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416, Maetan 3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do 443-772, Korea
www.samsung.com
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Author
Lee Won-ju, Principal Engineer
Song Sang-hoon, Senior Engineer
Kim Hyeong-kyun, Senior Engineer
Kim Jae-eun, Senior Engineer
(aaeun7.kim@samsung.com)
Kim Hyun-woon, Senior Engineer
Kim Sung-wook, Engineer
Kim Se-young, Engineer
Ji Yoon-kyeong, Assistant Engineer
Na You-jung, Assistant Engineer

Approver

Amendment
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NVMe SSD Overview

**XS1715 (SFF-8639 Form Factor)**

XS1715 supports PCI Express® (PCIe) Base 3.0 specifications and NVM Express™ Rev.1.0c. Its 2.5-inch form factor supports the SFF-8639 standard connector. Available capacities are 400GB, 800GB, and 1.6TB; single-port 4 lanes and PCIe Gen3 are supported.

XS1715 delivers 3GB/s sequential read and 1.4GB/s sequential write speeds while consuming just 25 watts (W) of power. Supporting 7 Drive Writes per Day (DWPD) for five years, it is optimized for enterprise applications. Equipped with efficient power-loss protect (PLP), it supports the hot plug insertion and removal feature.

![XS1715 SFF-8639 Type](image)

**SM1715 (HHHL Form Factor)**

SM1715 supports PCIe Base 3.0 specifications and NVM Express Rev.1.0e. Available capacities are 1.6 TB and 3.2 TB. Aside from supporting PCIe Base 3.0 specifications and NVM Express Rev.1.0e, SM1715 complies with the PCIe Card Electromechanical 3.0 specifications and uses the Half-Height, Half-Length (HHHL) form factor.

SM1715 delivers 3GB/s sequential read and 2GB/s sequential write speeds and consumes only 25-W of power. Supporting 10 DWPD for five years, it is optimized for enterprise applications. When sudden power off or failure occurs, its efficient PLP saves the data issued by the host to the storage (SM1715), preventing data loss.
SM953 (M.2 Form Factor)

SM953 supports PCIe Base 3.0 specifications and NVM Express Rev.1.1a

Available in a 480GB capacity, SM953 uses the M.2 form factor (22 x 110 mm [0.87 x 4.33in.]). SM953 delivers 1.75GB/s sequential read and 850MB/s sequential write speeds, consuming only 6W of power. Supporting 0.9 DWPD for five years, SM953 is optimized for datacenter environments. Its efficient PLP saves data issued by the host without data loss when a sudden power off or failure occurs.
System Recommendations

To help achieve optimal drive performance, refer to the following hardware recommendations when selecting the system:

### Hardware

<table>
<thead>
<tr>
<th>Category</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>Enterprise server class system with Intel® Tylersburg, Sandy Bridge, or later class chipset motherboard</td>
</tr>
</tbody>
</table>
| Processor  | • 64-bit processor (required) Single, dual, or higher number of processors can be used  
|            | • Intel® Xeon® (Nehalem-EP) or better processor with four or more cores/processors  
|            | • 12MB local cache  
|            | • Processor with clock speed greater than 2.5GHz                                  |
| Memory     | More than 4GB DRAM                                                              |
| Chipset    | Intel 5520 or later generation chipset                                           |
| Slots      | • Require PCIe Gen3 x4 link width slot (For Max Performance)                    
|            | • Support PCIe Gen1/Gen2 slot                                                   |
| Power      | 25W-compatible PCIe slot                                                        |

*Note: No external power connection is required for drive*

### Software

The following operating systems are supported, with some requiring additional drivers:

- Windows Server® 2008R2 (64bit)
- Windows Server 2012/2012 R2 (64bit)
- Windows 7, 8, 8.1 (32/64bit)
- Red Hat® Enterprise Linux (RHEL) 7.0 (64bit)
- Red Hat Enterprise Linux (RHEL) 6.4/6.5 (64bit)
- SUSE® Linux Enterprise (SLES) 11SP3 (64bit)
- Ubuntu® 12.04.02 LTS Server (64bit)
- Ubuntu® 12.04.04 LTS Server (64bit)
- Solaris 11 SP2 (64bit)
- Windows Server 2008 R2/2012/2012 R2 Hyper-V® (64bit)
- VMware ESX 5.5
- Oracle Virtual Machine 3.0
- KVM

* Some chip sets might not be compatible.
Installation Process

The 2.5-inch-type SSD can be inserted directly into the compatible SFF-8639 connection without any device. To connect it to the PCIe slot, an additional adapter cable is needed, as shown below.

[Figure 3-1] Inserting the 2.5-inch-type NVMe SSD

[Figure 3-2] Connecting to the PCIe slot with an additional adapter cable

The HHHL-type SSD directly connects to the supported PCIe (Gen2 or Gen3) slot.

[Figure 3-3] Checking the supported PCIe Speed

[Figure 3-4] Inserting after checking the PCIe Slot
The HHHL-type SSD directly connects to the supported PCIe (Gen2 or Gen3) slot.

