



CPCIe M.2 Flash Storage Module

Model: OSS-CPCIe3-3U-CR-4-M.2 / OSS-CPCIe3-3U-CR-8-M.2



CPCIe M.2 Flash Storage Module

SKU: OSS-CPCIe3-3U-CR-4-M.2



OSS
ONE STOP SYSTEMS

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Preface

Advisories

Five types of advisories are used throughout this manual to provide helpful information, or to alert you to the potential for hardware damage or personal injury.



NOTE

Used to amplify or explain a comment related to procedural steps or text.



IMPORTANT

Used to indicate an important piece of information or special “tip” to help you



CAUTION

Used to indicate and prevent the following procedure or step from causing damage to the equipment.



WARNING

Used to indicate and prevent the following step from causing injury.



DANGER or STOP

Used to indicate and prevent the following step from causing serious injury or significant data loss

Disclaimer: We have attempted to identify most situations that may pose a danger, warning, or caution condition in this manual. However, the company does not claim to have covered all situations that might require the use of a Caution, Warning, or Danger indicator.

Safety Instructions

Always use caution when servicing any electrical component. Before handling the expansion chassis, read the following instructions and safety guidelines to prevent damage to the product and to ensure your own personal safety. Refer to the “Advisories” section for advisory conventions used in this manual, including the distinction between Danger, Warning, Caution, Important, and Note.

- Always use caution when handling/operating the computer. Only qualified, experienced, authorized electronics personnel should access the interior of the computer and expansion chassis per UL and IEC 60950-1
- The power supplies produce high voltages and energy hazards, which can cause bodily harm.
- Use extreme caution when installing or removing components. Refer to the installation instructions in this manual for precautions and procedures. If you have any questions, please contact Technical Support.



WARNING

Never modify or remove the radio frequency interference shielding from your workstation or expansion unit. To do so may cause your installation to produce emissions that could interfere with other electronic equipment in the area of your system.

When Working Inside a Computer

1. Before taking covers off a computer, perform the following steps:
2. Turn off the computer and any peripheral devices.
3. Disconnect the computer and peripheral power cords from their AC outlets or inlets in order to prevent electric shock or system board damage.

In addition, take note of these safety guidelines when appropriate:

- To help avoid possible damage to systems boards, wait five seconds after turning off the computer before removing a component, removing a system board, or disconnecting a peripheral device from the computer.
- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs. If you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before connecting a cable, make sure both connectors are correctly oriented and aligned.



CAUTION

Do not attempt to service the system yourself except as explained in this manual. Follow installation instructions closely.

Protecting Against Electrostatic Discharge



Electrostatic Discharge (ESD) Warning

Electrostatic Discharge (ESD) is the enemy of semiconductor devices. You should always take precautions to eliminate any electrostatic charge from your body and clothing before touching any semiconductor device or card by using an electrostatic wrist strap and/or rubber mat.

Static electricity can harm system boards. Perform service at an ESD workstation and follow proper ESD procedures to reduce the risk of damage to components. We strongly encourage you to follow proper ESD procedures, which can include wrist straps and smocks, when servicing equipment.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component's anti-static packaging material until you are ready to install the component in a computer. Just before unwrapping the anti-static packaging, be sure you are at an ESD workstation or are grounded.
- When transporting a sensitive component, first place it in an anti-static container or packaging.
- Handle all sensitive components at an ESD workstation. If possible, use anti-static floor pads and workbench pads.
- Handle components and boards with care. Do not touch the components or contacts on a board. Hold a board by its edges or by its metal mounting bracket.

1 Introduction

The PCIe 3U M.2 Flash Memory Board supports up to 32TB of flash in a single PCIe or PCIe Type 2/Hybrid slot. The backplane connection supports up to PCIe 3.0 x8 to the M.2 drives for up to 64Gb/s bandwidth to the M.2 drives. Provides up to 32TB of storage in the card when using a mezzanine and 4TB modules.

Part#:

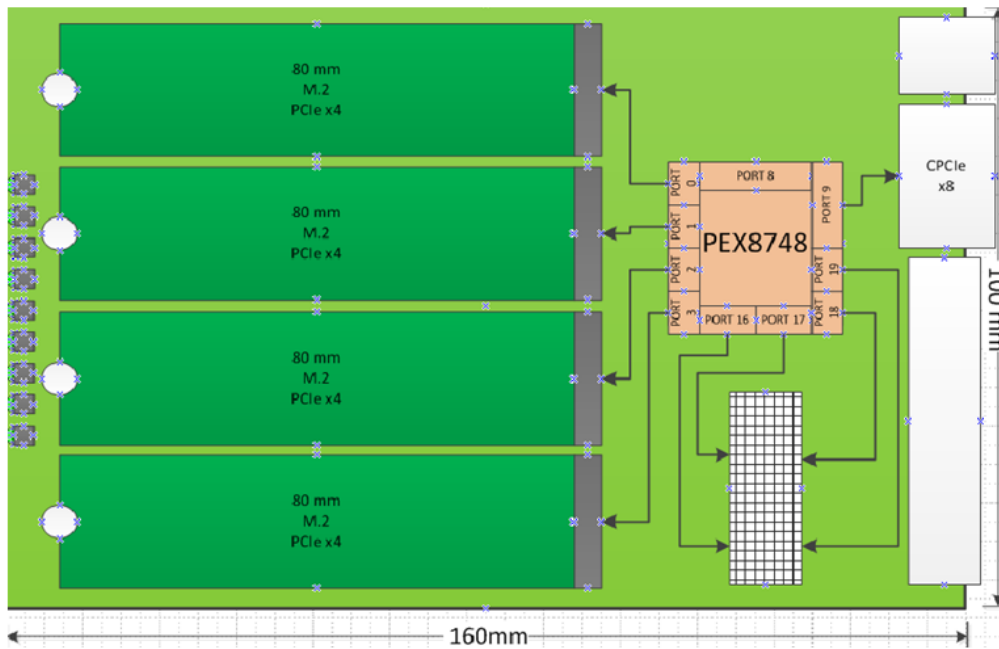
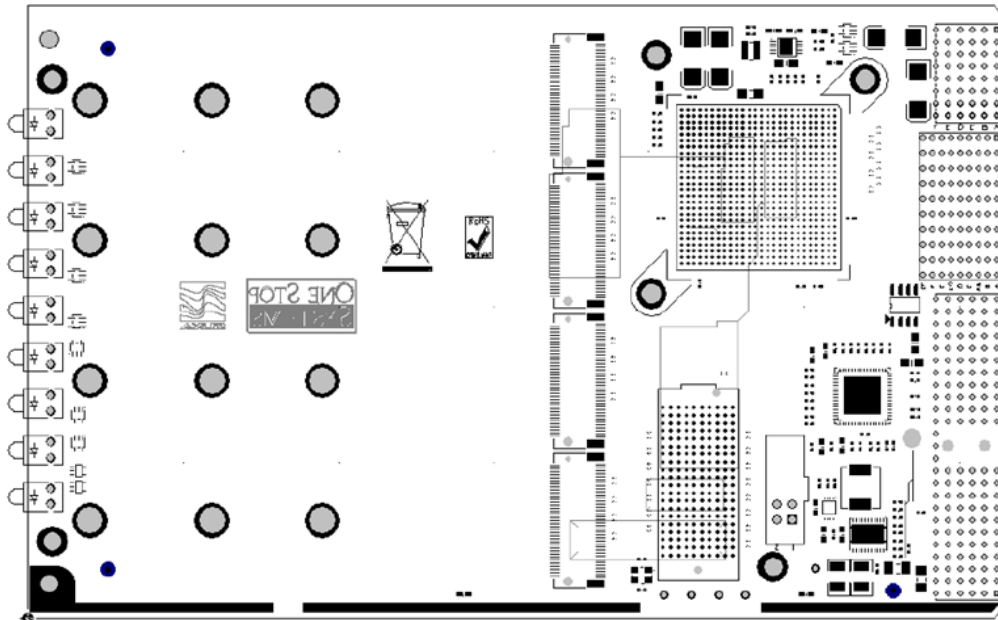
- OSS-478
- OSS-481

