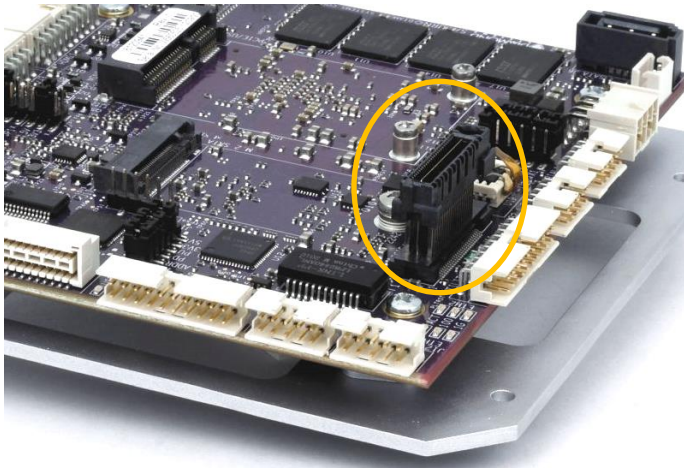
OneBank™ Overview

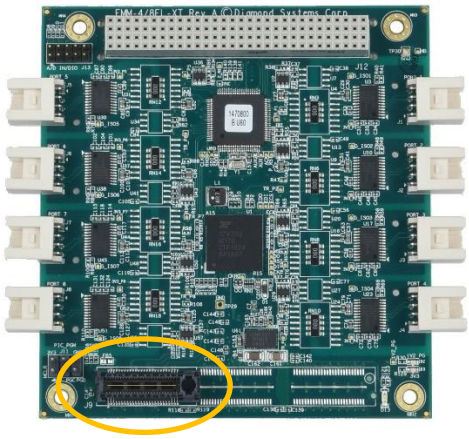
What is OneBank™?

OneBank is the name for a compact, rugged PCIe-based I/O expansion connector created by the PC/104 Consortium. The OneBank connector provides PCIe, USB, and SMBus interfaces to enable the installation of I/O expansion modules onto single board computers (SBCs). The name “OneBank” refers to both the connector and to boards that rely on that connector for their electrical interconnection.

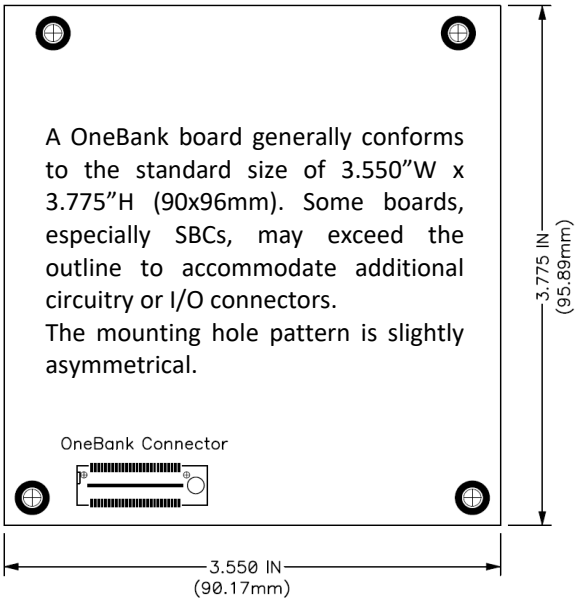
The OneBank connector supports two board-to-board spacings: The standard 0.6” / 15.24mm spacing is standard for I/O modules and used on some SBCs. The taller 0.866” / 22mm spacing enables OneBank boards to be installed over minicards and other socketed modules on SBCs or COM carrier boards.

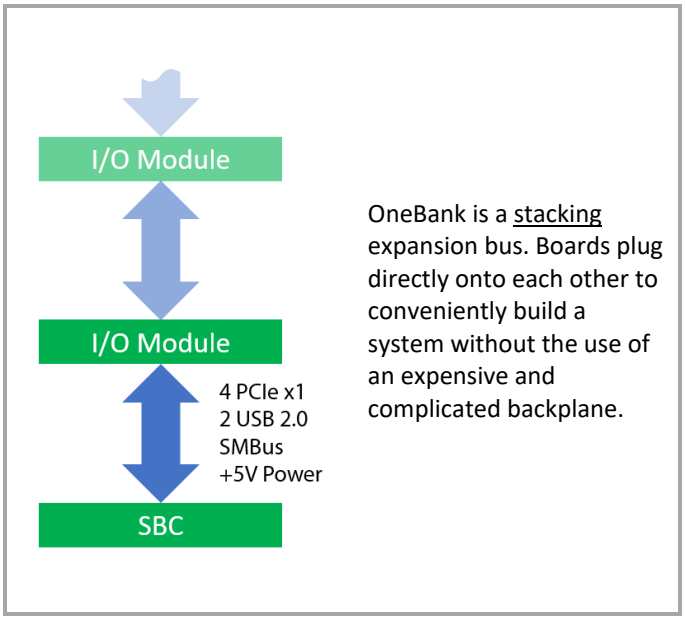


Example SBC containing the OneBank expansion connector. The taller 22mm version is used to enable an add-on board to fit over the M.2 and Minicard sockets on the SBC.



