Linux Debian On HighPoint NVMe RAID Controller Installation Guide

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1 Overview

The purpose of this document is to provide clear instructions on how to install Linux Debian to an SSD or RAID array hosted by HighPoint NVMe controllers.

The following is a list of NVMe controllers and system.

Supported System	Debian10.1
	Debian10.2
	Debian10.3
	Debian10.4
	Debian10.5
	Debian10.6
	Debian10.7
	Debian10.8
	Debian10.9
	Debian11.3
	Debian11.4
	Debian11.5
	Debian11.6
Supported Controller	SSD7202
	SSD7105
	SSD7505
	SSD7502
	SSD7540
	SSD7580A
	SSD7580B
	SSD7580C
	RocketAIC 7505HW Series
	RocketAIC 7540HW Series
	RocketAIC 7749EW Series
	RocketAIC 7502HW Series
	RocketAIC 7105HW Series

2 Installing Linux Debian on NVMe controller

If you would like to install Linux Debian onto drives attached to the NVMe controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your NVMe SSD to the NVMe controller, you can use **EFI Utility** to configure your NVMe SSDs into RAID arrays, or just use them as single disks.

Before installation, you must remove all the NVMe SSD, which are not physically attached to NVMe controller, from your system.

Note

NVMe controller only support EFI boot. If you have other SCSI adapters installed, you must make sure the NVMe controller EFI will be loaded firstly. If not, try to move it to another PCI slot. Otherwise, you may be unable to boot up your system.

Step 2 Check System EFI Settings

In your system EFI SETUP menu, change **Boot Sequence** in such a way that the system will first boot from **EFI** CDROM or **EFI** a Bootable USB drive; after you finish installation, set the NVMe controller as the first boot device to boot up the system. Refer to your motherboard EFI manual to see how to configure the boot sequence.

1. Set UEFI setting with SuperMicro X11DPi-NT motherboard as an example.
   a. **"Advanced->PCIe/PCI/PnP Configuration->CPUSlot PCI-E OPROM"**
      to **"EFI"**. NVMe controller is connected to motherboard CPU1 Slot 2 PCI-E X16, then you should set "CPU1 Slot 2 PCI-E X16 OPROM" to "EFI".
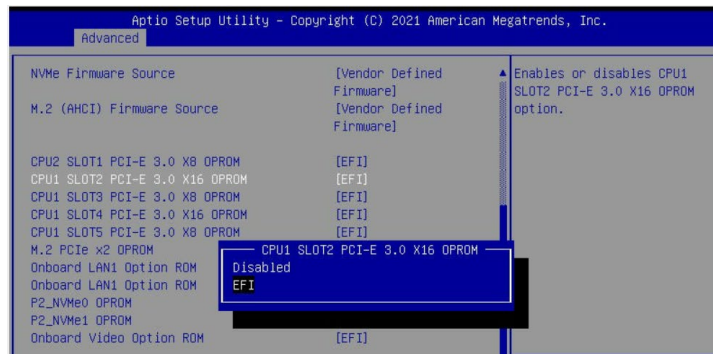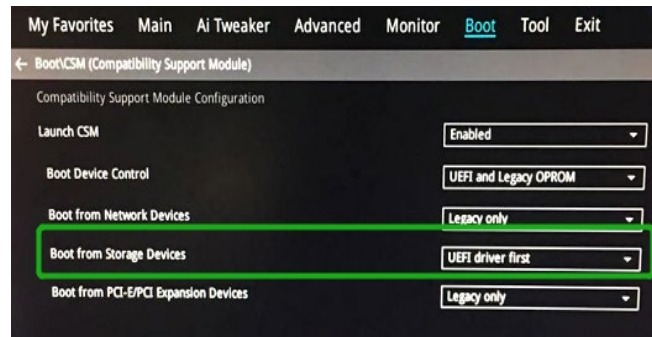
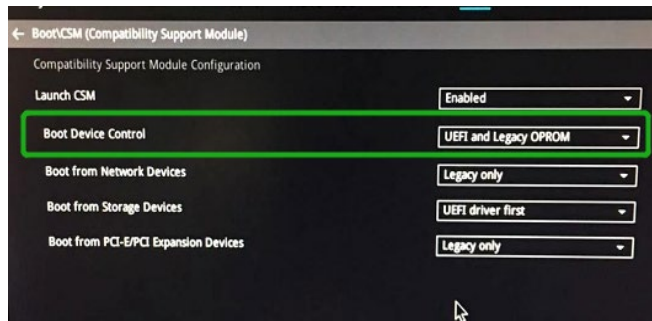b. Disable "Secure Boot", set "Attempt Secure Boot" to "Disabled".
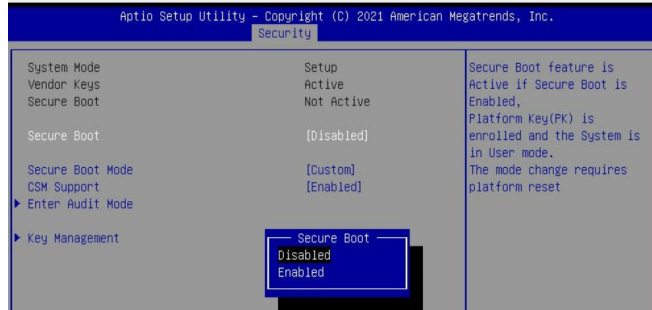
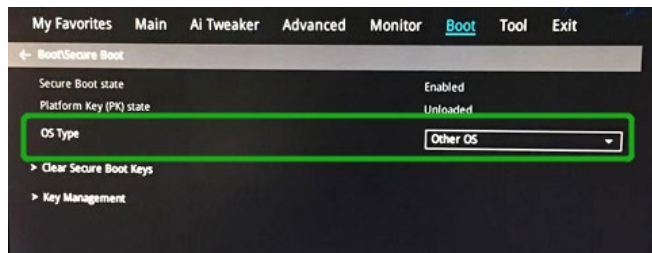2. Configuring the UEFI settings (using an ASUS PRIME X299 -DELUXE motherboard as an example):