1.1 Specifications

Item	Description
Form Factor	3U PCIe/PXIe Type 2 Single slot order time option (not field upgradeable)
Dimensions	3.94 x 6.3" (100 x 160 mm) (H x L) <ul style="list-style-type: none"> • Single Slot 4HP, 0.8" width (OSS-478) • Single Slot 8HP, 0.8" width (OSS-478 + OSS-481 mezzanine) Weight: 3 lb
Bandwidth / Backplane Interface	PCIe x8 Gen3 (64Gb/s)
M.2 Interface	Four or Eight x4 Gen3 (32Gb/s) to each M.2
M.2 Modules	80mm up to 4TB each
RAID Configurations	Supports JBOD and Software RAID 0, 1, 5, 10 and 50
Front Panel Indicators	<ul style="list-style-type: none"> • 1 Power-on LED (green) • 4 or 8 M.2 link status LEDs (green)
Backplane Connectors	<ul style="list-style-type: none"> • XJ3 and XJ4 connectors • Optional J1 connector for use in hybrid slots (OEM option)
Power Consumption	30W max
Temperature Range	Operating: 0° to 55° C Non-operating: -40° to 85° C
Relative Humidity	10 to 90% non-condensing
Agency/Compliances	Designed to Meet: <ul style="list-style-type: none"> • FCC Part 15 Subpart B, Class A • CE • RoHS • EN55022, Class A • EN55024 • EN300386-2
Operating System	Windows 10, Windows Server 2012 R2

1.2 478 Block Diagram

OSS-478 (OSS-CPCIe-3U-M.2)

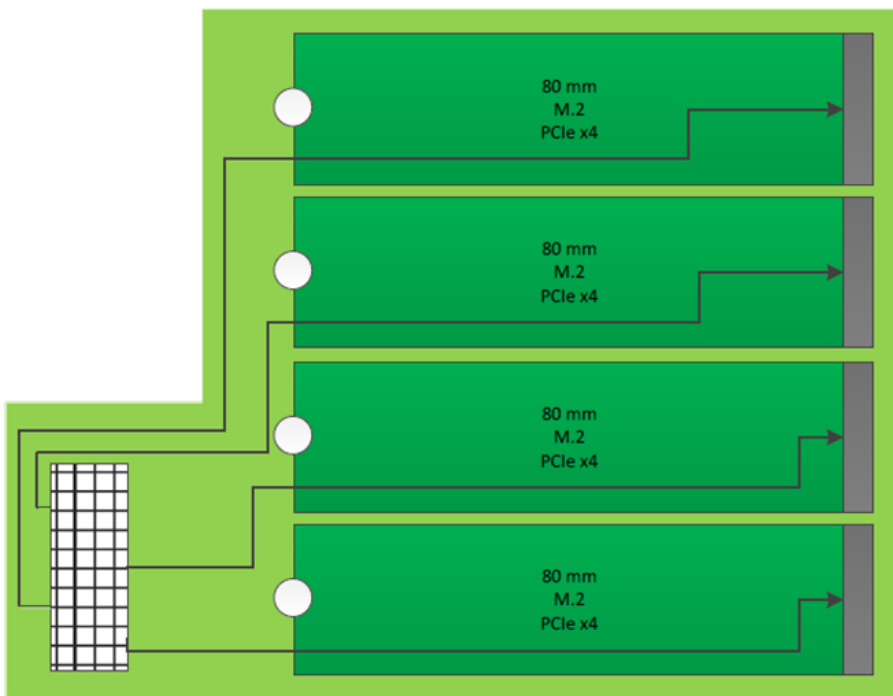
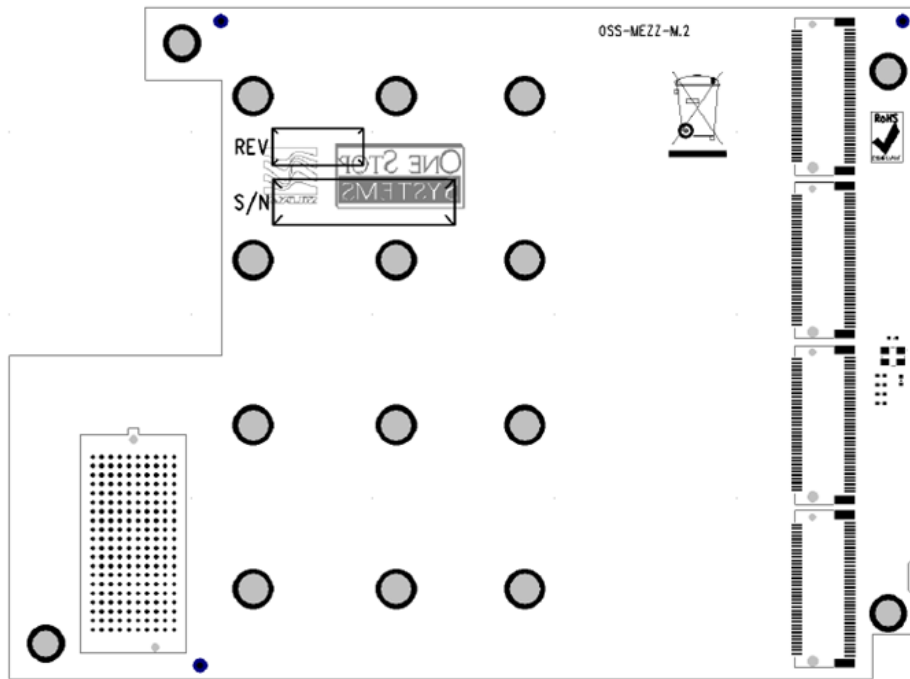


1.3 M.2 Interface

Since M.2 allows for direct communication over PCIe at up to 4 lanes without a controller chip, a PCIe switch chip is used on the M.2 mezzanine board to provide maximum lanes to each M.2 module

