■ SSD7103&SSD7202&SSD7505&SSD7540 Boot RAID Windows Installation Guide

V1.03– May 2021

Content

Prerequisites for a Bootable RAID Configuration

The SSD7202/SSD7103/SSD7505/SSD7540 controllers can support bootable RAID arrays. After configuring an array using the UEFI RAID tool, you can install a Windows or Linux operating system to the NVMe SSD's. In order to configure a bootable NVMe RAID array, you will need the following:

1. **An NVMe SSD must be installed**. You must have at least one NVMe SSD installed into the SSD7202/SSD7103/SSD7505

2. RAID controller.

3. **A PCIe 3.0/4.0 slot with x8 or x16 lanes.** The SSD7202, SSD7103 or SSD7505 , SSD7540 must be installed into a PCIe 3.0/4.0 slot with x8 or x16 lanes.

4. **Your motherboard must have a UEFI BIOS with option ROM settings** for third party devices (such as the SSD7202/SSD7103/SSD7505/SSD7540, optical drives and USB flash drives). If this is not configured correctly, the system will fail to load the SSD7000 RAID controller. Please check the [SSD7202](#), [SSD7103](#), [SSD7505](#) and [SSD7540](#) compatibility lists for recommended motherboards.

5. **Secure Boot must be disabled.** The SSD7202/SSD7103/SSD7505/ SSD7540 UEFI capability has not been signed and certified. If Secure Boot is enabled, the motherboard will not recognize the SSD7000 controller, and you will be unable to proceed with installation.

6. **Install an optical drive into the system** (such as a DVD-ROM, DVD-RW or Blu-Ray drive).

7. **Prepare the OS Installation disc (**Windows 10 & later / Windows server 2016 & later, or a Linux Distribution that corresponds with the binary diver you intend to install). Download and burn an official copy of the latest ISO image of your preferred operating system to a DVD. This should be inserted into the optical drive when booting the system.

8. **You will need a USB flash drive** – the UEFI package and driver should be extracted to the root directory of this flash drive.

9. **Remove all other drives during the OS installation process.** Make sure only the SSD7000 controller, the USB flash drive, and the optical drive are installed into the system during this procedure. This includes any other USB hard drives, USB flash drives, memory sticks, or SAS/SATA drives. You can reattach these drives after the operating system has been successfully installed.

10. **Make sure any non-HighPoint drivers are uninstalled for any SSD's hosted by the SSD7000 series RAID controllers. 3rd party software and manufacturer provided drivers may prevent the SSD7000 from functioning properly**

11. **For Windows 10 users, make sure to Disable Fast Boot.**

UEFI BIOS Settings

Different motherboards will provide different UEFI-related BIOS settings. Please consult your motherboard's user manual for more information. This section provides examples for two different types of motherboard BIOS menus.

1. **Example 1:** Changing the UEFI setting (SuperMicro X11DAi-N motherboard).
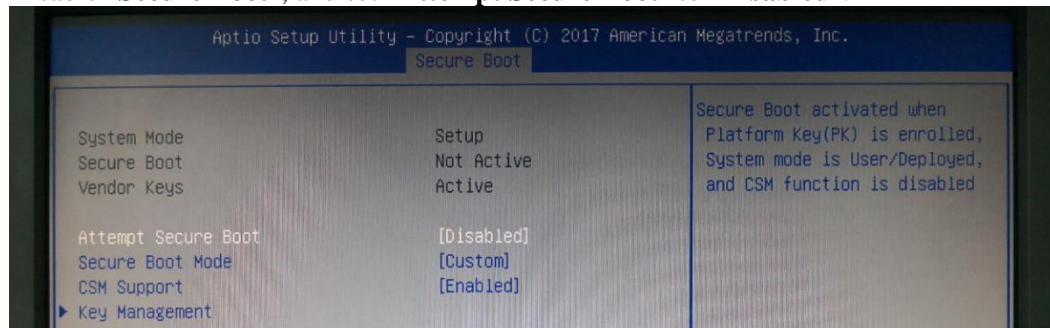   1. Boot the system and access the motherboard BIOS menu.
   2. Scroll to the **Boot** tab and set the "**Boot Mode Select**" to "**UEFI**";
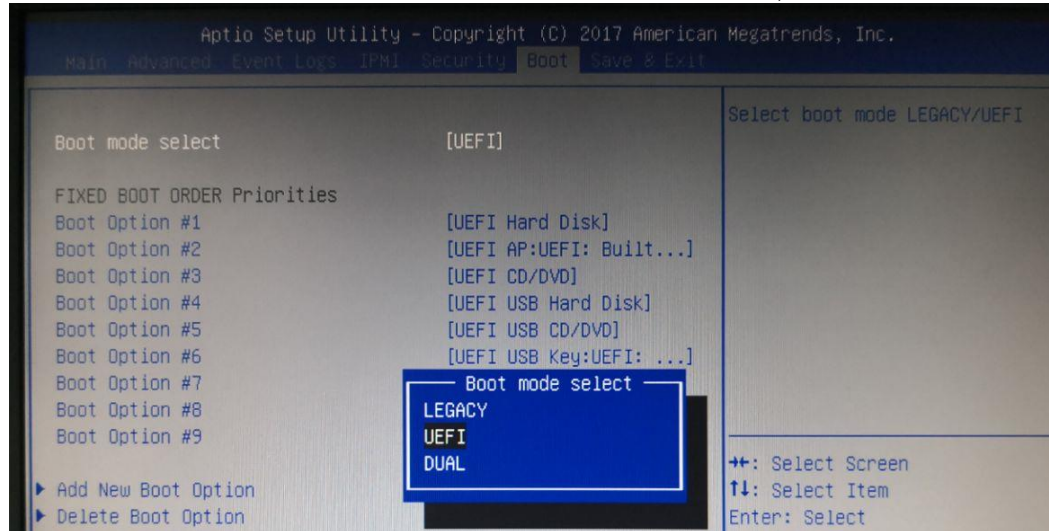

