



# XCubeSAN Series Hardware Manual

## Applicable Models:

XS5224D, XS5216D, XS5212D, XS5212S, XS5226D, XS5226S  
XS3224D, XS3224S, XS3216D, XS3216S, XS3212D, XS3212S  
XS3226D, XS3226S, XS1224D, XS1224S, XS1216D, XS1216S  
XS1212D, XS1212S, XS1226D, XS1226S



QSAN Technology, Inc.  
[www.QSAN.com](http://www.QSAN.com)



## **Copyright**

© Copyright 2018 QSAN Technology, Inc. All rights reserved. No part of this document may be reproduced or transmitted without written permission from QSAN Technology, Inc.

## **July 2019**

This edition applies to QSAN XCubeSAN XS5200 / XS3200 / XS1200 series SAN storage systems. QSAN believes the information in this publication is accurate as of its publication date. The information is subject to change without notice.

## **Trademarks**

QSAN, the QSAN logo, XCubeSAN, and QSAN.com are trademarks or registered trademarks of QSAN Technology, Inc.

Intel, Xeon, Pentium, Intel Inside, and the Intel Inside logo are trademarks of Intel Corporation in the United States and other countries.

Other trademarks and trade names used in this document to refer to either the entities claiming the marks and names or their products are the property of their respective owners.

## Notices

---

This XCubeSAN hardware owner’s manual is applicable to the following XCubeSAN models:

### XCubeSAN Storage System 4U 19” Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5224D	Dual Controller	LFF 24-disk 4U Chassis
XS3224D	Dual Controller	LFF 24-disk 4U Chassis
XS3224S	Single Controller	LFF 24-disk 4U Chassis
XS1224D	Dual Controller	LFF 24-disk 4U Chassis
XS1224S	Single Controller	LFF 24-disk 4U Chassis

### XCubeSAN Storage System 3U 19” Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5216D	Dual Controller	LFF 16-disk 3U Chassis
XS3216D	Dual Controller	LFF 16-disk 3U Chassis
XS3216S	Single Controller	LFF 16-disk 3U Chassis
XS1216D	Dual Controller	LFF 16-disk 3U Chassis
XS1216S	Single Controller	LFF 16-disk 3U Chassis

### XCubeSAN Storage System 2U 19” Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5212D	Dual Controller	LFF 12-disk 2U Chassis
XS5212S	Single Controller	LFF 12-disk 2U Chassis
XS3212D	Dual Controller	LFF 12-disk 2U Chassis
XS3212S	Single Controller	LFF 12-disk 2U Chassis
XS1212D	Dual Controller	LFF 12-disk 2U Chassis
XS1212S	Single Controller	LFF 12-disk 2U Chassis
XS5226D	Dual Controller	SFF 26-disk 2U Chassis
XS5226S	Single Controller	SFF 26-disk 2U Chassis
XS3226D	Dual Controller	SFF 26-disk 2U Chassis
XS3226S	Single Controller	SFF 26-disk 2U Chassis
XS1226D	Dual Controller	SFF 26-disk 2U Chassis

XS1226S	Single Controller	SFF 26-disk 2U Chassis
---------	-------------------	------------------------

Information contained in this manual has been reviewed for accuracy. But it could include typographical errors or technical inaccuracies. Changes are made to the document periodically. These changes will be incorporated in new editions of the publication. QSAN may make improvements or changes in the products. All features, functionality, and product specifications are subject to change without prior notice or obligation. All statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products.

All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

## Regulatory Statements

### FCC Statement

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards and Specifications listed below.

Technical Standard: FCC Part 15 Class A

IC ICES-003

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.

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。VCC1-A

警告：這是甲類的資訊產品。在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

### **CE Statement**

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards and Specifications listed below.

Technical Standard: EMC DIRECTIVE 2014/30/EU  
(EN55022 / EN55024)

### **UL Statement**

Rack Mount Instructions - The following or similar rack-mount instructions are included with the installation instructions:

1. Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T<sub>ma</sub>) specified by the manufacturer.
2. Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
3. Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
4. Circuit Overloading – Careful consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

**CAUTION:**

The main purpose of the system left and right ears are for 19" rack use only. Do NOT use those ears to carry or transport the system.

---

The ITE is not intended to be installed and used in a home, school or public area accessible to the general population, and the thumbscrews should be tightened with a tool after both initial installation and subsequent access to the panel.

Warning: Always remove all power supply cords before service

This equipment intended for installation in restricted access locations.

- Access should only be allowed by qualified SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken.
- Access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.
- Recommended operation temperature: 0 ~ 40°C (31.99 ~ 103.99°F); operation rating (100-127 Vac, 50-60Hz, 10.0A; 200-240 Vac, 50-60Hz, 5.0A)

**CAUTION: (English)**

Risk of explosion if battery is replaced by incorrect type. Please replace the same or equivalent type battery use and dispose of used batteries according to the instructions.

**ATTENTION: (French)**

IL Y A RISQUE D'EXPLOSION SI LA BATTERIE EST REMPLACÉE PAR UNE BATTERIE DE TYPE INCORRECT. METTRE AU REBUT LES BATTERIES USAGÉES CONFORMEMENT AUX INSTRUCTIONS.

