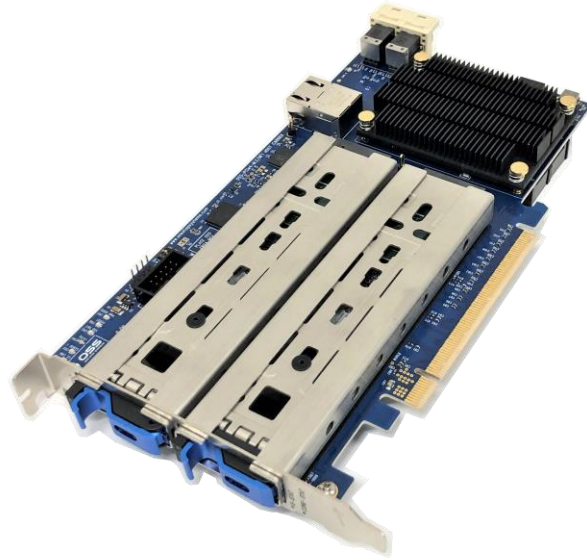


PCIe 4.0 Dual M.2 Carrier  
OSS-PCIe4-ADPT-x16-M.2-2



# User Manual

SKU: OSS-PCIe4-ADPT-x8-M.2-2



**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, One Stop Systems 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 One Stop Systems 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.



### **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

Before taking covers off a computer, perform the following steps:

Turn off the computer and any peripheral devices.

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. One Stop Systems strongly encourages 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.

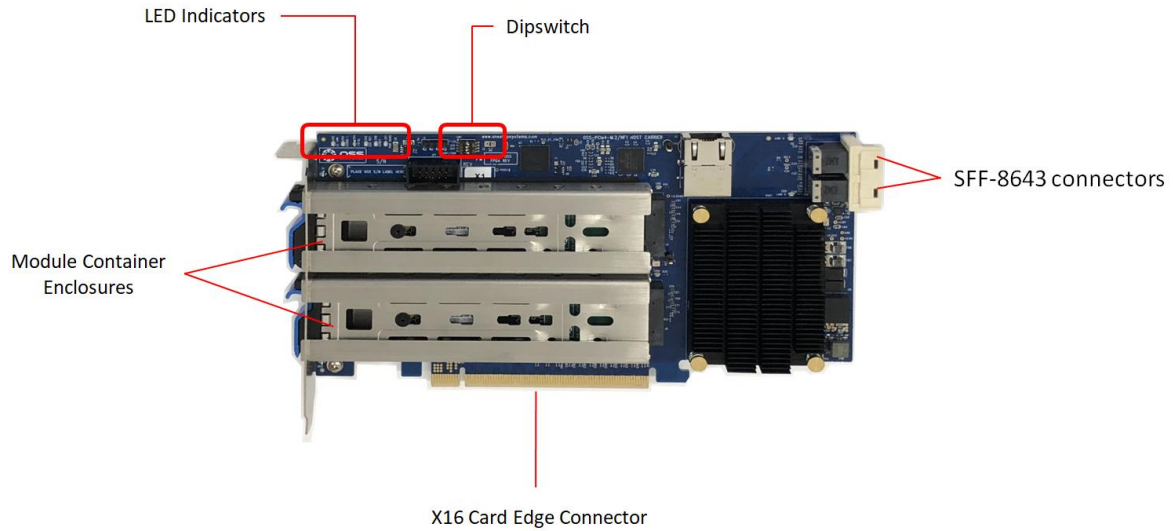
When transporting a sensitive component, first place it in an anti-static container or packaging.

Handle all sensitive components at an ESD workstation. If possible, use anti-static floor pads and workbench pads.

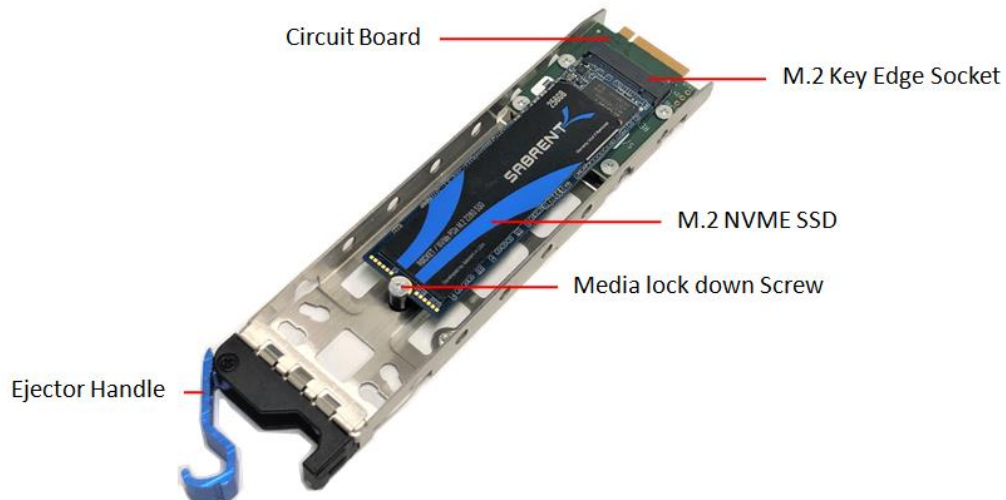
Handle components and boards with care. Do not touch the components or contacts on a board. Hold a board by its edges or by its metal mounting bracket.

# 1 Product Information

PCIe x16 Gen 4 add-in card supporting dual Gen 4 hot-swap M.2 drives in removable carriers and dual SFF-8643 connectors supporting additional NVMe expansion. The hot-swap removable carriers provide interchangeability and flexibility at Gen 4 M.2 speeds for edge applications while providing scalability through the additional SFF-8643 internal connections.



## 1.1 Removal Tray



## 1.2 Features

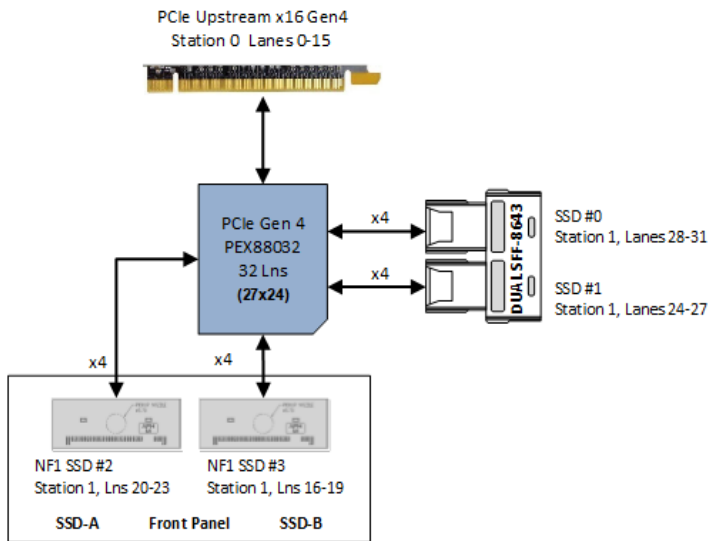
- Operates at up to 256Gb/s at PCIe Gen 4 speeds
- Dual PCIe 4.0 NVMe M.2 slots
- Hot-swap removable drive carriers
- Dual SFF-8643 connectors for additional PCIe 4.0
- Expansion options
- Supports M.2 2242/2260/2280
- Can be modified to support 22110 M.2 and EDSFF form factors
- Supports PCIe 3.0 backward compatibility