   3. Under "**Advanced->PCIe/PCI/PnP Configuration->**, change **"CPUx Slot x PCI-E OPROM**" to "**EFI**". "**x**" represents the PCIE slot assignment. For this example, the SSD7103 is installed into "CPU1 Slot 1".
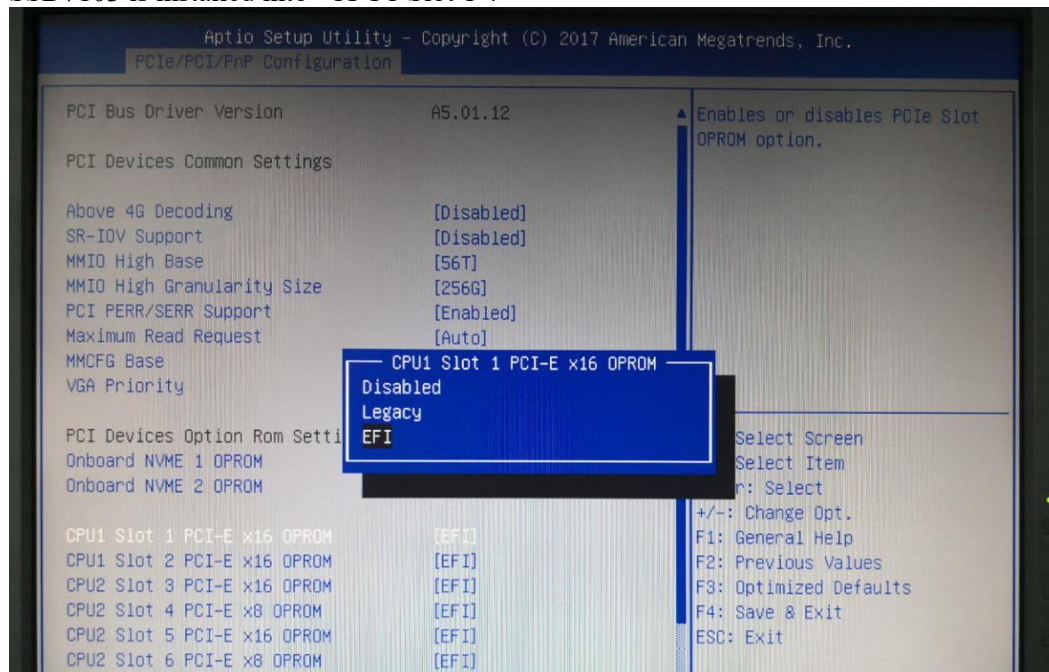
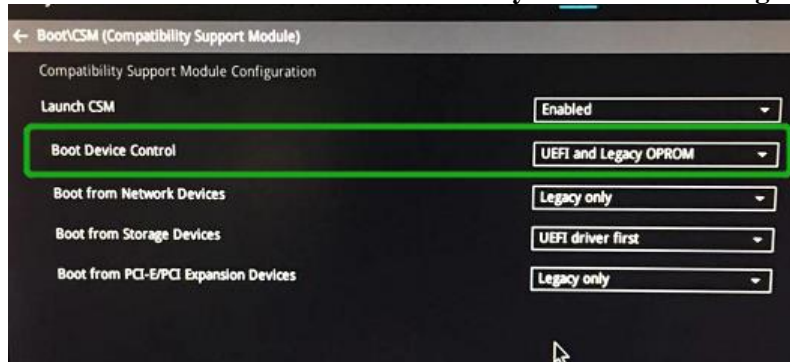4. Disable "**Secure Boot**", and set "**Attempt Secure Boot**" to "**Disabled**".
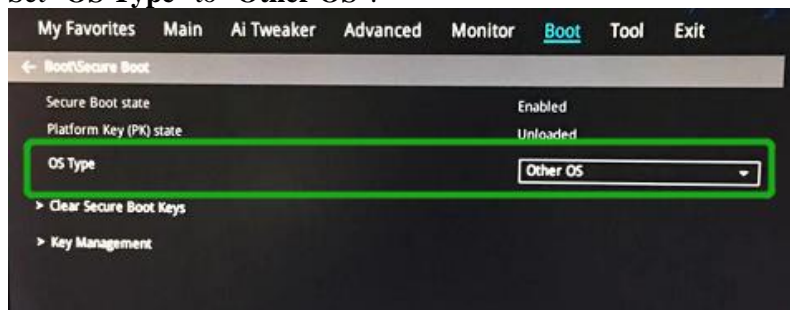