a. Set "Boot from Storage Devices" to "UEFI driver first";

b. And "Boot Device Control" to "UEFI Only" or "UEFI and Legacy OPROM";


c. Set "OS Type" to "Other OS".

## Step 3 Flash UEFI ROM to NVMe controller

Example SSD7505：

For other products, please refer to: <u>Update UEFI ROM</u>

Note： ***Make sure your USB flash partition format is FAT32.***

a. Unzip SSD7505 UEFI package to the root dir(/) of a USB flash drive, and connect the USB flash drive to the motherboard;

b. Booting from the UEFI USB flash and enter the UEFI environment;
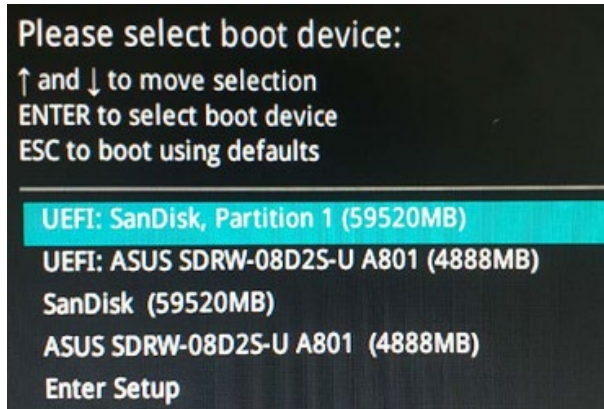
c. Use the command "go.nsh" to flash UEFI ROM to the SSD7505 and reboot the system.
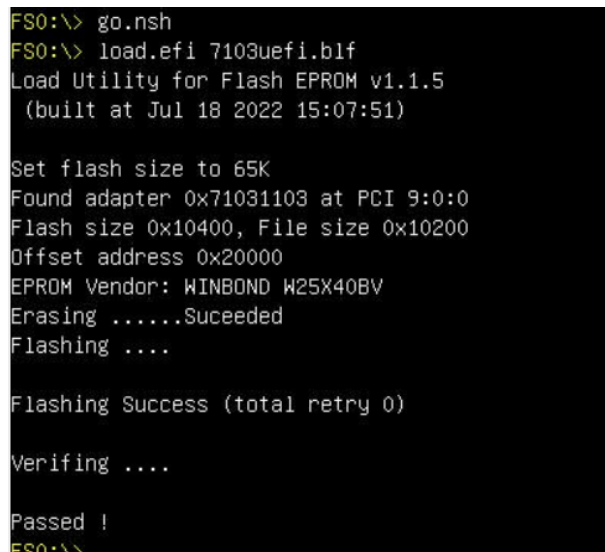
d. Use the "exit" command to exit the utility.