## 1.3 General Specification

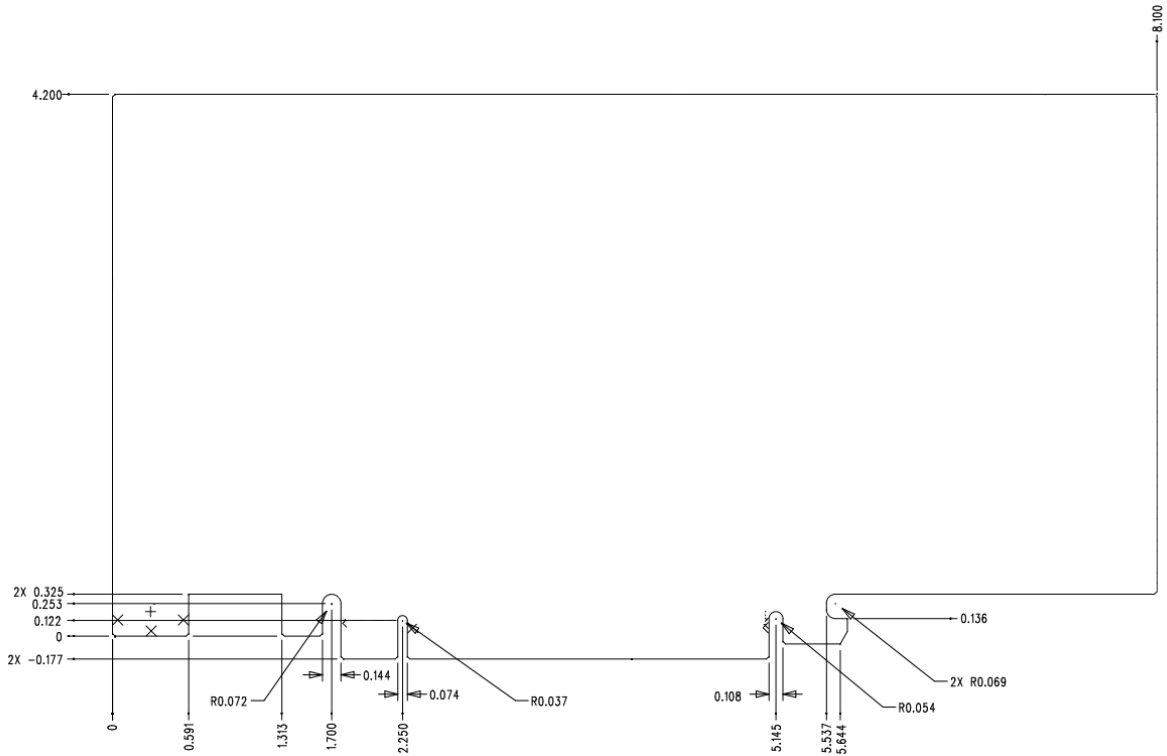
Form Factor	PCIe 4.0 x16 add-in card
Dimensions	8.1" x 4.2" (20.57 x 10.67 cm) at 0.063" (1.6mm) thickness
Bandwidth	Up to 256Gb/s
Drive Form Factors	Drive form factors supported: <ul style="list-style-type: none"> <li>• PCIe 4.0 NVMe M.2 2242, 2260, 2280 SSDs</li> <li>• PCIe 3.0 NVMe M.2 2242, 2260, 2280 SSDs</li> <li>• Canisters can be modified to support 22110 M.2 and EDSFF form factors</li> </ul>
Connectors	PCIe x16 card edge connector Dual SFF-8643 internal connectors Compliant to PCI-SIG PCI Express® External Cable Specification 3.0
Bracket	Standard full-height
PCIe Switch	Broadcom PLXPEX88032 <ul style="list-style-type: none"> <li>• 16 GT/s 32-Lane PCI Express Gen 4 Switch</li> <li>• DMA controller</li> <li>• SSC Isolation</li> </ul>
Power Consumption	45W
Operating Temperature	0°C to 40°C (200LFM airflow required) based on 1.7°C/W
Storage Temperature	-40°C to 85°C
Operating Humidity	20% to 80% relative humidity non-condensing
Storage Humidity	20% to 80% non-condensing
Agency Compliance	Designed to meet the following agency standards: <ul style="list-style-type: none"> <li>• FCC – Part 15 Class A, 47CFR; Canada ICES-003, issue 4, Class A; Japan: VCCI, Class A' CE Emissions 2004-108EC</li> <li>• UL/IEC 60950-1; Canada: CSA C22.2 No. 60950-1; Argentina: IEC60950-1; IEC 60950-1 (CB Certificate and CB Test Report)</li> <li>• CE Mark (EN55022 Class A, EN60950-1, EN55024, EN61000-3-2, EN61000-3-3)</li> <li>• CISPR 22, CISPR 24, Class A; Australia/New Zealand AS/NZS CISPR 22, Class A</li> <li>• RoHS 6 of 6 compliance (Directive 2002/95/EC)</li> <li>• WEEE (EU 2012/19) &amp; RoHS 3 (EU 2015/863)</li> </ul>
Supported Operating Systems	Windows 10 & Windows 10 Pro Windows 2012 Server Centos 7 Ubuntu 16x



## 1.4 Block Diagram

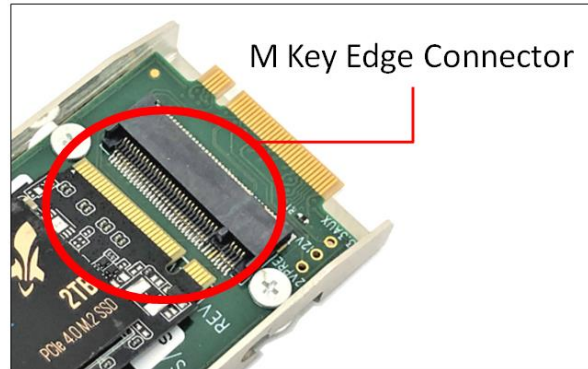


## 1.5 Dimensions



## 1.6 M Key Connector

The OSS-537 board supports M key edge connector



## 2 Hardware Requirements

This section provides the hardware parts needed for the OSS-537 board to work. It is strictly recommended to follow and use the hardware requirements listed below in order for the board to operate properly.

