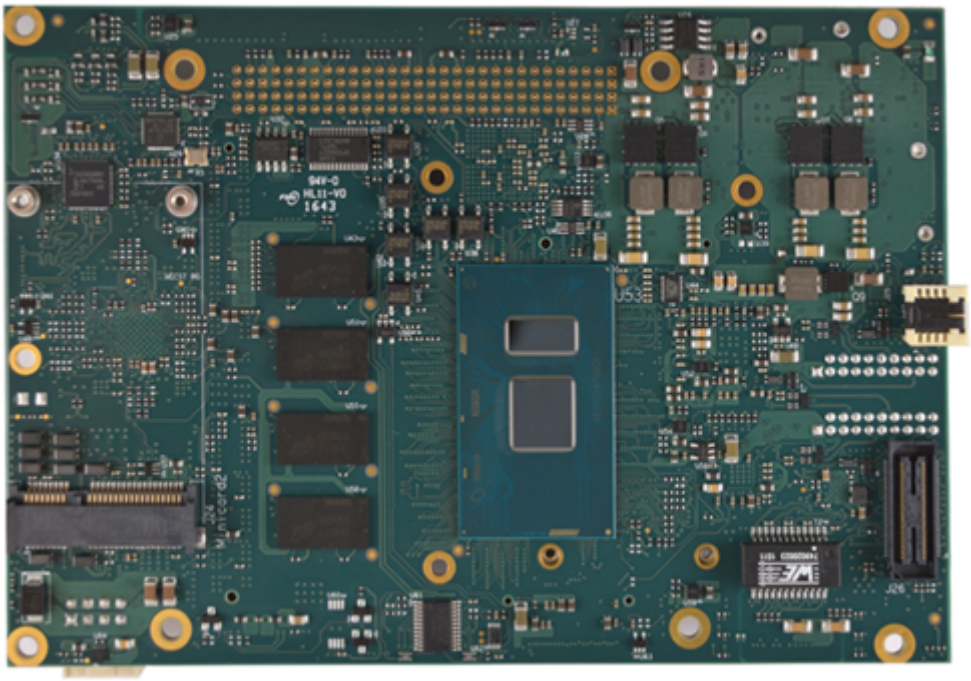
Venus uses a 2.3mm/.90” thick PCB for increased rigidity and immunity to vibration.

Rugged Mission Computer Systems

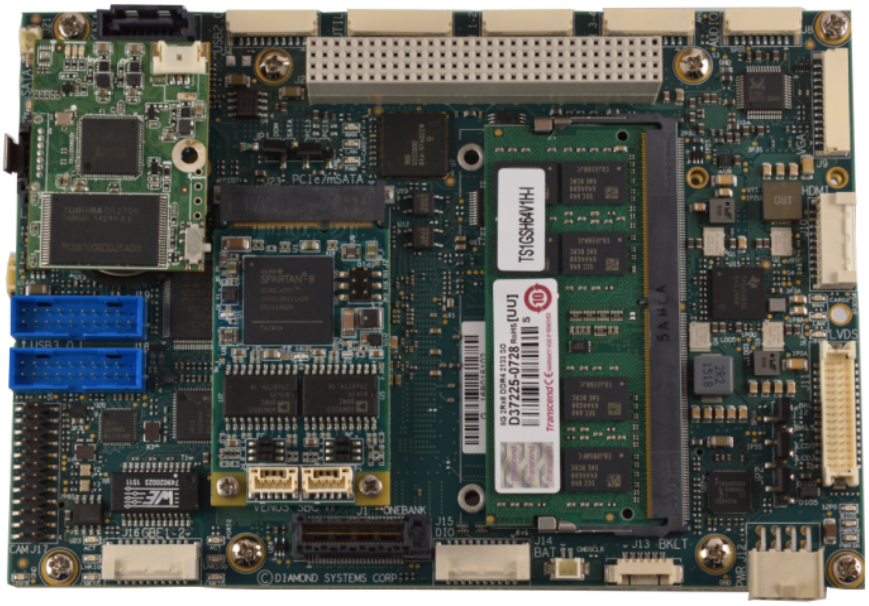
If you’re looking for a complete rugged embedded computer solution, check out our Raptor rugged computer systems using Venus in an enclosure with MIL-DTL-38999 connectors, MIL-STD-202G shock/vibration specs, MIL-STD-461 compliance, and IP67 environmental rating. These systems can be customized to include additional I/O boards as well as customer-specific connector arrangements.

Rugged Memory

Venus includes 4GB of DDR4-2133MHz memory soldered on board for enhanced ruggedness. The memory size may be upgraded to as high as 20GB using standard DDR4 SODIMM modules in 4GB, 8GB, and 16GB capacity.



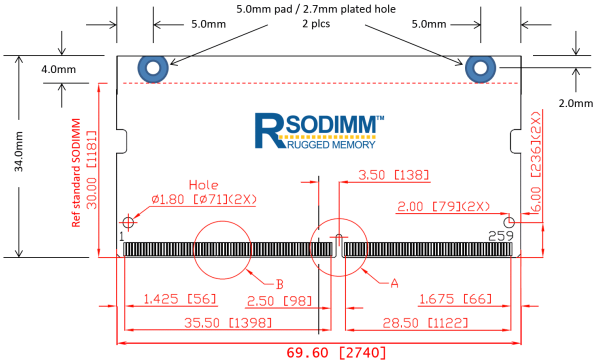
4GB memory soldered on board (bottom side view).