2. **Example 2:** Changing the UEFI setting (ASUS PRIME X299 –DELUXE):
   a. Boot the system and access the motherboard's BIOS menu.
   b. Set "**Boot from Storage Devices**" to "**UEFI driver first**";
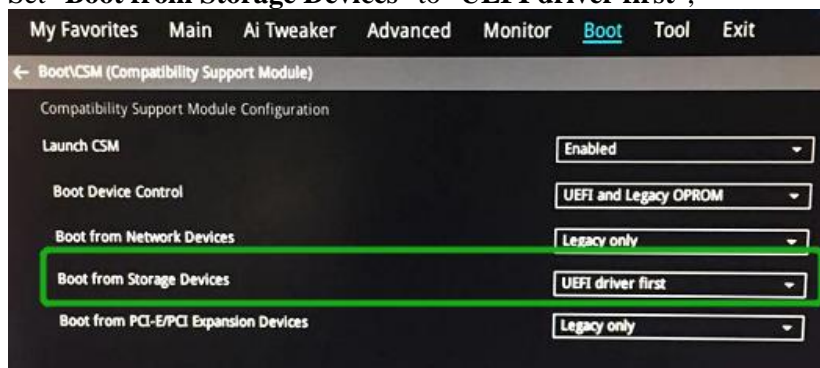
   c. Set "**Boot Device Control**" to "**UEFI Only**" or "**UEFI and Legacy OPROM**";

   d. Set "**OS Type**" to "**Other OS**".

How to install Windows to the SSD7202/SSD7103/SSD7505/SSD7540 RAID Controller

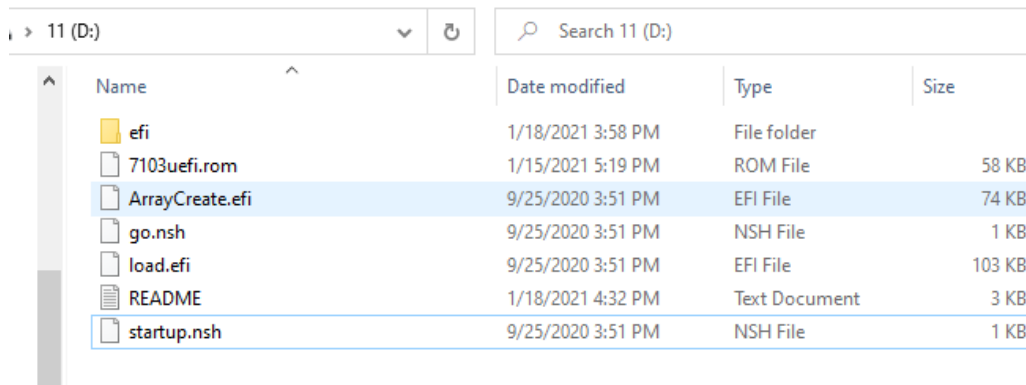*Note: The following installation process uses the SSD7103 as an example*

Step 1 - Preparing the USB Flash Drive

When preparing the USB flash dive, make sure to format the USB partition as FAT32. If another file system is used, the USB drive may not be properly recognized, and will not appear as an option under the motherboard's UEFI BIOS menus.