1. M.2 NVME SSD (Gen 4)
2. Recommended: Server type computer
3. Optional: Standard work station (with x16 Gen3 or Gen4 PCIe slot) with good air flow and cooling.

Your computer must have sufficient cooling and airflow to prevent overheating of the M.2 media.

Operating Temperature	0°C to 40°C (200LFM airflow required) based on 1.7°C/W. For standard workstation, it is highly recommended using 20 CFM Fan or higher
-----------------------	--



You can measure the airflow by using an inexpensive gadget called "Anemometer Handheld Wind Speed Mete".

## 3 Software Requirements

1. Computer running Windows Server or Windows 10 and Windows 10 Pro
  - a. For Windows 10 and Windows Pro you need to download and install the driver manually.
    - i. Download the Software from Broadcom:  
<https://www.broadcom.com/products/storage/host-bus-adapters/sas-nvme-9500-16j>
    - ii. Click the "Downloads", click "Driver" and click the link "ITSas35.....and download the file
    - iii. You can also go to "<https://www.broadcom.com/support/download-search>" and search for keyword "ItSas35"
  - b. On Windows Server, requires no driver. OS loads the driver automatically.
2. Centos 7
3. Ubuntu 16
  - a. NOTE: Ubuntu 18.x to 20.X are not yet compatible due to lack of driver support

## 4 Hardware Installation

The following steps will guide you through the installation of your OSS-537 board.

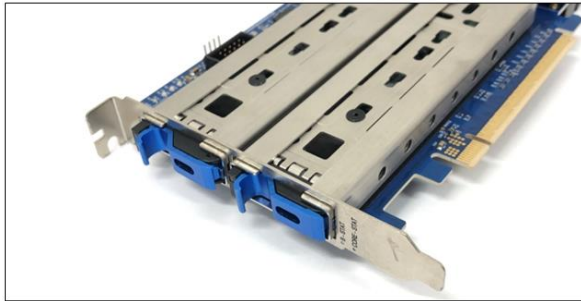
### 4.1 Installation-Procedures Overview

Following steps provide the exact sequence that needs to be followed in order to properly install the OSS-537 Board:

1. Set the OSS-537 board on a sturdy surface
2. Remove the module canister
3. Install the M.2 onto the circuit board
4. Secure the M.2 onto the circuit board
5. Turn OFF computer before installation
6. Remove cover from the computer
7. Remove the corresponding slot cover from computer chassis
8. Configure SW1 Dipswitch
9. Plug-in OSS-527 carrier board and secure it.
10. Slide the canister back into the PCIe carrier board
11. Power ON the computer
12. Perform Hardware check (Verify LED indicators)
13. Verify device installation (i.e Windows Device Manager or Linux lspci tree)

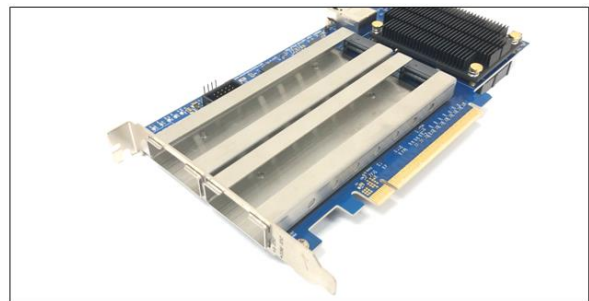
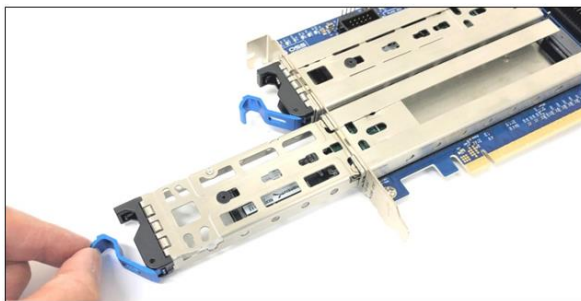
## 4.4 Prepare OSS-537 board

Place the OSS-537 board on a sturdy surface



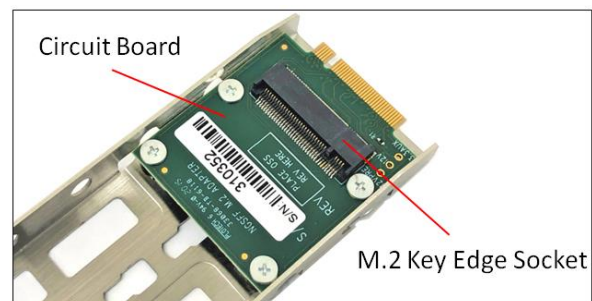
## 4.5 Remove the canister

Remove the module canister from the carrier board by pulling the tab to disengage.

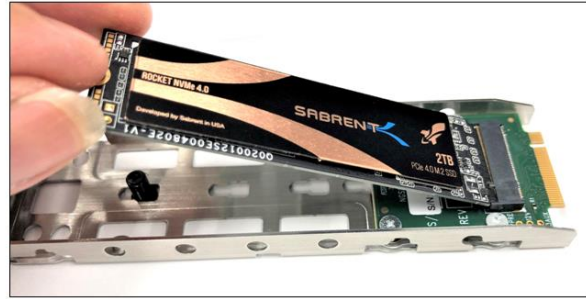


## 4.6 Install M.2 module

Align the M.2 Key edge connector to the M.2 key edge socket on the circuit board

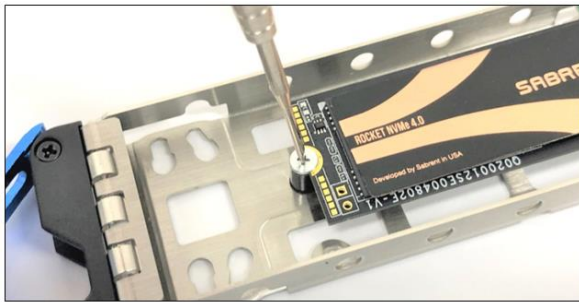


Slowly insert the media at ~30 degree position into the connector socket until it is fully seated inside the connector.



#### 4.7 Secure the Media

Secure the M.2 media onto the circuit board



Follow the steps below on how to install the canister in the PCIe card carrier and hot to plug in the PCIe cards in the computer.

#### 4.8 Turn OFF computer

Prior to installing the OSS-537 board make sure to turn OFF or power down the computer.

#### 4.9 Remove Computer's top cover

Remove the top cover of the computer to gain access to the motherboard.