Example OneBank I/O board. This board includes the PCI-104 connector (upper edge) for passing through the PCI bus signals from the SBC to a PCI-104 board installed in the stack.





Why is OneBank important?

OneBank delivers a compelling set of benefits for embedded systems requiring I/O expansion:

- Most popular I/O chips today, including Video, Ethernet, and UART, as well as most FPGAs intended for high-speed applications, use PCIe as their host interface. OneBank provides a rugged and compact way to use these ICs on I/O boards for embedded systems. The OneBank connectors are suitable for use with PCIe up to Gen 3 speeds.
- While other expansion form factors include PCIe, they may not offer the same level of ruggedness as OneBank. For any application in a moving vehicle or an environment subject to adverse weather, OneBank provides superior ruggedness and reliability over card-edge type expansion boards due to its enhanced shock and vibration resistance.
- The design of the two connectors completely encapsulates the contacts, preventing exposure to the environment which could allow contamination to work its way between the contacts and possibly reduce reliability. OneBank connectors are readily compatible with conformal coating.
- The center power tab provides a reliable high-current power path for power-intensive I/O boards, such as graphics or Ethernet.
- Compared to a Minicard, a OneBank board offers 3 times the surface area as well as a taller component envelope on both the top and bottom sides, allowing the use of larger components and connectors plus more complex, feature-rich I/O circuitry with higher channel counts.

What are the I/O signals on the OneBank connector?

The illustration at right shows the I/O signals on the OneBank connector. The connector supports up to 4 PCIe x1 links. These links cannot be combined into x2 or x4 links, they are limited to x1 configuration.

Note that although the connector supports up to 4 PCIe links, the actual number of links available on the host SBC may vary between 1 and 4. Always check the manufacturer datasheet to ensure that the SBC has the number of PCIe links you need for your application. Each I/O board will typically use a single PCIe link, however some boards may use 2, 3, or even 4 links.

In order to support minicard adapter boards that work with USB-based minicards, the OneBank connector also supports up to two USB 2.0 ports.

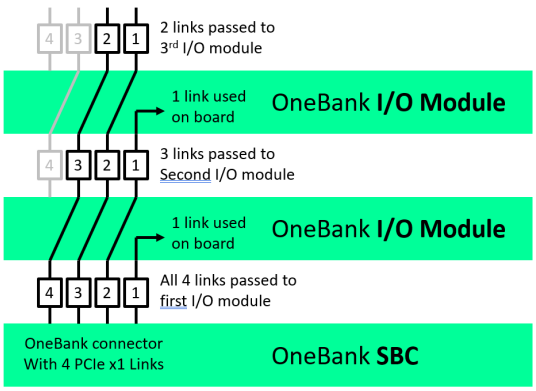
5V power is supplied through the large center tab. The ground pins on the connector serve as both the power supply current return path and differential signal isolation.

OneBank™

1	USB_OC#		PE_RST#	2
3	**3.3V**		**3.3V**	4
5	USB_1p		USB_0p	6
7	USB_1n		USB_0n	8
9	**GND**		**GND**	10
11	PEx1_1Tp		PEx1_0Tp	12
13	PEx1_1Tn		PEx1_0Tn	14
15	**GND**		**GND**	16
17	PEx1_2Tp		PEx1_3Tp	18
19	PEx1_2Tn		PEx1_3Tn	20
21	**GND**		**GND**	22
23	PEx1_1Rp	**+5V Power Tab**	PEx1_0Rp	24
25	PEx1_1Rn		PEx1_0Rn	26
27	**GND**		**GND**	28
29	PEx1_2Rp		PEx1_3Rp	30
31	PEx1_2Rn		PEx1_3Rn	32
33	**GND**		**GND**	34
35	PEx1_1Clkp		PEx1_0Clkp	36
37	PEx1_1Clkn		PEx1_0Clkn	38
39	**+5V_SB**		**+5V_SB**	40
41	PEx1_2Clkp		PEx1_3Clkp	42
43	PEx1_2Clkn		PEx1_3Clkn	44
45	DIR		PWRGOOD	46
47	SMB_DAT		Reserved	48
49	SMB_CLK		Reserved	50
51	SMB_ALERT		PSON#	52

OneBank uses a lane shifting scheme to enable boards to be installed and connected automatically without having to configure them to use particular PCIe lanes.