Step 2 - Preparing the UEFI Package

The package must be unzipped directly to the root of the bootable USB flash drive (do not extract the contents to a new folder). All of the following items must be present in the root of the USB flash drive:

For example (SSD7103)

Name	Date modified	Type	Size
efi	1/18/2021 3:58 PM	File folder	
7103uefi.rom	1/15/2021 5:19 PM	ROM File	58 KB
ArrayCreate.efi	9/25/2020 3:51 PM	EFI File	74 KB
go.nsh	9/25/2020 3:51 PM	NSH File	1 KB
load.efi	9/25/2020 3:51 PM	EFI File	103 KB
README	1/18/2021 4:32 PM	Text Document	3 KB
startup.nsh	9/25/2020 3:51 PM	NSH File	1 KB

Note: If the above content is not present in the root directory, the UEFI boot device will not be properly recognized, and/or you will be unable to create an array for OS installation.

Step 3 - Creating the RAID Array

a. This procedure assumes you have already installed NVMe SSD's into the SSD7000 controller (please see Step 1- Prerequisites).

Note: Make sure your USB flash drive has been formatted using the FAT32 file systems.

b. Insert the bootable USB flash drive into the motherboard and boot the system.

c. The motherboard's BIOS post screen should display information about the NVMe SSD's:

```
HighPoint SSD71xx NVMe driver version v1.1.4
Found PLX upstream port (bus 1).
Found PLX upstream port (bus 6).
start scanning devices
Adding HPT VD0-0 SCSI Disk Device (SINGLE) Capacity 250GB BlockSize 512 Bytes
Adding HPT VD0-1 SCSI Disk Device (SINGLE) Capacity 2000GB BlockSize 512 Bytes
Adding HPT VD0-2 SCSI Disk Device (SINGLE) Capacity 250GB BlockSize 512 Bytes
Adding HPT VD0-3 SCSI Disk Device (SINGLE) Capacity 512GB BlockSize 512 Bytes
```

d. Enter the motherboard's BIOS settings, and select the **UEFI: "flash drive"** from the menu:

```
Please select boot device:

↑ and ↓ to move selection
ENTER to select boot device
ESC to boot using defaults

UEFI: SanDisk, Partition 1 (59520MB)
UEFI: ASUS SDRW-08D2S-U A801 (4888MB)
SanDisk  (59520MB)
ASUS SDRW-08D2S-U A801  (4888MB)
Enter Setup
```

e. At the prompt, enter the following command to change the resolution:
mode 160 53

```
FS0:\> mode
Available modes for console output device.
   Col    80 Row    25  *
   Col    80 Row    50
   Col   100 Row    31
   Col   127 Row    33
FS0:\> mode 127 33_
```

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f. Next, enter the following command to enter the RAID creation utility:
    ArrayCreate.efi

```
FS0:\> ArrayCreate.efi
Highpoint RAID utility for UEFI v1.2.1
==== Controller information:
      Vendor: HighPoint Technologies, Inc.
      Product: SSD7103 (7103)

==== Physical device list(count 4):
1/1 Samsung SSD 970 PRO 512GB-S463NF0K409599K, 512110MB(MaxFree 0MB), Normal
1/2 Samsung SSD 970 PRO 512GB-S463NF0K411087N, 512110MB(MaxFree 0MB), Normal
1/3 Samsung SSD 970 PRO 512GB-S463NF0K512590N, 512110MB(MaxFree 0MB), Normal
1/4 Samsung SSD 970 PRO 512GB-S463NF0K409211V, 512110MB(MaxFree 0MB), Normal

==== Logical device list(count 4):
1 1/1 Samsung SSD 970 PRO 512GB-S463NF0K409599K, 512110MB(MaxFree 0MB), Normal
2 1/2 Samsung SSD 970 PRO 512GB-S463NF0K411087N, 512110MB(MaxFree 0MB), Normal
3 1/3 Samsung SSD 970 PRO 512GB-S463NF0K512590N, 512110MB(MaxFree 0MB), Normal
4 1/4 Samsung SSD 970 PRO 512GB-S463NF0K409211V, 512110MB(MaxFree 0MB), Normal
-------------------------------------------------------------------------------
>>> Please specify command to execute:
<<< _
```