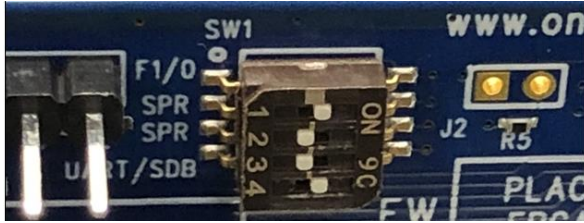
#### 4.10 Remove PCIe slot cover

Locate an unused PCI express 1x6 slot and remove the corresponding slot cover from computer chassis.

## 4.11 Configure SW1 Dipswitch

Set the SW1 Dipswitch using the settings below.

1= ON , 2= OFF, 3= OFF, 4= ON

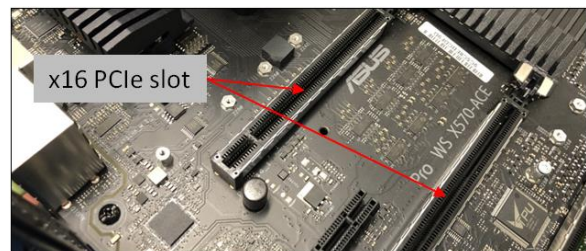
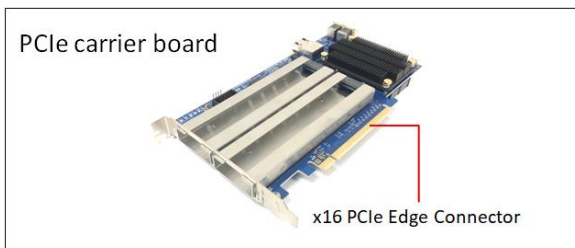


### 4.11.1 SW1 Dipswitch

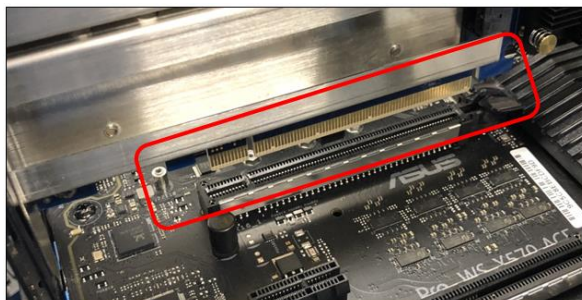
Toggle Switch#	Description / Purpose	ON	OFF
1	Flash 0 or Flash 1 SBR select	Flash 1 (default)	Flash 0
2	Spare switch		
3	Spare switch		
4	PCIe Switch Debug Serial Port select	UART port	SDB port

## 4.12 Install the PCIe carrier board

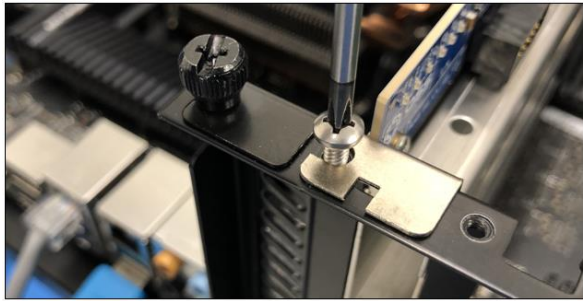
Plug-in the PCIe carrier board onto PCI express x16 slot.



Align the x16 edge connector of the PCIe card on top of the x16 slot connector on the motherboard and gently push the card down until it is seated firmly.



Secure the bracket with a screw.



### 4.13 Install Canister

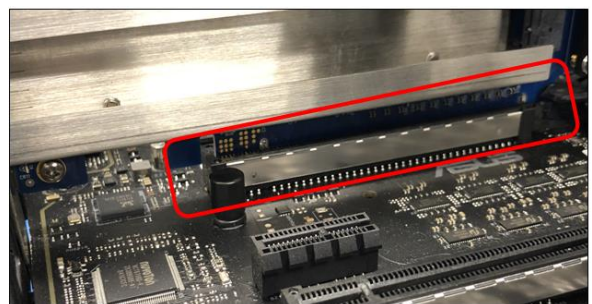
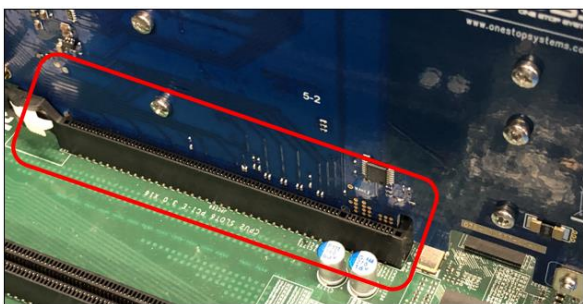
After installing PCIe carrier card into the computer, the next step is to install the canister.

- Slide the canister back into the enclosure of the PCIe carrier board.
- Push the lever forward to latch the canister in place



### 4.14 Power ON the computer

Prior to powering ON the computer, verify that the PCIe card edge connector is fully seated in the PCIe slot connector as shown from the photos below.

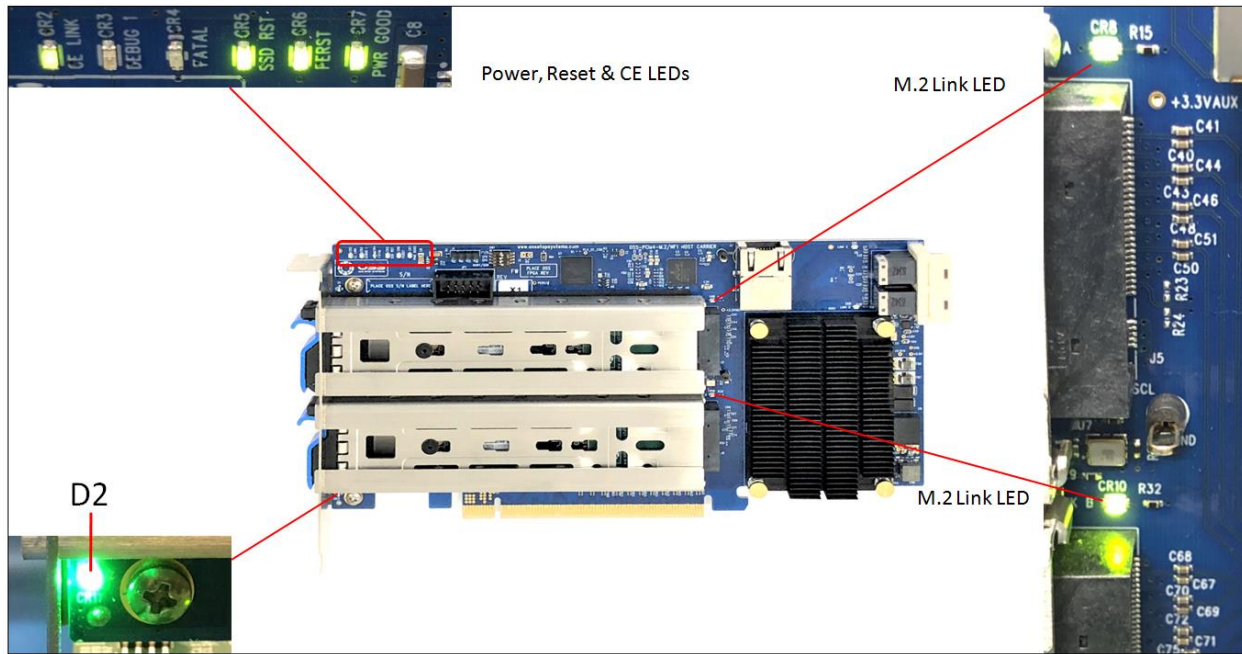




## 5 Hardware Check

Once the host computer has booted up, verify that all LEDs are correctly illuminated on the carrier card. An operational OSS-537 board will show the following LEDs illuminated.