Step 4 Create Array

Note: *RocketAIC series NVMe drives are already pre-configured with RAID0. You can skip this step. If you want to use another type of RAID array for a Boot-RAID configuration, you can refer to the following steps.*

    a. Attach NVMe SSDs to NVMe controller.

    b. Boot, enter the motherboard's Boot List and select start from UEFI USB flash.

    c. Use the command "ArrayCreate.efi" to enter the Utility:

    d. Use the command "create RAID0".
       This will create a RAID0 array using all of the NVMe SSDs, and the maximum available capacity.

    e. Use the "exit" command to exit the utility.

    f. For additional command lines, refer to Appendix A.

Step 5 Prepare the Driver Diskette

Extract **HighPoint_NVMe_Debian_11.6.0_x86_64_vx.x.x_xx_xx_xx.tar.gz** to the top(/) directory of a USB flash drive. It will look like:

```
root@debian:/home/test/Documents# tar zxvf HighPoint_NVMe_debian11.6_x86_64_v1.4.8_23_02_22.tar.gz
hptdd/
hptdd/postinst.sh
hptdd/postinst2.sh
hptdd/boot/
hptdd/boot/hptnvme5.10.0-20-amd64x86_64.ko.gz
hptdd/hptdrv
hptdd/hptblock
hptdd/60-persistent-storage-hptblock.rules
hptdd/preinst.sh
hptdd/readme.txt
root@debian:/home/test/Documents# ▏
```

Step 6 Install Linux Debian

Example: Debian 11

a. Before starting the installation procedure, verify the status of your network environment. To ensure Debian is successfully installed to the RAID array, we recommend that the system is disconnected from the internet and any local network.

b. Insert the Bootable USB drive into the target system.

c. Boot the system using a bootable USB drive.

d. When the Installation screen appears, press '**e**' to edit boot command line option.
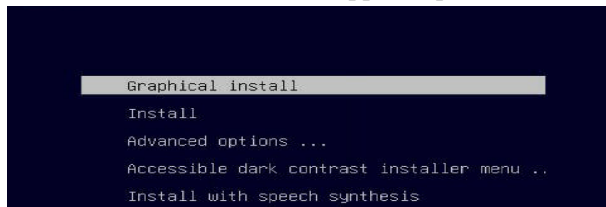
On the edit command window, move the cursor to the end of line "linux /install/vmlinuz... ", and append "**modprobe.blacklist=nvme** " (do not include the quotation marks).
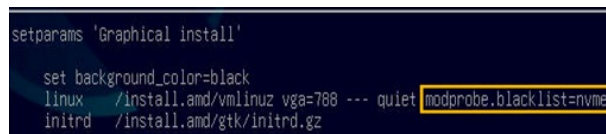
Press **CTRL-x** or **F10** to start the system.

e. When the following window appears during the installation process,

Press "**Ctrl+ALT+F2**" to switch to the shell on console 2. Next, execute the following commands:

 # mkdir /hptdd   ← Create mount point for USB flash drive

 # mount /dev/sda1 /hptdd/   ← Mount the USB flash drive to /hptdd

 # cp -a /hptdd/hptdd /tmp/   ← Copy driver installation file to system temporary directory

 # umount /hptdd   ← Unmount the USB flash drive

```
:~# mkdir /hptdd
:~# mount /dev/sda1 /hptdd/
:~# cp -a /hptdd/hptdd/ /tmp/
```
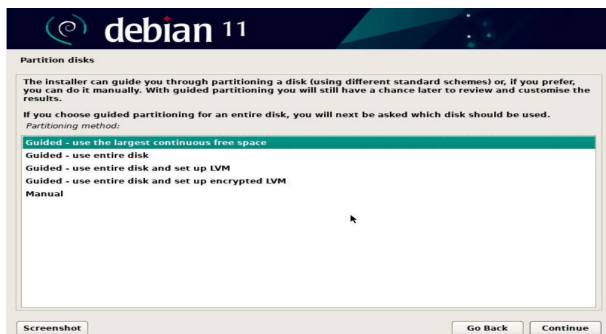
When the USB flash drive is unmounted, please unplug the USB flash drive from the system. Next, execute the following commands to install driver for Linux Debian.