g. Next, create the array using the following command:
    create RAID0

    This will create a RAID0 array using all of the SSD's, and configured for
    maximum capacity:

```
<<< create RAID0
    Creating array: RAID0_000041A7.
    Array created successfully.
===============================================================================

==== Physical device list(count 4):
1/1 Samsung SSD 970 PRO 512GB-S463NF0K409599K, 512040MB(MaxFree 0MB), Normal
1/2 Samsung SSD 970 PRO 512GB-S463NF0K411087N, 512040MB(MaxFree 0MB), Normal
1/3 Samsung SSD 970 PRO 512GB-S463NF0K512590N, 512040MB(MaxFree 0MB), Normal
1/4 Samsung SSD 970 PRO 512GB-S463NF0K409211V, 512040MB(MaxFree 0MB), Normal

==== Logical device list(count 1):
1 [VD4] RAID0_000041A7 (RAID0), 2048162MB (Stripe 512KB), Normal
      1/1 Samsung SSD 970 PRO 512GB
      1/2 Samsung SSD 970 PRO 512GB
      1/3 Samsung SSD 970 PRO 512GB
      1/4 Samsung SSD 970 PRO 512GB
-------------------------------------------------------------------------------
>>> Please specify command to execute:
<<< _
```

h. You can now exit the utility. Enter the following command:
    Exit

    Note: For more additional commands, please refer to Appendix of this user guide.

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Step 4 - Install Windows

    a. Insert the Windows install DVD in your optical drive (DVD/Blu-ray, etc.) and then reboot your system.

    b. The following RAID information should be displayed by the motherboard BIOS post screen:

```
HighPoint SSD71xx NVMe driver version v1.1.4
Found PLX upstream port (bus 1).
Found PLX upstream port (bus 6).
start scanning devices
Adding HPT VD0-0 SCSI Disk Device (RAID0) Capacity 999GB BlockSize 512 Bytes
```
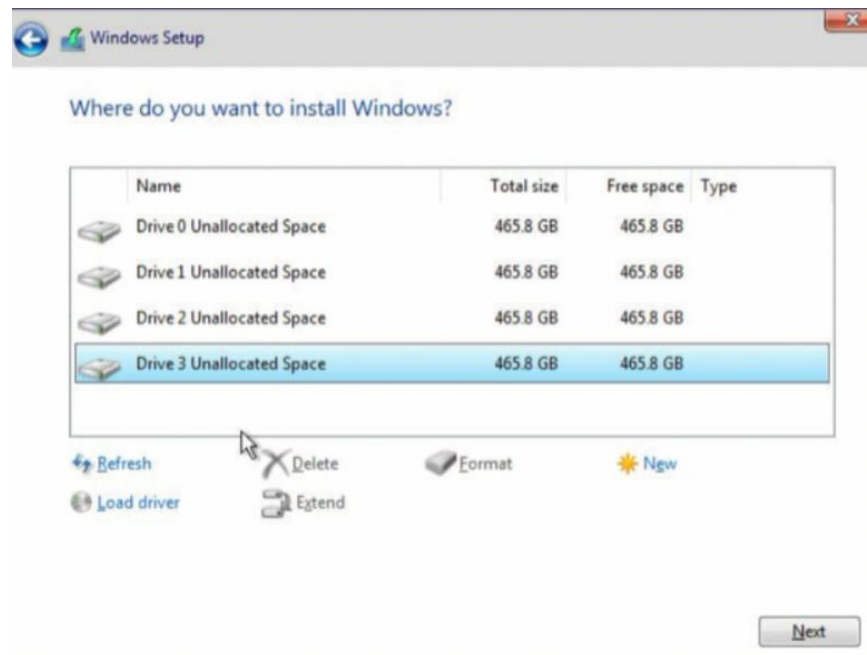
    c. Enter the Boot list, and select start from **UEFI DVD:**

```
Please select boot device:

↑ and ↓ to move selection
ENTER to select boot device
ESC to boot using defaults

  UEFI: SanDisk, Partition 1 (59520MB)
  UEFI: ASUS SDRW-08D2S-U A801 (4888MB)
  SanDisk  (59520MB)
  ASUS SDRW-08D2S-U A801  (4888MB)
  Enter Setup
```
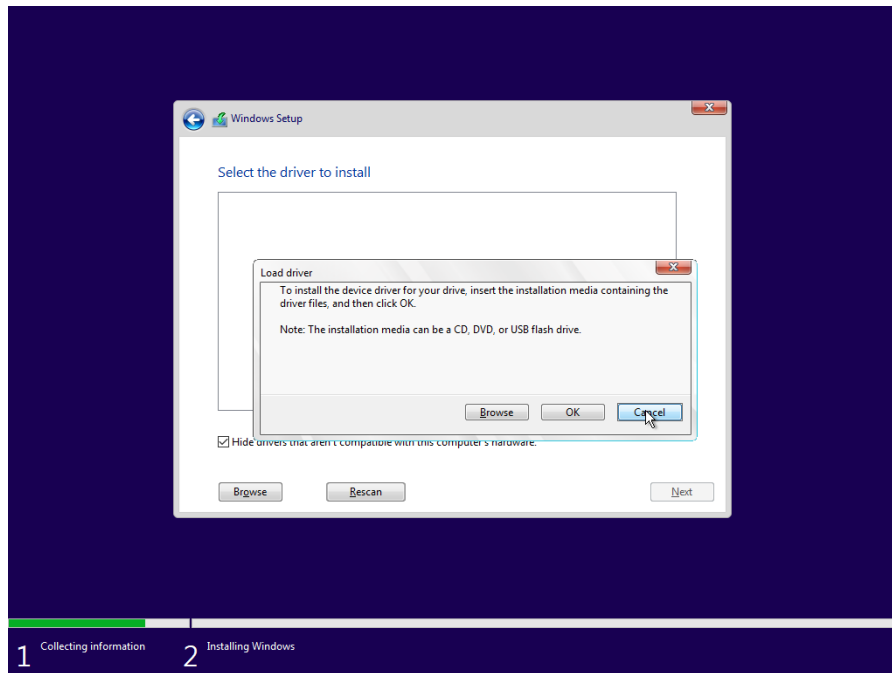
    d. Install Windows, to "**Where do you want to install Windows?**", you should see several Legacy disks available (one for each SSD you have installed into the SSD7202/SSD7103/SSD7505/SSD7540 controller).