1. CE LINK, SSD RST and RESET LED
2. M.2 LINK LEDs
3. D2 LED



### 5.1 LED Definition

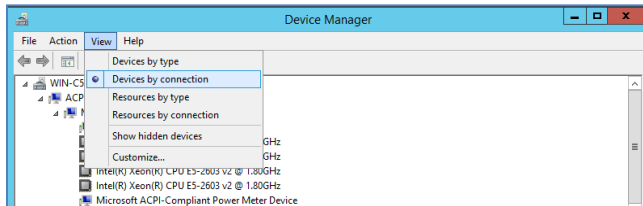
LED Name	When ON	When OFF
A and B Stat	Swap status still in development.	Normal for now
Core Stat	ARM core running when flashing	ARM core not running
CE	Card edge link status: solid on when Gen4 <ul style="list-style-type: none"> <li>• On for Gen4,</li> <li>• Flashing fast for Gen3,</li> <li>• Flashing slow for Gen2</li> </ul>	Not linked
SSD RST	One or more M.2 is seated in the carrier	Stuck in reset
PWR GOOD	Power is present on the board	No Power
M.2 Link LED	M.2 media is present / detected can flash at different rates	M.2 media is missing / not detected

## 6 Verify OSS Device on Windows OS

### 6.1 Using Device Manager

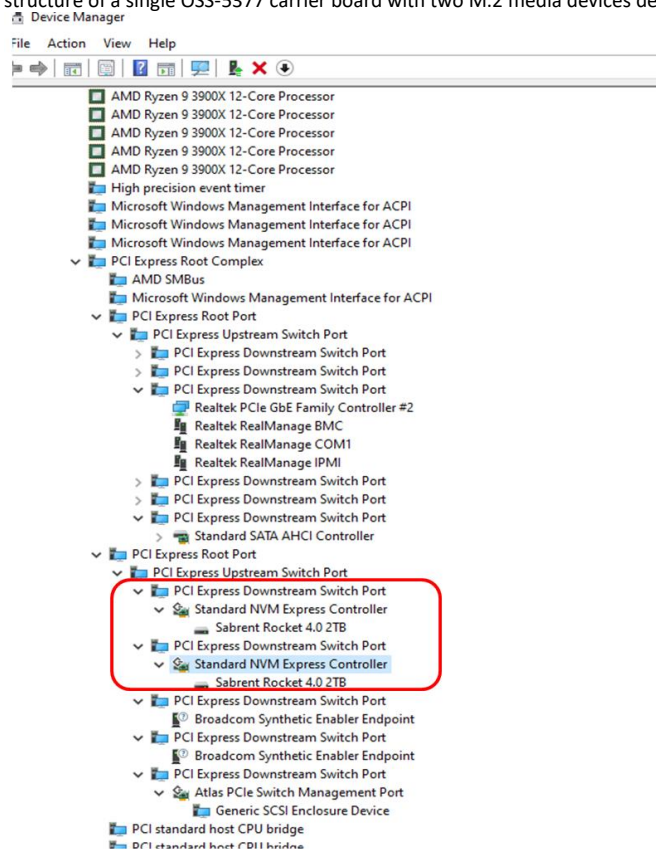
Verify the hardware device in Windows Device Manager. As your Windows computer starts up, you will see a small message box popping-up in the lower-right corner of the screen to alert you that Windows has found new hardware.

To verify a successful installation on Windows, find the **'My Computer'** icon and "right-click" on it. Then select **'Manage'** from the pop-up menu. Next, click on **'Device Manager'** in the leftmost Computer Management window. Finally, click on the **View Menu** and select **View Devices by Connection**.



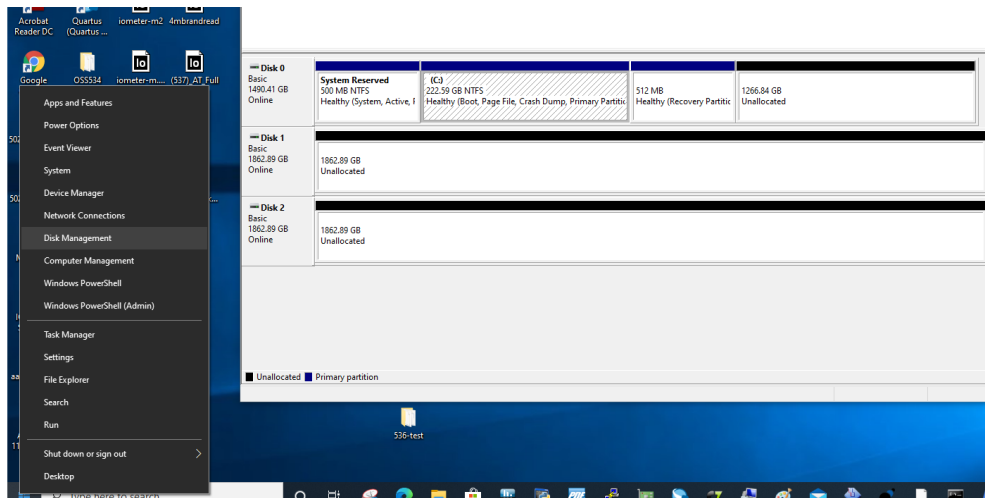
Open ACPI (BIOS) → Open PCI Bus → Click the '+' sign several times until you reach a PCI Express Root Port Complex with PCI Express standard Upstream Switch Port and PCI Express standard Downstream Switch Port.

When installed properly, you will see the two M.2 media devices and Standard NVM Express Controllers. The screenshots below represent the structure of a single OSS-5377 carrier board with two M.2 media devices detected on Windows 10 host computer.



## 6.2 Using Disk Management

You can also view the new M.2 storage devices by using the Disk Management, see photo below.