 # sh /tmp/hptdd/preinst.sh   ← Load NVMe controller driver.

```
:~# sh /tmp/hptdd/preinst.sh
This step succeeded!
```

f. Then press **"Ctrl+ALT+F5"** to switch back to installation screen and continue the installation as usual**.**

g. Now click the "**Go Back**" button to detect the hptnvme disk.
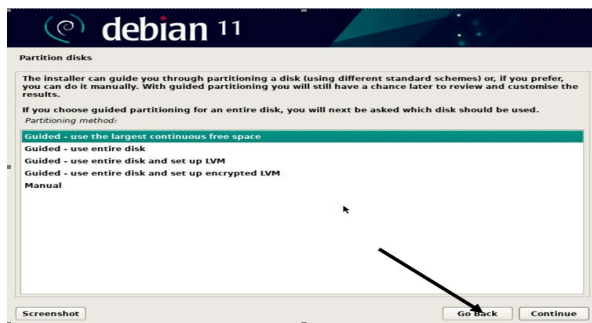
h. Now click the "**Detect disks**" button and "**Continue**" to detect the hptnvme disk.
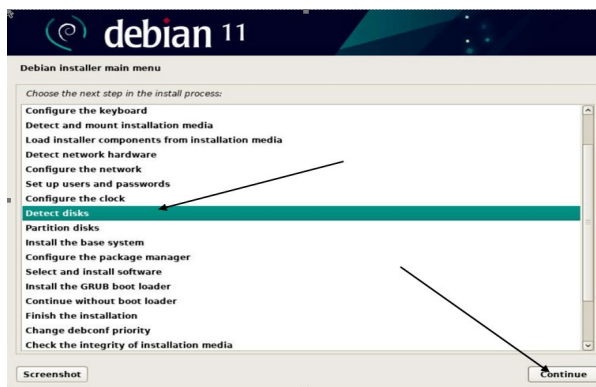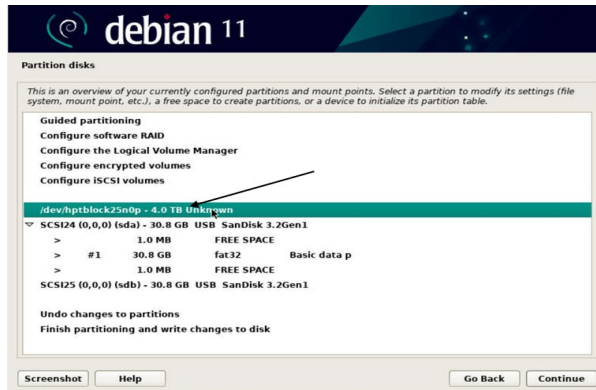
i. When the screen shows that "**Finish the installation**".
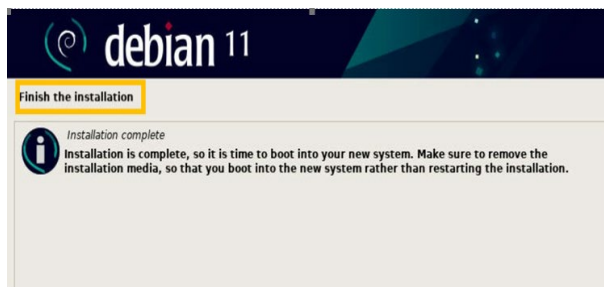
press "**Ctrl+ALT+F2**" to the shell and type the following commands:

#sudo sh /tmp/hptdd/postinst.sh ← Install NVMe controller driver.

A message will be displayed that the driver has been installed successfully.

j. Press **"Ctrl+ALT+F5"** to switch back to installation screen and **finish the installation**.

k. If you want to boot from another kernel, please install the NVMe controller driver after entering the system.

l. Restart to enter the system，**please connect to the internet:**

1) Download the appropriate driver from the Software Downloads web page.

2) Please execute the following command before installing the driver

   # umount /dev/sda1

   # mount /dev/sda1 /media/cdrom

   Note: sda1 is Bootable USB drive, the default repository path is cdrom, so we need to

adjust the ISO image mount path to /mnt/cdrom

 # apt install gcc

 # apt install make

 # apt install linux-headers-$(uname -r)

3) Extract the driver package:

tar zxvf HighPoint_NVMe_G5_Linux_Src_vx.x.x_xxxx_xx_xx.tar.gz

4) Run the **.bin** file to install the driver package.