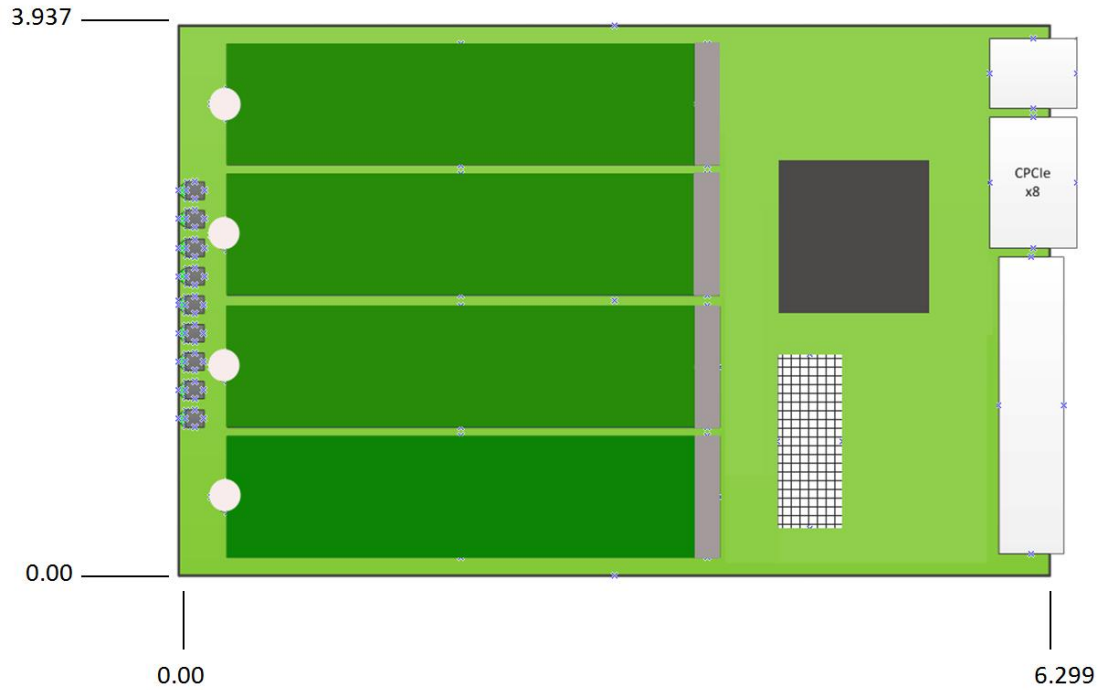
1.4 Optional Mezzanine board

OSS-481 (OSS-MEZZ-M.2)

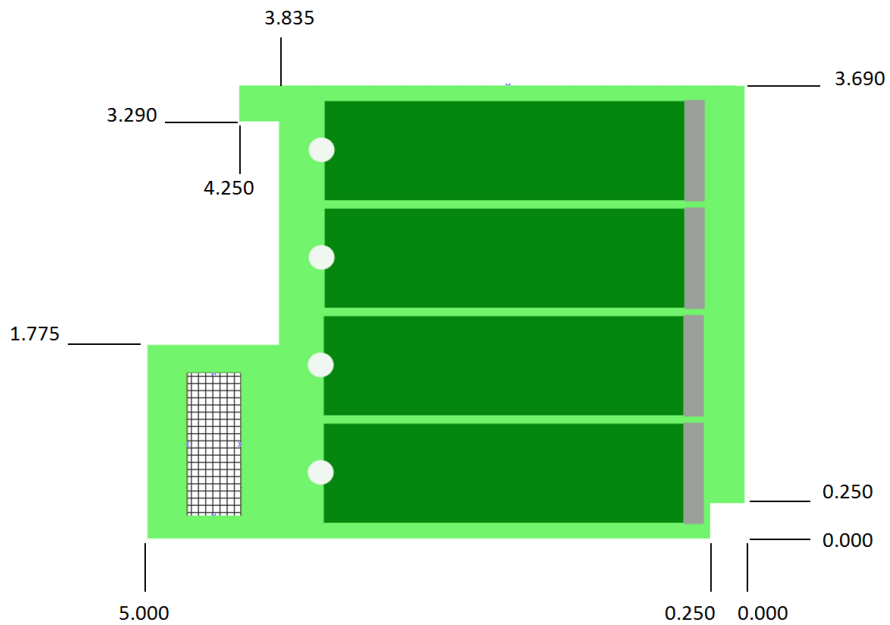


1.4 Board Dimensions

1.4.1 OSS-478 (OSS-CPCle-3U-M.2)

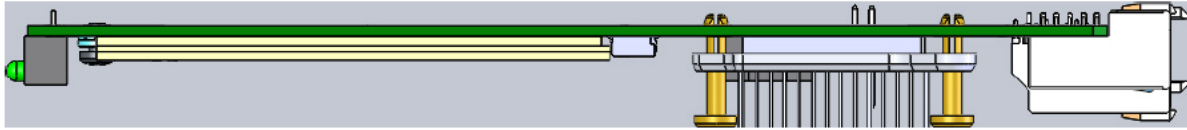


1.4.2 OSS-481 (OSS-MEZZ-M.2)

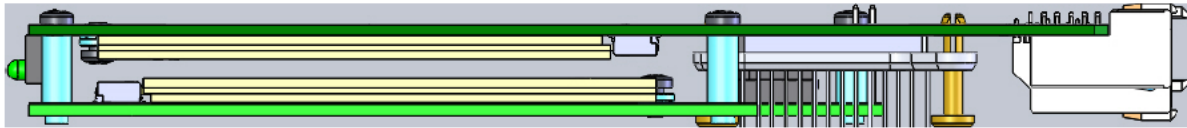


1.5 478 and 481 Combined

OSS-478 with M.2 DRIVES



OSS-478 and OSS-481 attached together



1.6 PCIe link LEDs

PCIe Link Status	LED Pattern
No Link	Off
Link is up, 2.5 GT/s, Any negotiated link width	Blinking 1Hz
Link is up, 5 GT/s, Any negotiated link width	Blinking 2Hz
Link is up, 8 GT/s, Any negotiated link width	On

1.7 General Features

- 3U CPCle form factor
- The board uses the 3U PXIe/EXP.0 4HP form factor to implement a standard configuration board using XP3 and XP4
- A 4HP filler front panel with flat folding handle is designed for this board to allow for very low profile board retention to the chassis.
- Compact PCIe EXP.0 Rev 1.0 Compliant interface
- PCIe 3.0 x8 bus interface on XP3 connector
- Utilizes a PCIe 3.0 Broadcom PEX 8748 PCIe switch
- Supports automatic down training to PCIe 1.1a (2.5GHz) or 2.0 (5GHz) to appropriate on-board and cabled devices supporting the PCIe Cable specifications
- RAID is accomplished via software RAID programs.
- The M.2 carrier supports up to 4 M.2 Modules
- The M.2 Mezzanine supports up to 4 additional M.2 PCIe modules plugged directly into the riser with no other cabling needed.
- Four 22mm x 80mm M.2 drives are mounted on the front side of the carrier and 4 are mounted on the rear side of the mezzanine.
- Current capacity of the mezzanine with all 8 M.2 modules
- Only M Key modules are supported. This is the version with PCIe signal interface. SATA interface is not supported.
- M.2 lengths supported are 80mm, 60mm and 42mm

1.8 PLX 8748 (48-lane) PCIe Switch

Description: 48-Lane, 12-Port PCIe Gen 3 Switch

Power:

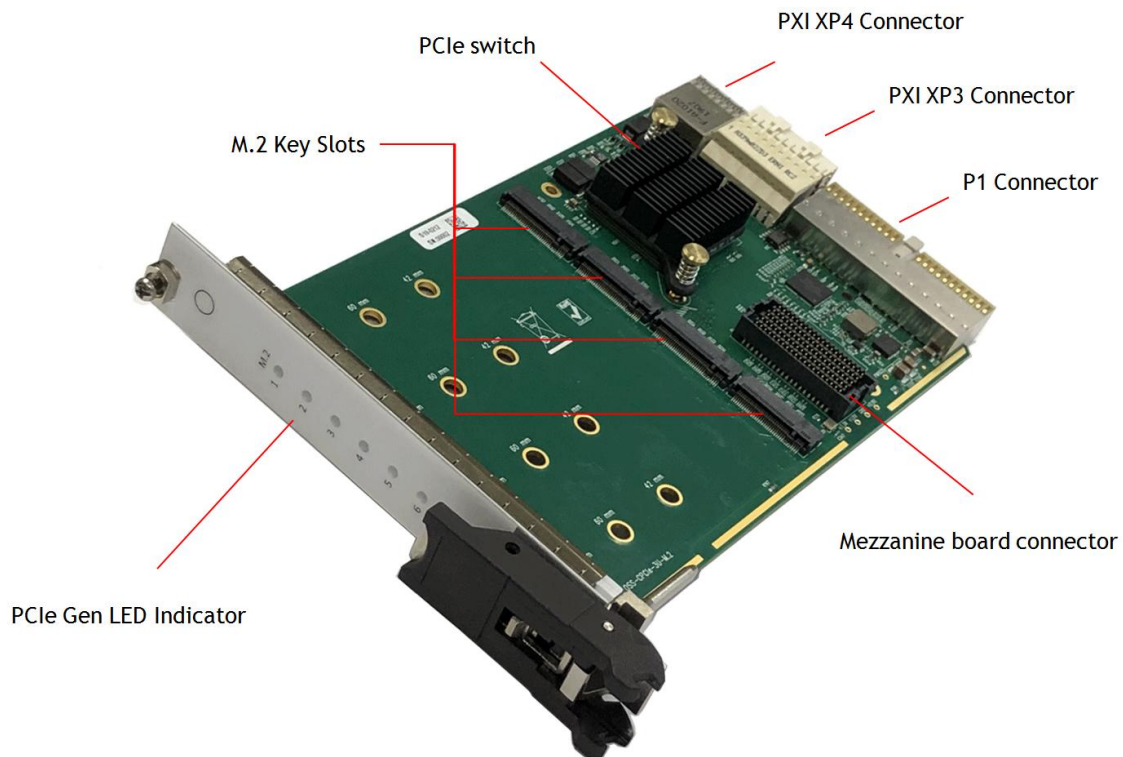
@2.5GT/s - .9V @ 11.6W, 1.8V @ 1.0W = 12.6W max

@5.0GT/s - .9V @ 13.2W, 1.8V @ 1.0W = 14.2W max

@8.0GT/s - .9V @ 13.9W, 1.8V @ 1.0W = 14.9W max

- The M.2 module carrier draws power from the +12v rail.
- The performance is limited by the width of the Gen3 x 8 (maximum) connections to the 478 board.

1.9 Parts of OSS-478 board



- PCIe Gen LED Indicator: Signify the PCIe Gen Speed of the M.2 slot
- PCIe Switch : On board PLX 8748 PCIe Switch
- M.2 Key slot: Slot for mounting the M.2 module
- Mezzanine board connector: For attaching the optional OSS-481 board
- PXI XP4 Connector>> Power and PXI Trigger and Local Bus
- PXI XP3 Connector>>. PCIe 3.0 x8 Bus Interface
- P1 Connector>> PCI Bus

2 Hardware & Software Requirements

2.1 Hardware

1. OSS-CPCle3-3U-CR-4-M.2 (OSS-478) **OR** OSS-CPCle3-3U-CR-8-M.2 (OSS-478 & OSS-481)
2. CPCle Host unit (with an internal x8 Gen3 backplane / slot or CPCle expansion unit (with Target adapter card)
 - a. If you are planning to use an CPCle expansion chassis, you need a x16 iPass cable (qty:1) and x16 Host adapter card, model: OSS-PCle-HIB38-x16 (qty:1)
3. M.2 Modules (Qty: 4 or Qty 8)
4. Power Cord(s)

2.2 Software

- M.2 driver / software. This is provided by the M.2 vendor. You can download the software / driver from the vendor's website.
- Windows 7, 10 and Server

2.3 Tools Required for Installation

To complete the installation of the OSS product you will need a Phillips-head screwdriver and ESD wrist strap to prevent electrostatic discharge.



3 Installation Procedures

The following steps will guide you through the installation of your OSS-478 board, OSS-481 and M.2 modules.

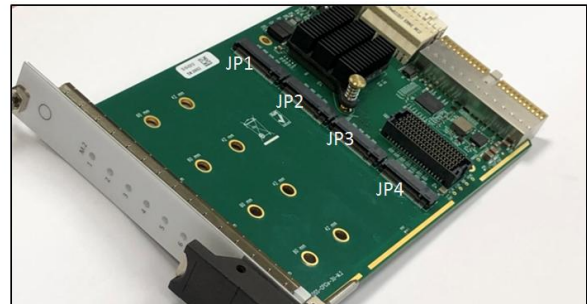
3.1 Installation on PCIe Host unit

Below is an example of a PCIe host running Windows OS (i.e Windows 10)



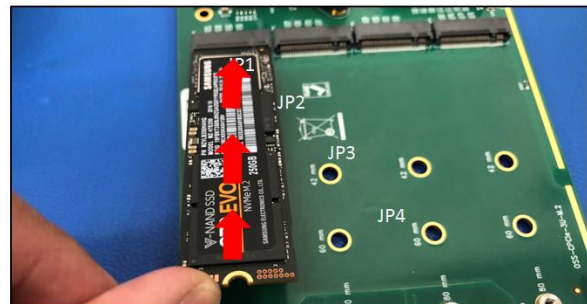
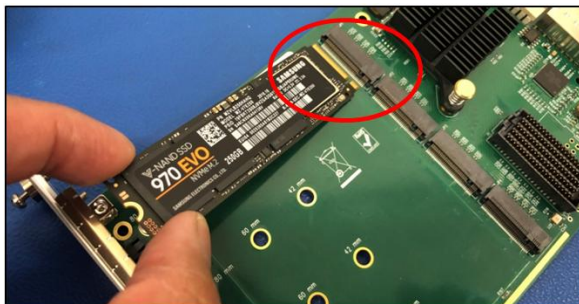
3.2 Prepare the OSS-478 board

Set the carrier board on a sturdy surface



3.3 Mount the M.2 CARD

Install the M.2 to JP1, JP2, JP3 and JP4 socket. Align the M.2 card to the slot and slowly push the card until it is fully seated.

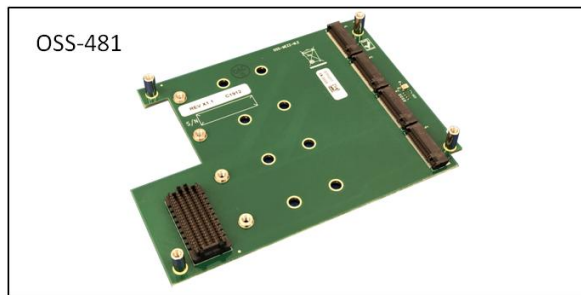


Secure the M.2 card(s).