## 6.3 Check Temperature

You can check the temperature of the M.2 media via "Windows Powershell", see screenshot below.

```
Select Administrator: Windows PowerShell

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\WINDOWS\system32> Get-PhysicalDisk | Get-StorageReliabilityCounter | Sort-Object DeviceId | ft DeviceId,Temp*

DeviceId Temperature TemperatureMax
-----
0          34          90
1          29          90
2          34          90

PS C:\WINDOWS\system32> Get-PhysicalDisk | select DeviceID,FriendlyName,SerialNumber

DeviceID FriendlyName          SerialNumber
-----
2        Sabrent Rocket 4.0 2TB 6479_A731_F308_2E70.
0        SDLF1CRM-016T-1HA2 A0077815
1        Sabrent Rocket 4.0 2TB 6479_A731_F308_2D39.

PS C:\WINDOWS\system32>
```

## 7 Verify OSS Device on Linux OS

On a Linux based system, the installation can be verified by typing the following command lines:

### 7.1 Linux Commands

To check the storage devices, type the following commands

# nvme -list

```
root@localhost~
[root@localhost ~]# nvme -list
Node          SN                      Model                    Namespace Usage          Format          FW Rev
-----
/dev/nvme0n1  7F600703139D02311888  Sabrent Rocket 4.0 2TB  1          2.00 TB / 2.00 TB  S12 B + 0 B  RKT401.2
/dev/nvme1n1  A5CD070313B302311577  Sabrent Rocket 4.0 2TB  1          2.00 TB / 2.00 TB  S12 B + 0 B  RKT401.2
[root@localhost ~]#
```

# lsblk -a

```
[root@localhost ~]# lsblk -a
NAME                                MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
sda                                  8:0    0 465.8G  0 disk
├─sda1                               8:1    0  47.9G  0 part
├─sda2                               8:2    0    1K    0 part
├─sda3                               8:3    0    1G    0 part /boot
├─sda4                               8:4    0 353G   0 part
│   ├─centos-root                    253:0    0    50G   0 lvm  /
│   ├─centos-swap                    253:1    0    4G    0 lvm  [SWAP]
│   └─centos-home                    253:2    0 299G   0 lvm  /home
└─sda5                               8:5    0 63.9G  0 part
nvme0n1                             259:0    0  1.8T  0 disk
├─nvme0n1p1                         259:2    0 128M  0 part
nvme1n1                             259:1    0  1.8T  0 disk
├─nvme1n1p1                         259:3    0 128M  0 part
[root@localhost ~]#
```

# lspci -vtt | grep Phison

```
root@localhost~
[root@localhost ~]# lspci -vtt | grep Phison
|          +-+02.0-[82-88]----00.0-[83-88]--+00.0-[84]----00.0  Phison Electronics Corporation Device 5016
|          |          +-+01.0-[85]----00.0  Phison Electronics Corporation Device 5016
[root@localhost ~]#
```

# lspci -vtt | grep Broadcom

```
[root@localhost ~]# lspci -vtt | grep Broadcom
|          |          +-+02.0-[86]----00.0  Broadcom / LSI Device 02b2
|          |          +-+03.0-[87]----00.0  Broadcom / LSI Device 02b2
|          |          \-1f.0-[88]----00.0  Broadcom / LSI Device 00b2
[root@localhost ~]#
```

```
# lshw -short -class storage
```

```
[root@localhost ~]# lshw -short -class storage
H/W path          Device          Class          Description
-----
/0/100/11.4      scsi5           storage        C610/X99 series chipset sSATA Controller [AHCI mode]
/0/100/1f.2      scsi5           storage        C610/X99 series chipset 6-Port SATA Controller [AHCI mode]
/0/2/0/0/0      storage         Phison Electronics Corporation
/0/2/0/1/0      storage         Phison Electronics Corporation
/0/2/0/1f/0     storage         Broadcom / LSI
[root@localhost ~]#
```

```
# lsblk -f
```

```
[root@localhost ~]# lsblk -f
NAME            FSTYPE          LABEL  UUID                                MOUNTPOINT
sda
├─sda1          ext4             1317593c-b57a-4cf4-8ee7-41ed574fc881
├─sda2
├─sda3          xfs              dcb0ef42-9558-49e2-9268-0bf13f843ead  /boot
├─sda4          LVM2_member     3Rsgmt-dPyp-LSh3-ZkDF-3Ecu-1TAh-kL42cv
│   ├─centos-root xfs              3969e31a-d100-4dc2-b315-626d897a6975  /
│   ├─centos-swap swap             ffbbe5e1-a752-423f-9c9f-64a209a85b71  [SWAP]
│   └─centos-home xfs              6ae7569b-d9d7-4695-8565-8ca9b233de2c  /home
└─sda5          swap             b79888a0-c3df-4b23-94e7-2895465d2b17
nvme0n1
└─nvme0n1p1
nvme1n1
└─nvme1n1p1
```

```
# fdisk -l | grep nvme
```

```
[root@localhost ~]# fdisk -l | grep nvme
Disk /dev/nvme0n1: 2000.4 GB, 2000398934016 bytes, 3907029168 sectors
/dev/nvme0n1p1 1 4294967295 2147483647+ ee GPT
Disk /dev/nvme1n1: 2000.4 GB, 2000398934016 bytes, 3907029168 sectors
/dev/nvme1n1p1 1 4294967295 2147483647+ ee GPT
[root@localhost ~]#
```

```
# blkid
```

```
[root@localhost etc]# blkid
/dev/sda1: UUID="1317593c-b57a-4cf4-8ee7-41ed574fc881" TYPE="ext4"
/dev/sda3: UUID="dcb0ef42-9558-49e2-9268-0bf13f843ead" TYPE="xfs"
/dev/sda4: UUID="3Rsgmt-dPyp-LSh3-ZkDF-3Ecu-1TAh-kL42cv" TYPE="LVM2_member"
/dev/sda5: UUID="b79888a0-c3df-4b23-94e7-2895465d2b17" TYPE="swap"
/dev/mapper/centos-root: UUID="3969e31a-d100-4dc2-b315-626d897a6975" TYPE="xfs"
/dev/mapper/centos-swap: UUID="ffbbe5e1-a752-423f-9c9f-64a209a85b71" TYPE="swap"
/dev/mapper/centos-home: UUID="6ae7569b-d9d7-4695-8565-8ca9b233de2c" TYPE="xfs"
/dev/nvme0n1: PTTYPE="gpt"
/dev/nvme0n1p1: PARTLABEL="Microsoft reserved partition" PARTUUID="7d2c1029-cd2f-11ea-80b5-9c5c8ebcdf9d"
/dev/nvme1n1: PTTYPE="gpt"
/dev/nvme1n1p1: PARTLABEL="Microsoft reserved partition" PARTUUID="7d2c1023-cd2f-11ea-80b5-9c5c8ebcdf9d"
[root@localhost etc]#
```