*Note: The screenshot below shows 4 SSD's that have been installed into a SSD7103 controller:*

Name	Total size	Free space	Type
Drive 0 Unallocated Space	465.8 GB	465.8 GB	
Drive 1 Unallocated Space	465.8 GB	465.8 GB	
Drive 2 Unallocated Space	465.8 GB	465.8 GB	
Drive 3 Unallocated Space	465.8 GB	465.8 GB	

Where do you want to install Windows?

Refresh   Delete   Format   New
Load driver   Extend

Next

e. Click "**Load driver**", in the pop-up window and click "**Cancel**":

f. Next, insert the USB flash that contains the SSD7202/SSD7103/SSD7505 driver into the motherboard USB slot and click "**Browse**". Select the driver file as shown:
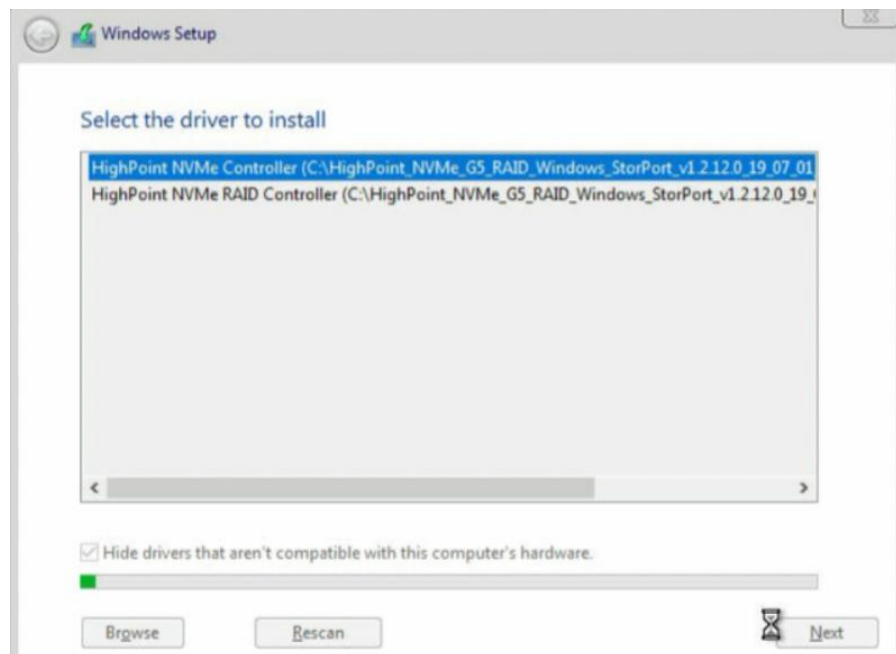
g. After loading the driver, return to the "Where do you want to install Windows?" interface. The previous Legacy disks will now be recognized as a RAID array:
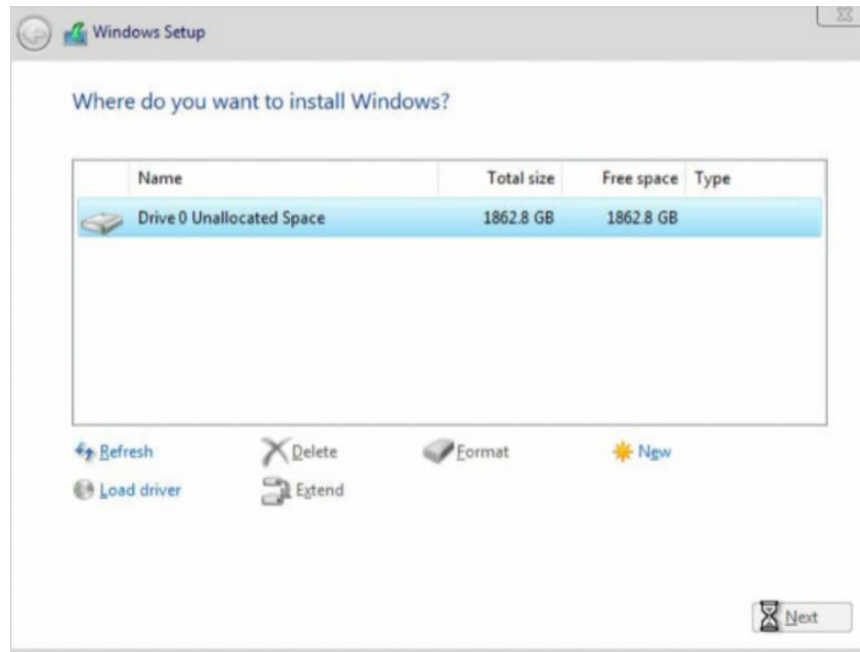
h. After partitioning, continue and complete the Windows installation procedure.