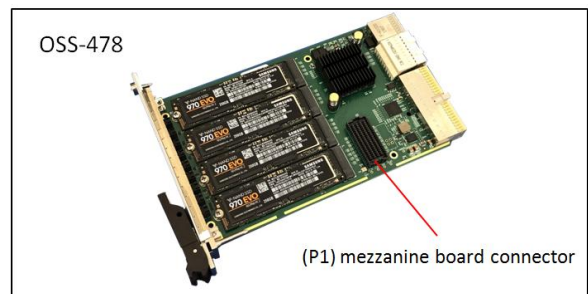
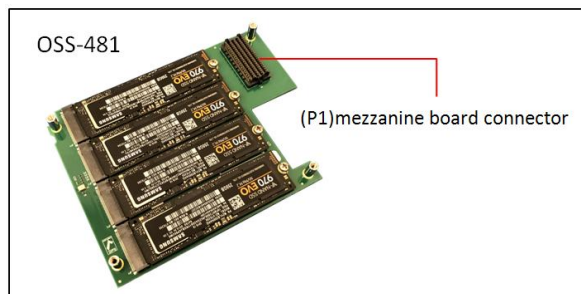


SKIP the instructions below if you do not have the mezzanine board (OSS-481). The OSS-481 is used to mount four more M.2 cards,

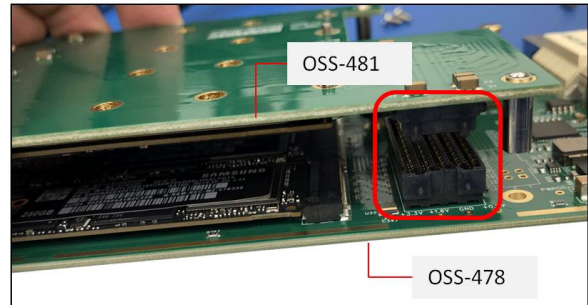
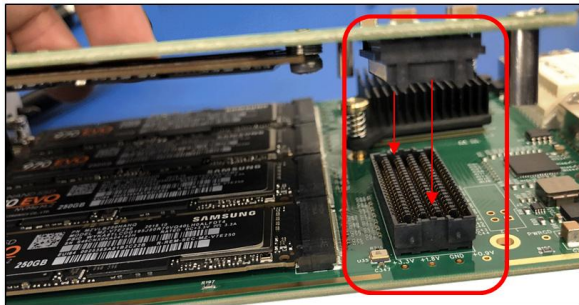
Place the OSS-481 mezzanine board on to a sturdy surface. Plug in each M.2 card to the slot (JP1, JP2, JP3 and JP4 socket). Secure the M.2 cards with screws.



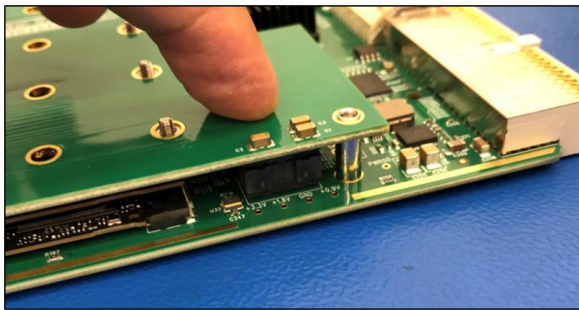
Attach the OSS-481 mezzanine board to the OSS-478 primary board.



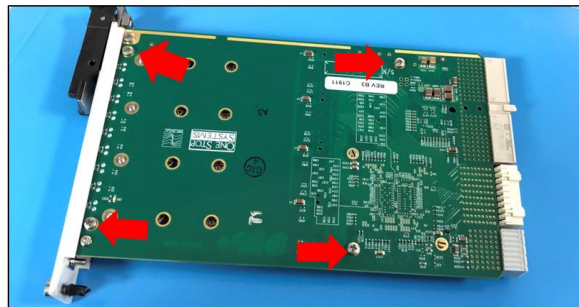
Place the OSS-48I on top of the OSS-478 and carefully align the two mezzanine board connectors.



Lightly press the OSS-48I board down to the OSS-478 board until both boards are firmly mated together.



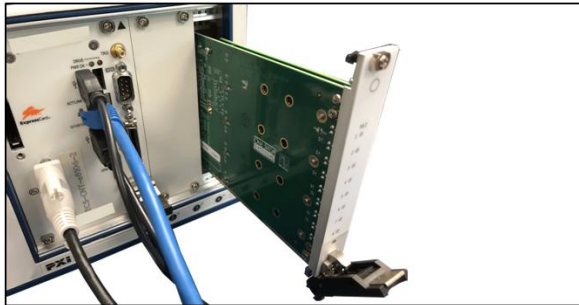
Turn the board and place the four screws to secure the OSS-48I board.



3.4 Install the CPCle M.2 Flash Storage Module

Install the card carrier or CPCle M.2 Flash Storage Module into the available slot of the CPCle enclosure / chassis.

Slowly push the card carrier until it is correctly seated in the slot and secure it.



3.5 Connect Power and Power UP

Plug in the power to the CPCle enclosure and power it UP. Upon powering UP the system, the OSS-478 bracket LEDs should come ON.

3.6 Verify Bracket LEDs

There are nine LEDs on the PXI bracket for 478. These are the Link LEDs for the 8748 PCIe switch.

- The top four LEDs are for each of the M.2 links on the main board, 478.
- The next four LEDs are for the M.2 links on the mezzanine board and the bottom LED is the upstream Link LED to the PXIe backplane.
- Solid green state means Gen3. Blinking green LEDs are Gen2 or Gen1 depending on the blink rate.



4 Software Installation

Install the appropriate software / driver for the M.2 device. OSS does not provide the driver / software for the M.2 device. This can be obtained or downloaded from the manufacturer's website.

When done installing the driver, reboot the host computer.

5 Identify / Verify the M.2 device

In Windows OS, you can access / view or manage the newly installed M.2 device by launching the “Disk Management” tool. Disk Management is a utility built into Windows Vista, Windows 7, Windows 8, and Windows 10, which can be used to create, delete, and format partitions.

5.1 Windows 10

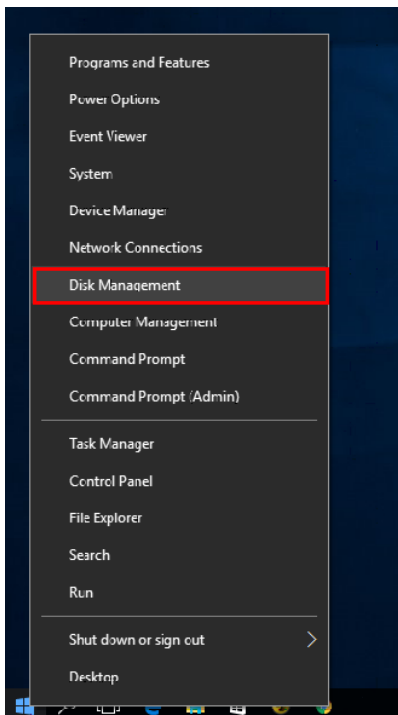
Several ways to open Disk Management in Windows 10

Way 1: Open it from the Quick Access Menu.