Top side of Venus provides a socket for DDR4 memory expansion. Both RSODIMM and standard SODIMM modules are supported.

In addition to standard SODIMM modules, Venus supports Diamond's unique RSODIMM™ Rugged SODIMM memory for enhanced protection against vibration. RSODIMM modules are exactly like standard SODIMM modules except they have a small PCB extension that provides two mounting holes to fix the module to the SBC more reliably.

RSODIMM™
RUGGED MEMORY



Specifications

Features

Processor	"Skylake U" i7-6600U 2.6GHz, or i5-6300U 2.4GHz, 2 cores 4 threads
	"Kaby Lake" 7th Gen Core i7-7660U 2.8GHz, 2 cores 4 threads
Chipset	Integrated onto processor package
Memory	Up to 20GB: 4GB memory down + socket for 4/8/16GB DDR4-2133 SODIMM / RSODIMM
Graphics	3 independent displays: HDMI, VGA, and LVDS, max resolution 4096 x 2304
Ethernet	2 Gigabit ports: 1 from chipset with i219 PHY, 1 from i210 on PCIe x1 lane, on-board LEDs for status
USB	4x USB 3.0/2.0 ports on Intel standard USB 2.0 connectors + 2x USB 2.0 on separate connector
	2x USB 2.0 via PCIe/104 OneBank expansion connector
	2x USB 2.0 via PCIe MiniCard sockets
Serial	4x multiprotocol RS-232/422/485, all features programmable including termination
Audio	HDA audio with Line in, Line out, and Mic in, ALC892 CODEC
Digital I/O	16 lines with bitwise programmable direction, configurable 3.3V/5V logic levels, and configurable pull-up/down resistors
Mass storage	3 SATA interfaces: SATA DOM, Standard SATA, mSATA support in one MiniCard socket
Security	TPM module Infineon SLB 9670XQ2.0
Expansion	MiniCard sockets:
	1 socket supports full size MiniCard / mSATA modules
	1 socket supports full / half size MiniCard
	OneBank Plus (PCIe/104 + PCI-104) socket with 22mm stacking height
	Stackable I/O:
	2 Full size (51mm length)
	Supports up to 3 PCIe x1 Type 1 / Type 2 / OneBank I/O modules + up to 2 USB interface modules
	Supports up to 4 PCI-104 expansion modules
Connectors	Latching, JST GH / GHD series
Form factor	"3.5 inch" form factor: 5.75" x 4.0" / 146 x 102mm
Weight	281.4 gms/ 9.92 ounces
Cooling	Conduction cooling heat spreader on bottom
Input voltage	9-18VDC
Power consumption	14W under typical operating conditions
Operating Temp	-40° to +85°C

Models and Accessories

Venus

available models:

VNS776KL-4GD	Venus SBC, i7-7660U 2.8GHz CPU, 4GB RAM soldered on board RSODIMM rugged memory expansion
VNS766-4GD	Venus SBC, i7-6600U 2.8GHz CPU, 4GB RAM soldered on board RSODIMM rugged memory expansion
VNS563-4GD	Venus SBC, i5-6300U 2.4GHz CPU, 4GB RAM
DK-VNS776KL-WE1064	Venus SBC development kit, includes VNS776KL-4GD SBC, Windows 10 64-bit OS on SATA DOM, and cable kit
DK-VNS776KL-LNX64	Venus SBC development kit, includes VNS776KL-4GD SBC, Ubuntu Linux 64-bit OS on SATA DOM, and cable kit

DK-VNS766-WE10	Venus SBC development kit, includes VNS766-4GD SBC, Windows 10 OS on SATA DOM, and cable kit
DK-VNS766-LNX	Venus SBC development kit, includes VNS766-4GD SBC, Linux OS on SATA DOM, and cable kit
SDK-VNS-WE10	Venus SBC software development kit, includes Windows 10 OS on SATA DOM
SDK-VNS-LNX	Venus SBC software development kit, includes Linux OS on SATA DOM

Please login or signup for an online quote request.

Cables and accessories

available models:

CK-VNS-01	Venus SBC Cable Kit, No HDMI Cale
CK-VNS-02	Venus SBC Cable Kit, With HDMI Cable
6980514	Cable, Utility, 2x6 2mm IDC Socket
6980517	Cable, GHDR-20V-S to DB-37F
6980507	Cable, VGA, 1.25mm Con DE15 Female
6980508	Cable, Audio, 1.25mm 2X 3.5mm
6989101	SATA Cable, 7-Pin Data, Straight to Right Angle, 500mm
6980513	Cable, Dual Ethernet, 2x10 1.25mm
6980500	Cable 1.25mm to 2x DV9M Serial
6980100	Dual USB 2.0/3.0 type A
6980503	Cable, 2xUSB 2.0, 1.25 Con
6980524	Cable, External Battery, Molex Spox
6980512	Cable Power, 2x4 0.1" Latching
6980519	Cable, HDMI, 2x10 1.25mm

Please login or signup for an online quote request.

www.diamondsystems.com | Sunnyvale, California USA | +1-650-810-2500 | sales@diamondsystems.com