## 7.1 Check Temperature

To check the M.2 media temperature on Linux, use the `nvme smart-log` command, see screenshot below.

```

root@localhost~# nvme -list
Node      SN                      Model                      Namespace Usage              Format              FU Rev
-----
/dev/nvme0n1  A5CD070313B302311577 Sabrent Rocket 4.0 2TB      1          2.00 TB / 2.00 TB      512 B + 0 B      RKT401.2
/dev/nvme1n1  7F600703139D02311888 Sabrent Rocket 4.0 2TB      1          2.00 TB / 2.00 TB      512 B + 0 B      RKT401.2
root@localhost~# nvme smart-log /dev/nvme0n1
Smart Log for NVME device:nvme0n1 namespace-id:ffffffff
critical_warning      : 0
temperature           : 31 C
available_spare       : 100%
available_spare_threshold : 5%
percentage_used       : 2%
data_units_read       : 63,423,184
data_units_written    : 61,224,337
host_read_commands   : 1,439,999,523
host_write_commands   : 2,231,673,921
controller_busy_time  : 1,613
power_cycles          : 235
power_on_hours        : 590
unsafe_shutdowns      : 62
media_errors          : 0
num_err_log_entries   : 316
Warning Temperature Time : 0
Critical Composite Temperature Time : 0
Thermal Management T1 Trans Count : 14
Thermal Management T2 Trans Count : 0
Thermal Management T1 Total Time : 560
Thermal Management T2 Total Time : 0
root@localhost~#

```

## 7.2 Check Speed and Link width

You can check the speed and link width of the OSS-537 board by using the commands below (see screenshot).

```

root@localhost~# lspci -vtt | grep Phison
+03.1-[09-0f]----00.0-[0a-0f]--+00.0-[0b]----00.0 Phison Electronics Corporation E16 PCIe4 NVME Controller
|
+-01.0-[0c]----00.0 Phison Electronics Corporation E16 PCIe4 NVME Controller
root@localhost~# lspci -vvv -s 0b:00.0 | grep 'LnkSta\|LnkCap'
LnkCap: Port #1, Speed 16GT/s, Width x4, ASPM not supported, Exit Latency L0s unlimited, L1 unlimited
LnkSta: Speed 16GT/s, Width x4, TrErr- Train- SlotClk+ DLActive- BWMgmt- ABWMgmt-
LnkSta2: Current De-emphasis Level: -6dB, EqualizationComplete+, EqualizationPhase1+
root@localhost~# lspci -vvv -s 0c:00.0 | grep 'LnkSta\|LnkCap'
LnkCap: Port #1, Speed 16GT/s, Width x4, ASPM not supported, Exit Latency L0s unlimited, L1 unlimited
LnkSta: Speed 16GT/s, Width x4, TrErr- Train- SlotClk+ DLActive- BWMgmt- ABWMgmt-
LnkSta2: Current De-emphasis Level: -6dB, EqualizationComplete+, EqualizationPhase1+
root@localhost~#

```

## 7.3 PCIe Device Detailed Info

You can view and capture the detailed information of the device by using the command below “lspci -vvv -s XX:xx.x (see screenshot below).

```

root@localhost:~# lspci -vvv -s 0b:00.0
0b:00.0 Non-Volatile memory controller: Phison Electronics Corporation E16 PCIe4 NVMe Controller (rev 01) (prog-if 02 [NVM Express])
Subsystem: Phison Electronics Corporation E16 PCIe4 NVMe Controller
Physical Slot: 16
Control: I/O- Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr- Stepping- SERR- FastB2B- DisINTx+
Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=fast >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-
Latency: 0, Cache Line Size: 64 bytes
Interrupt: pin A routed to IRQ 62
NUMA node: 0
Region 0: Memory at f6c00000 (64-bit, non-prefetchable) [size=16K]
Capabilities: [80] Express (v2) Endpoint, MSI 00
  DevCap: MaxPayload 256 bytes, PhantFunc 0, Latency L0s unlimited, L1 unlimited
    ExtTag+ AttnBtrn- AttnInd- PwrInd- RBE+ FLReset+ SlotPowerLimit 25.000W
  DevCtl: Report errors: Correctable+ Non-Fatal+ Fatal+ Unsupported+
    RlxdOrd+ ExtTag- PhantFunc- AuxPwr- NoSnoop+ FLReset-
    MaxPayload 256 bytes, MaxReadReq 512 bytes
  DevSta: CorrErr- UncorrErr- FatalErr- UnsuppReq- AuxPwr- TransPend-
  LnkCap: Port #1, Speed 16GT/s, Width x4, ASPM not supported, Exit Latency L0s unlimited, L1 unlimited
    ClockPM- Surprise- LLActRep- BwNot- ASPMOptComp+
  LnkCtl: ASPM Disabled; RCB 64 bytes Disabled- CommClk-
    ExtSynch- ClockPM- AutWidDis- BWInt- AutBWInt-
  LnkSta: Speed 16GT/s, Width x4, TrErr- Train- SlotClk+ DLActive- BWMgmt- ABWMgmt-
  DevCap2: Completion Timeout: Range ABCD, TimeoutDis+, LTR+, OBFF Not Supported
  DevCtl2: Completion Timeout: 50us to 50ms, TimeoutDis-, LTR-, OBFF Disabled
  LnkCtl2: Target Link Speed: 16GT/s, EnterCompliance- SpeedDis-
    Transmit Margin: Normal Operating Range, EnterModifiedCompliance- ComplianceSOS-
    Compliance De-emphasis: -6dB
  LnkSta2: Current De-emphasis Level: -6dB, EqualizationComplete+, EqualizationPhase1+
    EqualizationPhase2+, EqualizationPhase3+, LinkEqualizationRequest-
Capabilities: [d0] MSI-X: Enable+ Count=9 Masked-
  Vector table: BAR=0 offset=00002000
  PBA: BAR=0 offset=00003000
Capabilities: [e0] MSI: Enable- Count=1/8 Maskable- 64bit+
  Address: 0000000000000000 Data: 0000
Capabilities: [f8] Power Management version 3
  Flags: PMEClk- DSI- D1- D2- AuxCurrent=0mA PME (D0-,D1-,D2-,D3hot-,D3cold-)
  Status: D0 NoSoftRst+ PME-Enable- DSel=0 DScale=0 PME-
Capabilities: [100 v1] Latency Tolerance Reporting
  Max snoop latency: 0ns
  Max no snoop latency: 0ns
Capabilities: [110 v1] L1 PM Substates
  L1SubCap: PCI-PM L1.2+ PCI-PM L1.1+ ASPM L1.2+ ASPM L1.1+ L1_PM_Substates+
    PortCommonModeRestoreTime=10us PortTTPowerOnTime=300us
Capabilities: [128 v1] Alternative Routing-ID Interpretation (ARI)
  ARIcap: MFVC- ACS-, Next Function: 0
  ARIctl: MFVC- ACS-, Function Group: 0
Capabilities: [1e0 v1] #25
Capabilities: [200 v2] Advanced Error Reporting
  UESta: DLP- SDES- TLP- FCP- CmpltTO- CmpltAbrt- UnxCmplt- RxOF- MalfTLP- ECRC- UnsupReq- ACSViol-
  UEMsk: DLP- SDES- TLP- FCP- CmpltTO- CmpltAbrt- UnxCmplt- RxOF- MalfTLP- ECRC- UnsupReq- ACSViol-
  UESvrt: DLP+ SDES- TLP- FCP+ CmpltTO- CmpltAbrt- UnxCmplt- RxOF- MalfTLP+ ECRC- UnsupReq- ACSViol-
  CESSta: RxErr- BadTLP- BadDLLP- Rollover- Timeout- NonFatalErr-
  CEMsk: RxErr- BadTLP- BadDLLP- Rollover- Timeout- NonFatalErr+
  AERCap: First Error Pointer: 00, GenCap- CGenEn- ChkCap+ ChkEn-
Capabilities: [300 v1] #19
Capabilities: [340 v1] #26
Capabilities: [378 v1] #27
Kernel driver in use: nvme
Kernel modules: nvme
root@localhost ~#