Right-click on **Start** at the bottom left of the screen



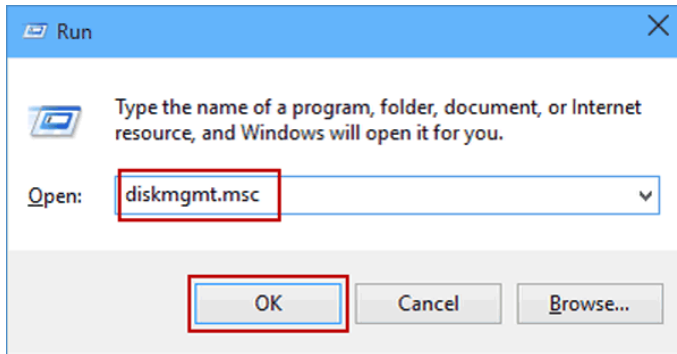
From the list, click on **Disk Management**



Disk Management will then launch on the Desktop

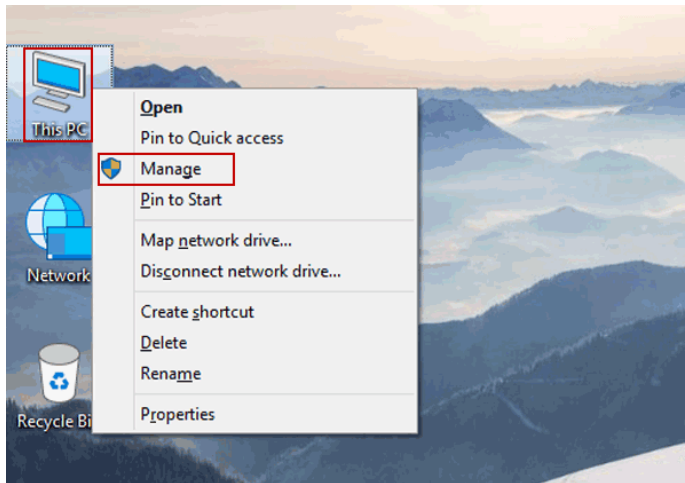
Way 2: Access Disk Management via Run.

Use Windows+R to open **Run**, type **diskmgmt.msc** in the empty box and tap **OK**.



Way 3: Open Disk Management in Computer Management.

Step 1: Right-click **This PC** and choose **Manage** in the context menu to enter Computer Management.

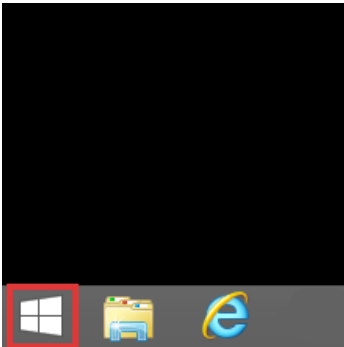


Step 2: Select **Disk Management** on the left.

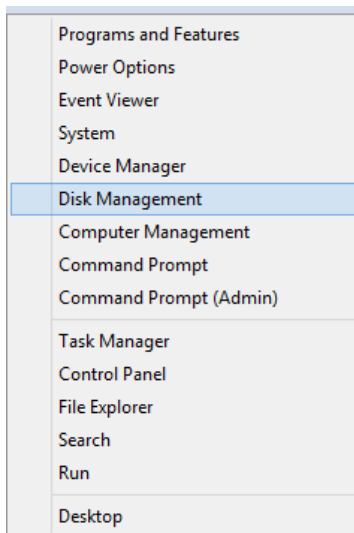
5.2 Windows 8

To access **Disk Management** in **Windows 8**, please follow the instructions below:

1. Right-click on **Start** at the bottom left of the screen



2. From the list, click on **Disk Management**

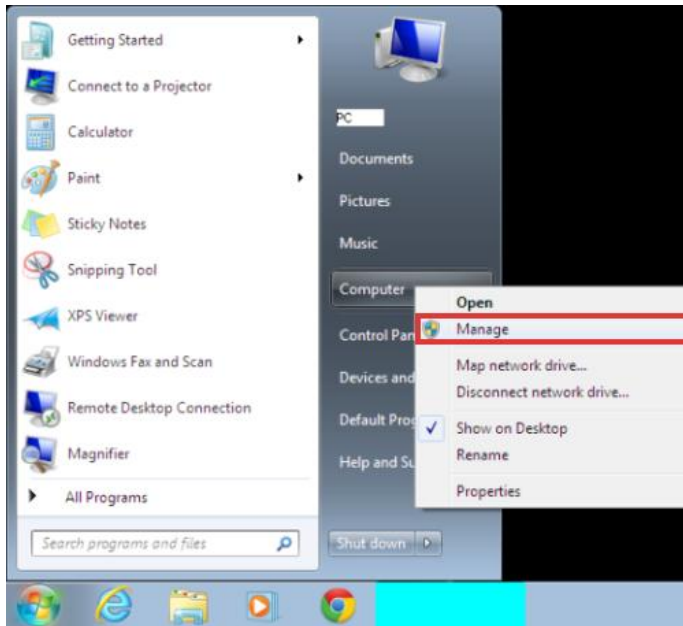


3. **Disk Management** will then launch on the Desktop

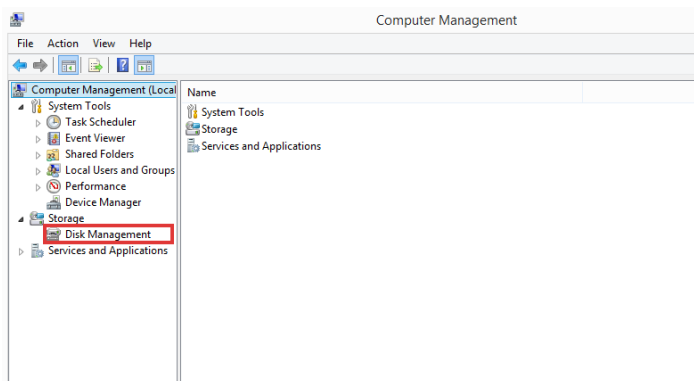
5.3 Windows Vista and 7

To access **Disk Management** in **Windows Vista** and **Windows 7** please follow the instructions below:

1. From the Start Menu, right-click on the **Computer** icon and choose **Manage** from the menu. This will bring up the Computer Management window



2. Click on **Disk Management**, which appears in the left-hand side under the heading Storage.

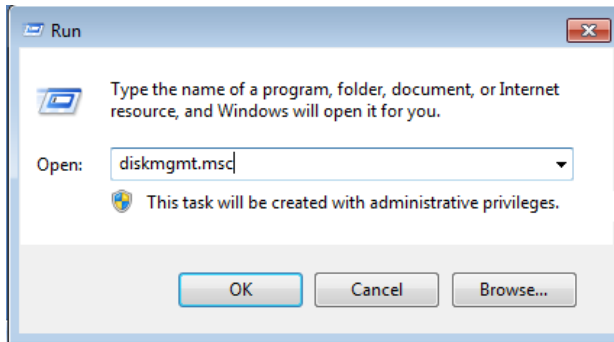


3. The list of the hard drives available is now be visible in the center of the window

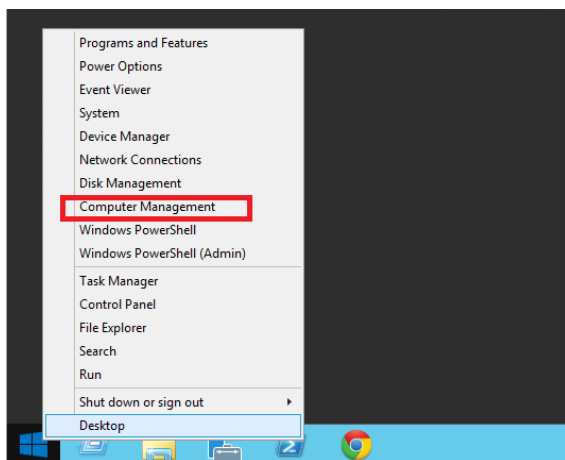
5.4 Disk Management in Windows Server 2012?

How to use Disk Management in Windows Server 2012? First, you need to open this tool. To open Disk Management in Server 2012, here provides you three different ways.