Connect SM953, XS1715, or SM1715 to the system by following the procedure below.

1. Check whether the system power is turned off.
2. Make sure that the Electrostatic Discharge (ESD) protection is appropriate before touching the SSD or system.
3. Detach the SSD from the ESD device and check for damage to the SSD.
4. Open the server cover or server case and insert the SSD into the PCIe slot.
5. Check whether each slot supports up to 25W (check the PCIe slot position and other information from the system or main board documents).
6. Adjust the cover position to check the SSD LED, if possible.
7. Turn on the system power.
8. Check the SSD LED; the LED color should be solid green.
9. Close the system cover or the case.
10. Verify the host system successfully boots into the operating system.

**Installing the Driver on a Windows System**

The driver can be installed using either of the following methods:

- Use the SetupNVMe.exe file for auto installation.
- Use the Windows setup file (NVMe.inf) for manual installation in the Device Manager.

※ The default driver is the inbox driver in the OS. The provision of available drivers depends on the product.

**Installing the Driver in Windows OS – SetupNVMe.exe**

1. Turn the power on and log onto the system with the admin account.
2. Copy the driver file package to the installation folder.
3. Double-click the Setup.exe file, and then click according to the driver installation guide.

※ The distributed package format may be changed.
Installing the Driver in Windows OS – Setup File (NVMe.inf)

1. Turn off the system power.
2. Boot the Windows OS.
3. Copy the Windows driver folder in the Samsung NVMe driver to the system.
4. Start the Device Manager.

5. In the Device Manager, select the “PCI Device” under “Other devices” where the driver is to be installed, and then right-click the item to select Update Driver Software.
6. Find the Windows driver and update the driver software.

7. In the Device Manager, check whether the driver software is successfully installed under "Storage controllers."
Installing the Driver on a Linux System

**RHEL 6.4 / 6.5 64bit**
1. Turn the power on and log on to the system with the admin account.
2. Copy the driver file package to the installation folder.
3. Install the rpm with the command below. After installing, the NVMe driver will automatically load when the system is booted.
   ```bash
   # rpm --ivh nvme-kmp-default-1.17_3.0.76_0.11-0.x86_64.rpm
   ```
   (The file name could change depending on the driver version.)
4. To upgrade from v1.9, execute the following command:
   ```bash
   # rpm --Uvh nvme-kmp-default-1.17_3.0.76_0.11-0.x86_64.rpm
   ```
5. To uninstall the package, execute the following command:
   ```bash
   # rpm --e nvme-kmp-default-1.17_3.0.76_0.11-0.x86_64.rpm
   ```

**RHEL 7.0 64bit**
1. Turn the power on and log on to the system with the admin account.
2. Copy the driver file package to the installation folder.
3. Install the rpm with the command below. After installing, the NVMe driver will automatically load when the system is booted.
   ```bash
   # rpm --ivh kmod-nvme-1.17-el7.x86_64.rpm
   ```
   (The file name could change depending on the driver version.)
4. To upgrade from v1.9, execute the following command:
   ```bash
   # rpm --Uvh kmod-nvme-1.17-el7.x86_64.rpm
   ```
5. To uninstall the package, execute the following command:
   ```bash
   # rpm --e kmod-nvme-1.17-el7.x86_64.rpm
   ```

**SLES 11 SP3 64bit**
1. Turn the power on and log on to the system with the admin account.
2. Copy the driver file package to the installation folder.
3. Install the rpm with the command below. After installing, the NVMe driver will automatically load when the system is booted.
   ```bash
   # rpm --ivh nvme-kmp-default-1.17_3.0.76_0.11-0.x86_64.rpm
   ```
   (The file name could change depending on the driver version.)
4. To upgrade from v1.9, execute the following command:
   ```bash
   # rpm --ivh nvme-kmp-default-1.17_3.0.76_0.11-0.x86_64.rpm
   ```
5. To uninstall the package, execute the following command:
   ```bash
   # rpm --ivh nvme-kmp-default-1.17_3.0.76_0.11-0.x86_64.rpm
   ```
Installing the Driver on a VMware System (ESX 5.5)

This section describes how to install the NVMe driver on the VMware ESXi 5.X system.

Installing VMWARE In-box Driver in ESX 5.5

1. Copy the Install Driver (nvme-1.0e.0.21-1vmw.550.0.0.31.x86_64.vib) in the folder of the ESXi-installed system.
2. Execute the following command in esxcli mode:
   - `# esxcli software acceptance set --level CommunitySupported`
   - `# esxcli software vib instal -v /<full_path_to_offline_vib> --no-sig-check`
   - `ex) # esxcli software vib install -v /vmfs/volumes/53c02e17-d0ed6b35-2957-b8ca3a7083dc/nvme-1.0e.0.21-1vmw.550.0.0.31.x86_64.vib --no-sig-check`
3. The following command output is displayed:
   - `~ # esxcli software vib install -d=/nvme-1.0e.0.21-1vmw.550.0.0.31.x86_64.vib`
   - `Installation Result Message: The update completed successfully, but the system needs to be rebooted for the changes to be effective.
     Reboot Required: true`
   - `VIBs installed: 
     VIBs removed: 
     VIBs skipped:

Uninstalling the VMware In-box Driver from ESX 5.5

1. To uninstall the driver, execute the following command in esxcli mode:
   - `# esxcli software vib list | grep nvme`
   - `# esxcli software vib remove --vibname=nvme`
2. The following command output is displayed:
   - `~ # esxcli software vib remove --vibname=nvme-1.0e.0.21-1vmw.550.0.0.31.x86_64.vib`
   - `Removal Result Message: The update completed successfully, but the system needs to be rebooted for the changes to be effective.
     Reboot Required: true`
   - `VIBs installed: 
     VIBs removed: 
     VIBs Skipped:`
Installing Re-Drive software to manage the SSD

This section describes how to install the Re-Drive software after installing the driver in the OS. Re-Drive is software that monitors and manages the Samsung SSD, such as firmware update or “Format Drive.” For more details, see the "Windows Samsung NVMe Re-Drive” manual.

Updating Firmware with Re-Drive

After installing the software package for the NVMe SSD, install Re-Drive. The binary file for the firmware update includes the latest firmware and OptionROM.

1. Start Re-Drive.
2. Click the “Firmware” tab, and then select “NVMe SSD”.

3. Select the NVMe drive to display the firmware slot box.
4. Select either Slot 2 or Slot 3; the selected slot color is then changed to orange.

5. Click “Download” and select the desired execution.
6. Specify the F/W path and “Open” the firmware binary.
8. Exit Re-Drive.
9. Turn off system power, and then boot the system again.

**Verifying the Installation**

Verify the software package in the OS on the SSD.

**Verifying the Installation of Software Package on the Windows System**

1. Start Disk Manager to check whether the newly installed NVMe SSD is displayed.
2. A dialog box appears to initialize to the master boot record (MBR).
   At this time, NVMe SSD should be “Online” and formatted to “Basic.” If the dialog box for initializing to MBR does not appear, right-click the driver number of NVMe SSD in the Disk Manager, and then select Initialize from the pop-up menu; you can see NVMe SSD with “Basic” format and “Online.”

**Verifying the Installation of the software package in the Linux System**

1. Turn the system power on, and then start the terminal window.
2. Run “Modinfo mtip32xx.” If the NVMe driver has been installed successfully, the version and module information are shown.
3. Run “fdisk –l | grep rssd*”; the NVMe SSD is shown as “/dev/rssd<x>drive”.

**Starting Re-Drive and Checking the NVMe SSD State**

1. Click the “Identify” tab and Name Space Button.
2. The NVMe SSD information is displayed.
Using the NVMe SSD as a boot Drive

This section describes how to install the operating system (OS) to use the NVMe SSD as a bootable device.

※ This is based on the fact that the platform (system BIOS) does not support the NVMe device. If the NVMe device is supported at the BIOS level, it can be installed like a general SATA/SAS device without following the procedure below.
※ The OS can be installed when OptionROM is enabled. OptionROM support is optional, varying according to model.
※ Before starting the OS installation, remove all other storage media from the system except the Samsung NVMe device from the system.

**<Windows Server 2008 R2 64bit>**

1. Copy the Samsung NVMe driver for the Windows Server 2008 R2 x64 to the USB drive in advance.
2. Insert the Windows Server 2008 R2 x64 installation disk and USB in step 1 into the system and boot with the installation disk.
3. Follow the “Install” procedure. Choose “Custom” (recommended) from the installation types.
4. When prompted to specify the location of the partition for installing Windows, choose “Load Driver” and specify the path of the Samsung NVMe driver inserted into the USB in step 1.
5. Select the identical device (XS1715, SM1715 or SM953) that was inserted into the system from the driver list.
6. Remove the USB and click “Next”.
7. Select the recognized Samsung NVMe drive and click Next.
8. Completing the Windows installation will take several minutes. The system will automatically reboot several times during the installation process.
9. After completing the installation, eject the Windows Server 2008 R2 installation disk, and then reboot the system.

**<Windows Server 2012 64bit>**

1. Copy the Samsung NVMe driver for Windows Server 2012 to the USB drive in advance.
2. Insert the Windows Server 2012 installation disk and USB in step 1 into the system and boot with the installation disk.
3. Follow the “Install” procedure. Choose “Custom” (recommended) from the installation types.
4. When prompted to specify the location of the partition for installing Windows, choose “Load Driver” and specify the path of the Samsung NVMe driver inserted into the USB in step 1.
5. Select the identical device (XS1715, SM1715 or SM953) that was inserted into the system from the driver list.
6. Remove the USB and click “Next”.
7. Select the recognized Samsung NVMe drive and click Next.
8. Completing the Windows installation will take several minutes. The system will automatically reboot several times during the installation process.
9. After completing the installation, eject the Windows Server 2012 installation disk, and then reboot the system.