```

## 7.4 Smartctl

Smartctl (**Self-Monitoring, Analysis and Reporting Technology**) is a command line utility or a tool that performs SMART tasks such as printing the SMART self-test and error logs, enabling and disabling SMART automatic testing, and initiating device self-tests.

Smartctl command allows you to check for errors and extract info regarding the disks that are used, see example below

```
[root@localhost etc]# smartctl -a /dev/nvme0n1
smartctl 7.0 2018-12-30 r4883 [x86_64-linux-3.10.0-1062.1.2.el7.x86_64] (local build)
Copyright (C) 2002-18, Bruce Allen, Christian Franke, www.smartmontools.org

=== START OF INFORMATION SECTION ===
Model Number:          Sabrent Rocket 4.0 2TB
Serial Number:         7F600703139D02311888
Firmware Version:     RKT401.2
PCI Vendor/Subsystem ID: 0x1987
IEEE OUI Identifier:  0x6479a7
Total NVM Capacity:   2,000,398,934,016 [2.00 TB]
Unallocated NVM Capacity: 0
Controller ID:        1
Number of Namespaces: 1
Namespace 1 Size/Capacity: 2,000,398,934,016 [2.00 TB]
Namespace 1 Formatted LBA Size: 512
Namespace 1 IEEE EUI-64: 6479a7 31f3082e70
Local Time is:         Mon Aug 10 21:17:56 2020 EDT
Firmware Updates (0x12): 1 Slot, no Reset required
Optional Admin Commands (0x0017): Security Format Frmw_DL Self_Test
Optional NVM Commands (0x005d):  Comp DS_Mngmt Wr_Zero Sav/Sel_Feat Timestmp
Maximum Data Transfer Size: 512 Pages
Warning Comp. Temp. Threshold: 90 Celsius
Critical Comp. Temp. Threshold: 95 Celsius

Supported Power States
St Op   Max   Active   Idle   RL RT WL WT  Ent_Lat  Ex_Lat
0 +     9.78W -        -      0 0 0 0    0        0
1 +     6.75W -        -      1 1 1 1    0        0
2 +     5.23W -        -      2 2 2 2    0        0
3 -     0.0490W -      -      3 3 3 3   2000    2000
4 -     0.0018W -      -      4 4 4 4  25000   25000

Supported LBA Sizes (NSID 0x1)
Id Fmt  Data  Metadt  Rel_Perf
0 +     512    0       2
1 -    4096    0       1

=== START OF SMART DATA SECTION ===
SMART overall-health self-assessment test result: PASSED

SMART/Health Information (NVMe Log 0x02)
Critical Warning:          0x00
Temperature:              28 Celsius
Available Spare:          100%
Available Spare Threshold: 5%
Percentage Used:          0%
Data Units Read:          13,608,598 [6.96 TB]
Data Units Written:       12,949,704 [6.63 TB]
Host Read Commands:      163,551,249
Host Write Commands:     211,987,584
Controller Busy Time:    81
Power Cycles:             204
Power On Hours:          296
Unsafe Shutdowns:        63
Media and Data Integrity Errors: 0
Error Information Log Entries: 186
Warning Comp. Temperature Time: 0
Critical Comp. Temperature Time: 0

Error Information (NVMe Log 0x01, max 63 entries)
No Errors Logged
```



## 8 Contacting Technical Support

Our support department can be reached by fax at (858) 530-2733 or by phone at (858) 530-2511. Support is available Monday through Friday, 8:00 AM to 5:00 PM PT. When contacting One Stop Systems Technical Support, please be sure to include the following information:

- |                  |  |
|------------------|--|
| 1) Name          | 7) Serial Number                                 |
| 2) Company Name  | 8) Computer Make                                 |
| 3) Phone Number  | 9) Computer Model                                |
| 4) Fax Number    | 10) Operating System and Version                 |
| 5) Email Address | 11) Make/Model of PCI cards in expansion chassis |
| 6) Model Number  | 12) Detailed description of the problem          |

You can also visit our web site at: <https://www.onestopsystems.com/support-0>

To submit a support ticket or case, use our OSS Online Support portal: <https://onestopsystems.desk.com/customer/portal/emails/new>

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. For example: Don't say "Won't boot up." Do say "Tried all the steps in the Troubleshooting Section and it still won't boot up."

For faster diagnosis of your problem, please run the two utility programs described in the following sections and include the diagnostic files they generate with your email.

## 9 Returning Merchandise to One Stop Systems

If factory service is required, you must contact OSS Service Representative to obtain 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. **One Stop Systems will return any product that is not accompanied by an RMA number.** 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:

RMA # \_\_\_\_\_  
One Stop Systems  
2235 Enterprise Street, Suite#110  
Escondido, CA 92029  
USA

It is not required, though highly recommended, that you keep the packaging from the original shipment of your One Stop Systems product. However, if you return a product to One Stop Systems 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. One Stop Systems 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 PCIe 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.

## 10 Shipping / transporting the card

Use appropriate packaging materials.



### IMPORTANT

PCIe cards should be removed (or not to be installed) prior to shipping to avoid or prevent possible damage, failure to do so, will void the warranty of the unit..

---

## 11 APPENDIX A Compliance

### FCC

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the service personnel will be required to correct the interference at his own expense. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the service personnel's authority to operate the equipment.

---



### NOTE

The assembler of a personal computer system may be required to test the system and/or make necessary modifications if a system is found to cause harmful interferences or to be noncompliant with the appropriate standards for its intended use.

---

Industry Canada

This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada

### CE

The product(s) described in this manual complies with all applicable European Union (CE) directives. One Stop Systems will not retest or recertify systems or components that have been reconfigured by customers



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