**VORSICHT: (German)**

Explosionsgefahr bei unsachgemäßem Austausch der Batterie.  
Entsorgung gebrauchter Batterien nach Anleitung.

**ADVERTENCIA: (Spanish)**

Las baterías pueden explotar si no se manipulan de forma apropiada. No desmonte ni tire las baterías al fuego. Siga las normativas locales al desechar las baterías agotadas.

**警告: (Simplified Chinese)**

电池如果更换不正确会有爆炸的危险，请依制造商说明处理用过之电池。

---

---

**警告: (Traditional Chinese)**

電池如果更換不正確會有爆炸的危險，請依製造商說明處理用過之電池。

---

**INFORMATION:**

QSAN provides limited warranty for QSAN-branded hardware products:

- System hardware and peripheral product (s): **3** years limited warranty from date of original purchase.
- Battery Backup Module or super capacitor module (applies for cache-to-flash module): **1** year limited warranty from date of original purchase.

For more detail warranty policy, please refer to QSAN official web site:

<https://www.qsan.com/warranty>

---

# Table of Contents

---

<b>Notices</b> .....	<b>i</b>
Regulatory Statements .....	ii
<b>Preface</b> .....	<b>xiv</b>
About This Manual .....	xiv
Related Documents .....	xiv
Technical Support .....	xiv
Information, Tip, and Caution .....	xv
Conventions .....	xv
<b>1. Overview</b> .....	<b>1</b>
1.1. XCubeSAN Series Product Overview .....	1
1.2. XCubeSAN Series Hardware Features .....	3
1.3. XCubeSAN Series Hardware Specifications .....	4
1.4. XCubeSAN Series Package Contents .....	9
1.5. XCubeSAN Series Optional Accessories .....	9
<b>2. System Components Overview</b> .....	<b>13</b>
2.1. Front Panel .....	13
2.2. System Disk Drive Numbering .....	16
2.3. Supported Disk Drives and SSDs .....	17
2.4. Rear Panel .....	18
2.4.1. Rear Panel Layout .....	18
2.4.2. Controller Module .....	20
2.5. Power Supply Unit .....	22
2.6. Fan Module .....	23
2.7. Cache-to-Flash Memory Protection .....	25
2.7.1. Mechanism of Cache Data Protection .....	27
2.7.2. Features of the Cache-to-Flash Module .....	28
<b>3. Installing the System Hardware</b> .....	<b>29</b>
3.1. Installation Checklist .....	29
3.2. Installing Disk Drives into the Trays .....	29
3.3. Installing the Optional Host Cards .....	36
3.4. Installing the Optional Memory Modules .....	44
3.5. Installing the Optional Cache-to-Flash Modules .....	48
3.6. Installing the Optional Slide Rails .....	52
3.7. Installing the Trays into the System .....	55

3.8.	Connecting the System to a Host .....	56
3.8.1.	Connecting to the Management Ports .....	57
3.8.2.	Dual Path (MPIO) Deployment .....	57
3.8.3.	Expansion Deployment .....	58
3.9.	Connecting Power Cords and Powering ON the System .....	59
3.10.	Powering OFF the System .....	61
3.11.	Wake-on-LAN / Wake-on-SAS to Power ON / OFF the System .....	62
3.12.	Connecting a UPS .....	63
3.13.	Connecting the Optional USB LCM .....	64
3.14.	Discover and Carry Out the Initial Configuration for the System.....	65
<b>4.</b>	<b>Deployment Types and Cabling .....</b>	<b>66</b>
4.1.	Deployment Types .....	66
4.2.	Cabling the System .....	67
4.2.1.	Expansion Configuration Rules .....	67
4.2.2.	Single Path Deployment.....	69
4.2.3.	Dual Path (MPIO) Deployment .....	70
4.2.4.	Multi-server Attached Cabling Deployment.....	72
4.2.5.	Expansion Topology and Deployment .....	75
4.2.6.	Introduction of Remote Replication .....	78
<b>5.</b>	<b>Descriptions of LEDs and Buttons .....</b>	<b>82</b>
5.1.	Front Panel .....	82
5.1.1.	System Controls and Indicators.....	82
5.1.2.	Disk Drive LEDs .....	84
5.2.	Rear Panel .....	85
5.2.1.	Controller LEDs.....	85
5.2.2.	Power Supply Unit LED .....	86
5.2.3.	Host Card LEDs .....	87
5.2.4.	Cache-to-Flash Module LEDs and Button.....	90
<b>6.</b>	<b>Quick Maintenance .....</b>	<b>92</b>
6.1.	Removing / Installing the Controller Module .....	92
6.2.	Removing / Installing the Power Supply Unit.....	97
6.3.	Removing / Installing the Fan Module.....	100
6.4.	Removing the Host Card .....	104
6.5.	Removing the Cache-to-Flash Modules .....	106
<b>7.</b>	<b>Support and Other Resources.....</b>	<b>110</b>
7.1.	Getting Technical Support.....	110
7.2.	Online Customer Support .....	112
7.3.	Accessing Product Updates.....	116
7.4.	Documentation Feedback .....	117