Step 5 - Disabling Hibernation

a. After Windows is installed, boot into the operating system and disable Hibernation. Hibernation fails when the system is installed on an NVMe RAID array; this bug will slow down or prevent startup and disable sleep mode.

If you do not turn the hibernation functionality off, you may experience the following problems：

a) Shutdown time is extended by an additional 3-5 minutes.
b) You cannot shut down properly; you need to manually press the power switch button of the motherboard to power off the system.

Please use **administrator privileges** to turn off hibernation using the following command (Command Prompt utility):

#powercfg /h off

```
Administrator: Command Prompt

Microsoft Windows [Version 10.0.17763.194]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Windows\system32>powercfg /h off

C:\Windows\system32>
```

Enter the command to check that the quick shutdown is turned off;
powercfg / a

```
C:\Windows\system32>powercfg /a
The following sleep states are available on this system:
    Standby (S3)

The following sleep states are not available on this system:
    Standby (S1)
        The system firmware does not support this standby state.

    Standby (S2)
        The system firmware does not support this standby state.

    Hibernate
        Hibernation has not been enabled.

    Standby (S0 Low Power Idle)
        The system firmware does not support this standby state.

    Hybrid Sleep
        Hibernation is not available.

    Fast Startup
        Hibernation is not available.

C:\Windows\system32>a
```
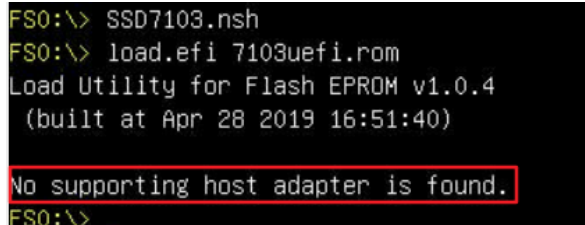
Trouble shooting

No supporting host adapter is found

In the UEFI environment, run the command, "SSD7103.nsh(Please see UEFI Read me for specific input content.)".
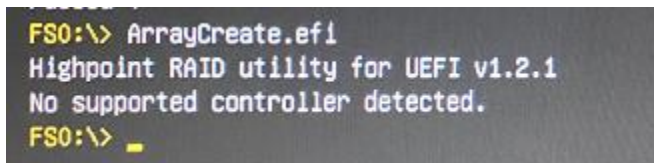
```
FSO:\> SSD7103.nsh
FSO:\> load.efi 7103uefi.rom
Load Utility for Flash EPROM v1.0.4
 (built at Apr 28 2019 16:51:40)

No supporting host adapter is found.
FSO:\>
```

Solutions: If you get the message, "No supporting host adapter is found."Try the following,

- a. The error message is to remind the user that when the card cannot be found in UEFI. Make sure the SSD7000 Series NVMe Controller is installed into a PCIe slot with x8 or x16 lane.
- b. In order to avoid this slot is broken, so replace the slot and test again.