sh hptnvme_g5_linux_src_vxx.x.x_xx_xx_xx.bin

```
README
root@debian:/home/test/Downloads# sh hptnvme_g5_linux_src_v1.5.1_2023_02_21.bin Verifying archive integrity... All good.
Uncompressing HighPoint NVMe RAID Controller Linux Open Source package installer..............................................
Checking and installing required toolchain and utility ...
Found program make (/usr/bin/make)
Found program gcc (/usr/bin/gcc)
Found program perl (/usr/bin/perl)
Found program wget (/usr/bin/wget)
```

m. Follow the prompts to complete the driver installation.

```
Found linux image: /boot/vmlinuz-5.10.0-20-amd64
Found initrd image: /boot/initrd.img-5.10.0-20-amd64
Warning: os-prober will be executed to detect other bootable partitions.
Its output will be used to detect bootable binaries on them and create new boot entries.
Adding boot menu entry for UEFI Firmware Settings ...
done
Synchronizing state of hptdrv-monitor.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable hptdrv-monitor
update-rc.d: warning: enable action will have no effect on runlevel 1
Created symlink /etc/systemd/system/default.target.wants/hptdrv-monitor.service → /lib/systemd/system/hptdrv-monitor.service.

SUCCESS: Driver hptnvme is installed successfully for kernel 5.10.0-20-amd64.
Please restart the system for the driver to take effect.
If you want to uninstall the driver from the computer , please run hptuninhptnvme to uninstall the driver files.
root@debian:/home/test/Downloads#
```

n. After Debian has been installed, you can reconnect the system to the network/internet and update the system as needed.

3 Monitoring the Driver

Once the driver is running, you can monitor it through the Linux proc file system support. There is a special file under /proc/scsi/hptnvme /. Through this file you can view driver status and send control commands to the driver.

Note

The file name is the SCSI host number allocated by OS. If you have no other SCSI cards installed, it will be 0. In the following sections, we will use x to represent this number.

Using the following command to show driver status:

cat /proc/scsi/hptnvme /x

This command will show the driver version number, physical device list and logical device list.

4 Installing RAID Management Software

HighPoint's RAID Management Software can be used to check the status of the SSDs and RAID arrays hosted by the NVMe controller. Installation of the management software is optional but recommended.

Please refer to HighPoint RAID Management Software documentation for more information.

5 Troubleshooting

If you do not install the system or update the kernel according to the installation manual, the system will crash and you will not be able to enter. Please follow the steps below.

a. Select the default (kernel: 5.10.0-20-amd64) and enter the system.

```
Loading Linux 5.10.0-20-amd64 ...
Loading initial ramdisk ...
```

b. Install Linux Opensource driver.

c. Download the appropriate driver from the Software Downloads web page.

Run the **.bin** file to install the driver package.

sh hptnvme_g5_linux_src_vxx.x.x_xx_xx_xx.bin

```
README
root@debian:/home/test/Downloads# sh hptnvme_g5_linux_src_v1.5.1_2023_02_21.bin Verifying archive integrity... All good.
Uncompressing HighPoint NVMe RAID Controller Linux Open Source package installer......................................
Checking and installing required toolchain and utility ...
Found program make (/usr/bin/make)
Found program gcc (/usr/bin/gcc)
Found program perl (/usr/bin/perl)
Found program wget (/usr/bin/wget)
```

d. Follow the prompts to complete the driver installation.

```
Found linux image: /boot/vmlinuz-5.10.0-20-amd64
Found initrd image: /boot/initrd.img-5.10.0-20-amd64
Warning: os-prober will be executed to detect other bootable partitions.
Its output will be used to detect bootable binaries on them and create new boot entries.
Adding boot menu entry for UEFI Firmware Settings ...
done
Synchronizing state of hptdrv-monitor.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable hptdrv-monitor
update-rc.d: warning: enable action will have no effect on runlevel 1
Created symlink /etc/systemd/system/default.target.wants/hptdrv-monitor.service → /lib/systemd/system/hptdrv-monitor.service.

SUCCESS: Driver hptnvme is installed successfully for kernel 5.10.0-20-amd64.
Please restart the system for the driver to take effect.
If you want to uninstall the driver from the computer , please run hptuninhptnvme to uninstall the driver files.
root@debian:/home/test/Downloads# 
```

e. After the installation is complete, you can perform system update operations.

6 Rebuilding Driver Module for System Update

When the system updates the kernel packages, the driver module hptnvme.ko should be built and installed manually before reboot.

Please refer to the README file distributed with NVMe controller opensource package on how to build and install the driver module.

7 Appendix A

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

- **Create Command**
  Syntax
  Create Array Type (RAID0/RAID1/RAID10) 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.

  <<< create RAID10
  <<< create RAID10 *
  <<< create RAID10 * *
      Create RAID10 array with all disks and with maximum 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
  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.