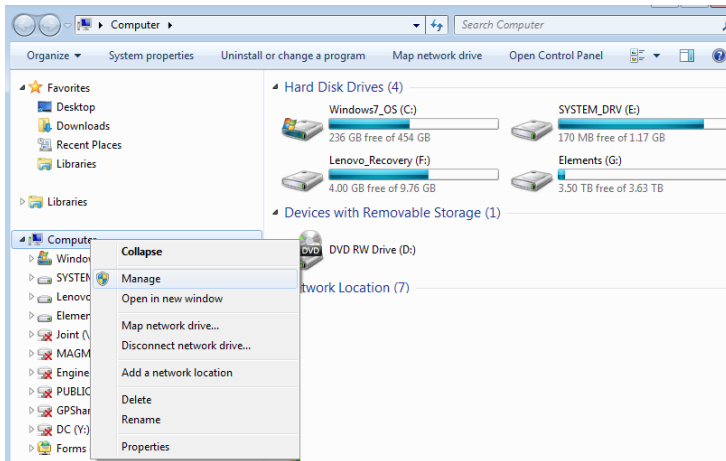
1. Right-click **Start** menu. Select **Run** program. In the Run dialog, type **diskmgmt.msc** and press **Enter** key. It will show you the Disk Management window.



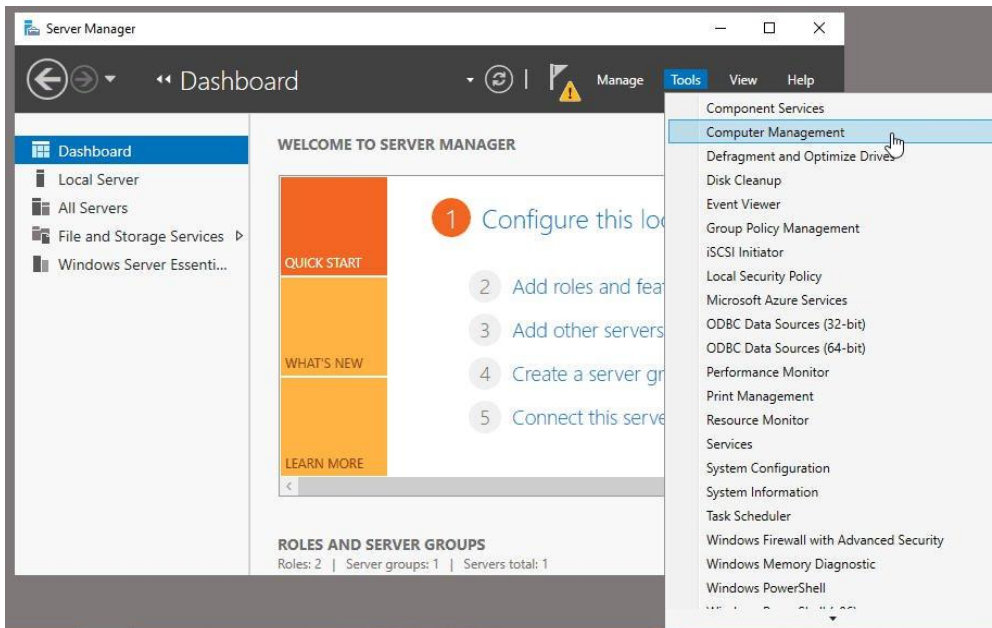
2. You can also right-click the **Start** menu, select **Computer Management** program here directly and click it. The Disk Management tool will be opened immediately.



3. Or you can open the Windows File Explorer, in the following window, right-click Computer, select **Manage**.



It will show you a Server Manager window, click **Tools -> Computer Management** to open the program.



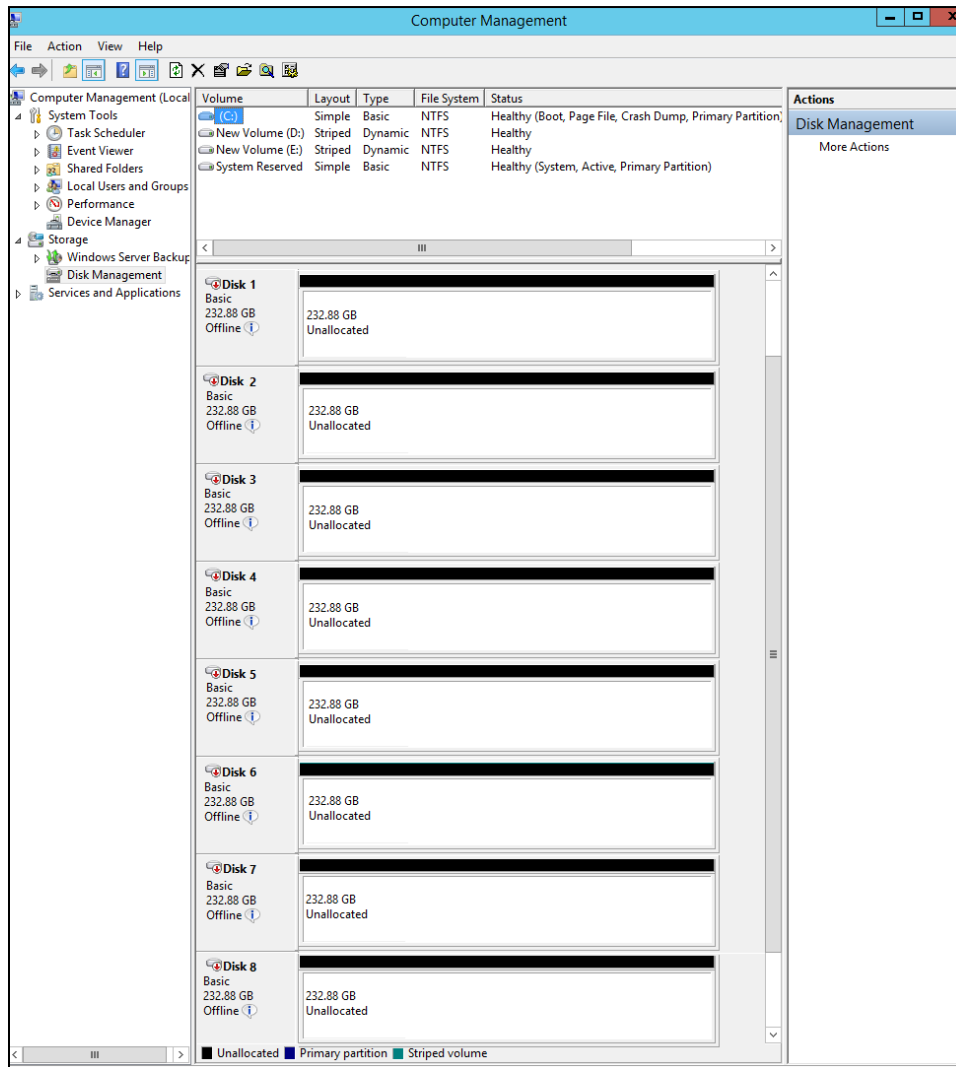
After opening the Disk Management, you can start to use it to partition hard drive for Server 2012. You can right-click on a disk or partition, and then, it will display a menu listing all options for different operations.

5.5 Managing the M.2 devices

Upon launching the “Disk Management” it will show all available disks on the screen. The M.2 storage devices are listed as Disk1, Disk2, Disk3, Disk4, Disk5, Disk6, Disk7 and Disk8 (see screenshot below). These disk are new and it will come up as “unallocated”.