No supported controller detected

In the UEFI environment, run the command, "ArrayCreate.efi".

```
FSO:\> ArrayCreate.efi
Highpoint RAID utility for UEFI v1.2.1
No supported controller detected.
FSO:\> _
```

Solutions: If you get the message, "No supported controller detected."Try the following,

- a. Check whether the Storage option ROM is Enabled in the motherboard BIOS.
- b. Check whether NVMe is connected to the controller.
- c. Replace the motherboard slot, enter the UEFI environment and re-enter the command.

If none of the above methods work, please provide UEFI log. You can submit a support ticket using our Online Support Portal, include a description of the problem in as much detail as possible.

### Yellow warning before and after installation of the driver.

Before and after installing the driver, a yellow exclamation point warning appears in the lower left corner of the installation interface.
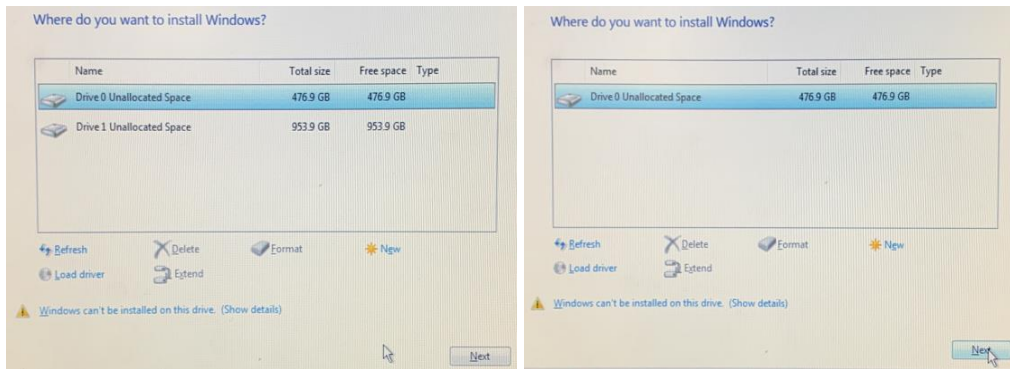
Solution:

  a. Please confirm "Boot from Storage Devices" is set to "UEFI driver first";

  b. Confirm whether UEFI DVD is selected to enter the system installation interface.

Load driver error

When installing the driver, it prompts that the driver needs to be updated.
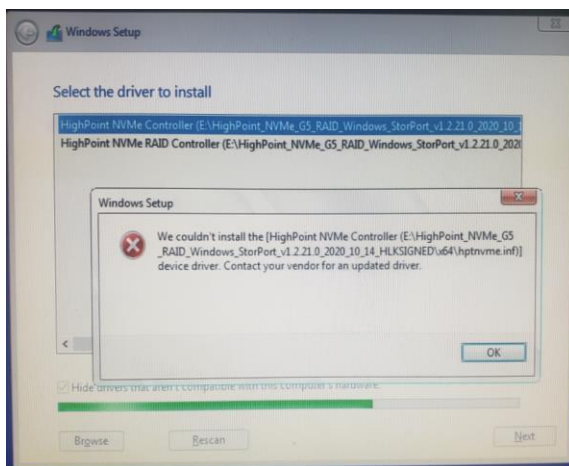
Solution: The appearance of the error message indicates that other NVMe Drives are connected to your applicable motherboard. Try the following:

  a. Remove all NVMe Drive installed on the motherboard and reinstall OS.

If none of the above methods work, please provide pci&driver information. You can submit a support ticket using our Online Support Portal, include a description of the problem in as much detail as possible.

Appendix

Support command: help/info/quit/exit/create/delete.

- ## Create Command

  Syntax

  Create Array Type (RAID0/RAID1) Member Disk list
  (1/1,1/2|*)Capacity(100|*)

  Examples

  <<< create RAID0

  <<< create RAID0 *

  <<< create RAID0 * *

      Create RAID0 array with all disks and with maximum capacity.

  <<< create RAID1 1/1, 1/3 10

      Create RAID1 array with disk 1/1 and 1/3 and with 10GB capacity.

- ## Delete Command

  Syntax

  delete {array ID}

  Examples

  <<< delete 1

      Delete the first array from Logical device list.

  <<< delete 2

      Delete the second array from Logical device list.

- ## Info Command

  Syntax

  info

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Display physical device list and logical list

• Exit Command

Syntax

Q/q/quit/exit

Quit the application

• Help Command

Syntax

H/h/help

This is help message