The illustration shows upward expansion with an SBC having a top-side OneBank connector. This configuration is found on SBCs with a bottom-side heat spreader. The SBC may also have the OneBank connector on the bottom side for downward expansion. This configuration is found on SBCs with top-side heat sinks. OneBank I/O boards automatically support both top side and bottom side installation.

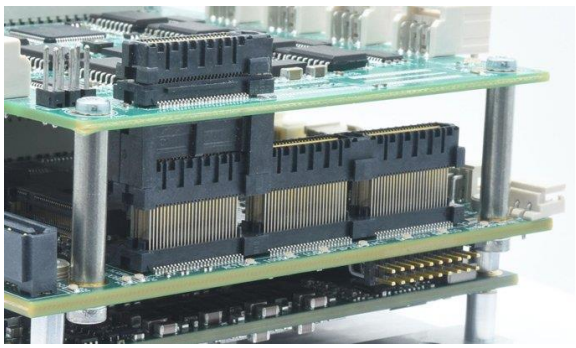


Are OneBank boards compatible with "full-size" PCIe/104 boards?

The OneBank connector signals are the same as those in the same position on the full-size PCIe/104 Type 1 and Type 2 connectors. OneBank I/O boards can be used with SBCs that have either the OneBank connector or the full-size Type 1 or Type 2 PCIe/104 connector.

A OneBank SBC can only be used with a OneBank I/O board or a PCIe/104 I/O board that only uses the signals on the first bank of the connector. It will not work with a PCIe/104 add-on board that requires the signals on the 2nd or 3rd banks of the larger connector.

A OneBank SBC with a PCI-104 connector can also work with a PCI-104 I/O board.



OneBank I/O board installed on top of PCIe/104 SBC with 22mm stacking height.

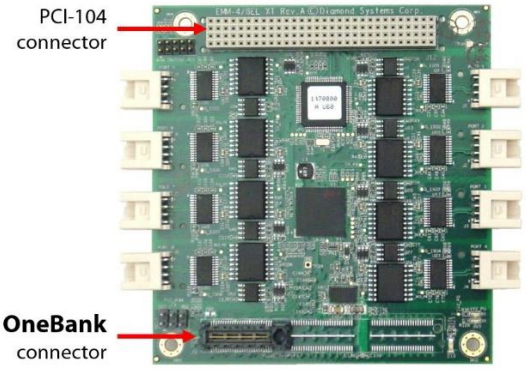
		I/O Module	
		Type 1 / Type 2	OneBank
SBC	Type 1 / Type 2	**OK**	**OK**
	OneBank	**X**	**OK**

PCIe/104 and OneBank Compatibility Table

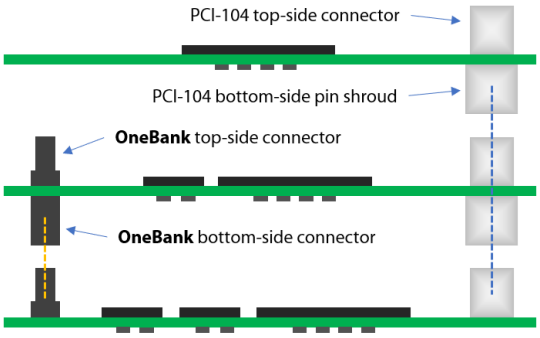
Note: Type 1 and Type 2 boards cannot be combined in the same system.

Why do some OneBank boards have the PCI-104 connector?

OneBank boards may optionally have the PCI-104 connector installed to enable them to be combined with PCI-104 boards using the PCI bus interface in the same system. This gives the system designer a greater choice of I/O boards. A OneBank board does not use the PCI-104 signals, they are simply passed through to enable the SBC on one side of the OneBank board to drive a PCI-104 board on the other side.



OneBank I/O board with pass-through PCI-104 connector.



PCI-104 I/O module

OneBank I/O module with PCI-104 pass-through

"PCI/104-Express" SBC with PCIe/104 and PCI-104 expansion

Where can I get more information?

Please visit the link below to obtain the PCIe/104 specification including the OneBank connector.

http://www.diamondsystems.com/support/techliterature