For more detailed information on “Disk Management” tool go to Microsoft website, see link below.

<https://docs.microsoft.com/en-us/windows-server/storage/disk-management/overview-of-disk-management>

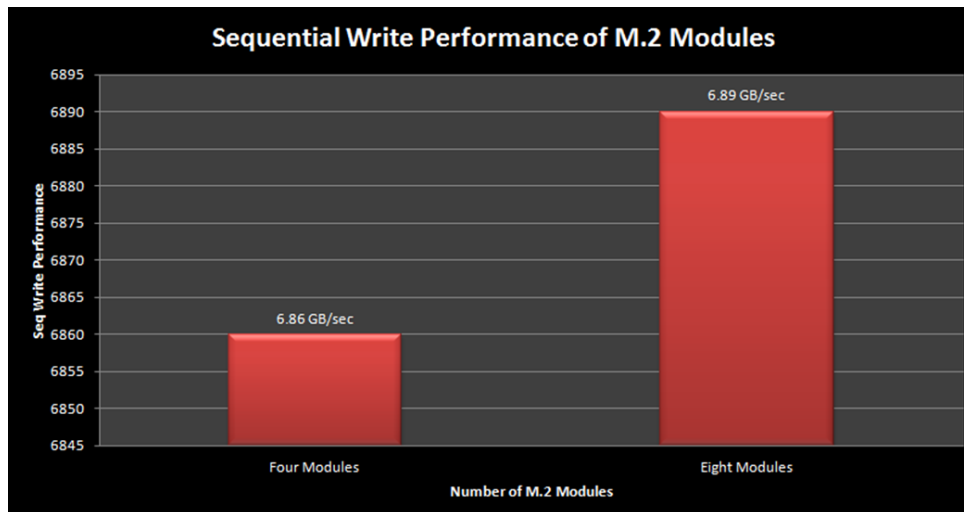


6 Read & Write Performance

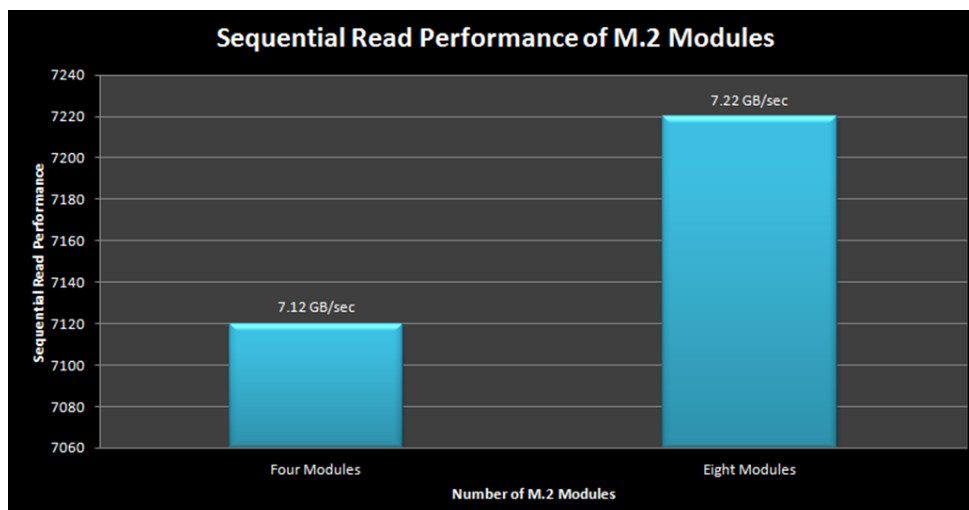
Below are the performance read and write test results of the M.2 modules mounted on the OSS card carrier.

- System: Using PXie 1095 NI Model with 25 GB DDR4, running Windows 10 64-bit Pro.
- Application for conducting read and write test: IOMeter version 1.1.
 - Setup with 4 Workers / Threads
- M.2 Module: Samsung V-NAND SSD 970 EVO, 2TB NVMe
 - Model: MZ-V7E2T0 2019.02 (R-REM-SEC-MZ-V7E2T0)
 - RATED: DC+3.3V (3.3A)
- 1st test with "Four M.2 modules = set as RAID 0"
- 2nd test with "Eight M.2 modules = set as RAID 0"

6.1 Sequential Write Performance



6.2 Sequential Read Performance



7 How to Get More Help

You can visit the Technical Support FAQ pages on the Internet at <https://www.onestopsystems.com/support>

7.1 Contacting Technical Support

Our support department can be reached by phone at [1 \(760\) 745-9883](tel:17607459883). Support is available Monday through Friday, 8:00 AM to 5:00 PM PT. When contacting Technical Support make sure to include the following information:

1. Exact and correct serial #
2. Service Ticket or Case # (if you already submitted an online request)
3. Computer Type & Model: Operating System
4. Make & Model of PCI/PCIe cards: Application
5. Problem description

When submitting an online technical support request always provide a valid working e-mail address, phone number, shipping address and proper contact name. Check your e-mail for an automated response containing the case # and updates. You can also visit our web site at: <https://www.onestopsystems.com/support> for a quick response, use the Technical Support and RMA Request Form available in the Support Section of the website. Simply complete the form with all required information. Please make sure that your problem description is sufficiently detailed to help us understand your problem.

Shipping or Transporting of Expansion Unit with PCI / PCIe cards

Any PCIe cards in **should be removed** (or not to be installed) prior to shipment to avoid or prevent possible damage. Note: Expansion board and PCIe / PCI cards that arrive damaged in shipment will not be covered under warranty.

7.2 Returning Merchandise

If factory service is required, a Service Representative will give you a Return Merchandise Authorization (RMA) number. Put this number and your return address on the shipping label when you return the item(s) for service. Please note that One Stop Systems WILL NOT accept COD packages, so be sure to return the product freight and duties-paid. Ship the well-packaged product to the address below:

Attention:RMA # _____, One Stop Systems
2235 Enterprise Street, #110
Escondido, CA 92029
USA

It is not required, though highly recommended, that you keep the packaging from the original shipment of your product. However, if you return a product for warranty repair/ replacement or take advantage of the 30-day money back guarantee, you will need to package the product in a manner similar to the manner in which it was received from our plant. We cannot be responsible for any physical damage to the product or component pieces of the product (such as the host or expansion interfaces for the expansion chassis) that are damaged due to inadequate packing. Physical damage sustained in such a situation will be repaired at the owner's expense in accordance with Out of Warranty Procedures. Please, protect your investment, a bit more padding in a good box will go a long way to insuring the device is returned to use in the same condition you shipped it in. Please call for an RMA number first.

7.3 Online Support Resources

As a product user and customer, listed below are our Online Support Resources

<https://www.onestopsystems.com/support> provides Knowledgebase Articles such as troubleshooting methods, compatibility, FAQ, documentation, and product technical information.

If you need technical support, product assistance or have a technical inquiry we encourage you to submit it on-line using our Technical Support Form. If you need to send a unit for repair or diagnostic evaluation, fill out our RMA (Return Material Authorization) online request form.

- <https://www.onestopsystems.com/support>



2235 Enterprise Street, Suite#110, Escondido CA 92029

Toll-Free : +1(800)285-8900 US • Main: +1 (760) 745-9883 • Fax: +1 (760) 745-9824

www.onestopsystems.com