**Appendix..... 118**  
    End-User License Agreement (EULA) ..... 118

# Figures

---

Figure 1-1	Form Factors of All XCubeSAN Series Models .....	2
Figure 2-1	System Controls and Indicators .....	14
Figure 2-2	LFF & SFF System Front Panel Components .....	15
Figure 2-3	Disk Drive Indicators of LFF & SFF Disk Drive Tray .....	15
Figure 2-4	System Disk Drive Numbering for the XCubeSAN Series .....	17
Figure 2-5	LFF & SFF Rear Panel Layout.....	19
Figure 2-6	General View of the Controller Module .....	20
Figure 2-7	Components of the Controller Module .....	20
Figure 2-8	Location of the Power Supply Unit in the LFF or SFF System .....	22
Figure 2-9	Components of the Power Supply Unit .....	23
Figure 2-10	Location of Each Fan Module Installed in the LFF or SFF System .....	24
Figure 2-11	Mechanical Components of the Fan Module .....	25
Figure 2-12	Location of the Cache-to-Flash Module.....	26
Figure 2-13	The Cache-to-flash Module – BBM (Battery Backup Module) Pack.....	27
Figure 2-14	The Cache-to-flash Module – SCM (Super Capacitor Module) Pack .....	27
Figure 2-15	Cache-to-Flash Workflow.....	27
Figure 3-1	Front Side Components of LFF & SFF Disk Drive Trays.....	30
Figure 3-2	Unlock and Open the Carrier Handle of a Disk Drive Tray (LFF) .....	31
Figure 3-3	Unlock and Open the Carrier Handle of a Disk Drive Tray (SFF) .....	31
Figure 3-4	Hold the Carrier Handle and Pull out the Disk Drive Tray (LFF) .....	32
Figure 3-5	Hold the Carrier Handle and Pull out the Disk Drive Tray (SFF).....	32
Figure 3-6	Align a Disk Drive & Install into a Tray (LFF-to-LFF).....	33
Figure 3-7	Align a Disk Drive & Install into a Tray (SFF-to-LFF) .....	34
Figure 3-8	Align a Disk Drive & Install into a Tray (SFF-to-SFF) .....	35
Figure 3-9	Host Card Installation Slots.....	37
Figure 3-10	Mechanical Components of the Controller Module.....	41
Figure 3-11	Steps of Removing the Controller Module.....	42
Figure 3-12	Procedures of Removing the Host Card Dummy Cage .....	42
Figure 3-13	Procedures of Installing the Host Card.....	43
Figure 3-14	Connection and Status of the Host Cards .....	44
Figure 3-15	The Installation Sequence of the Memory Module in XS3200 and XS5200 .....	46
Figure 3-16	The Installation Sequence of the Memory Module in XS1200.....	47
Figure 3-17	Location of the Cache-to-Flash Module.....	49
Figure 3-18	Components of the Cache-to-Flash Modules.....	50
Figure 3-19	The Dummy Cage Screw Location of the Cache-to-Flash Module .....	50
Figure 3-20	Installing the Flash Module.....	51
Figure 3-21	Installing the Power Module .....	51

Figure 3-22	Status and Information of Cache-to-Flash Module.....	52
Figure 3-23	First Step of the Slide Rails Installation .....	53
Figure 3-24	Second Step of the Slide Sails Installation .....	54
Figure 3-25	Third Step of the Slide Rails Installation .....	54
Figure 3-26	Fourth Step of the Slide Sails Installation.....	55
Figure 3-27	Install a Tray into the System and Lock the Release Button Lock (LFF) .....	56
Figure 3-28	Install a Tray into the System and Lock the Release Button Lock (SFF).....	56
Figure 3-29	Cabling Example of the Administrator to the XCubeSAN Management Port .....	57
Figure 3-30	One Server / One HBA / Two Switches / One XCubeSAN / Dual Path .....	58
Figure 3-31	One Server / One HBA / One XCubeSAN / One XCubeDAS / Dual Path.....	59
Figure 3-32	Press the Power Button One Time to Power on the System.....	60
Figure 3-33	PSU Power Cord Connects .....	60
Figure 3-34	Power off the System by Power Button.....	61
Figure 3-35	Power off the System via Web UI.....	62
Figure 3-36	Wake-on-LAN and Wake-on-SAS Technology .....	63
Figure 3-37	Location for the UPS System Connection .....	64
Figure 4-1	One Server / One XCubeSAN / Single Path .....	69
Figure 4-2	One Server / One XCubeSAN / One XCubeDAS / Single Path.....	70
Figure 4-3	One Server / One HBA / Two Switches / One XCubeSAN / Dual Path .....	71
Figure 4-4	One Server / One HBA / One XCubeSAN / One XCubeDAS / Dual Path.....	72
Figure 4-5	Two Servers / One HBA per Server / One XCubeSAN / Single Path.....	72
Figure 4-6	Two Servers / One HBA per Server / Two Switches / One XCubeSAN / Dual Path...	73
Figure 4-7	Ten Servers / One HBA per Server / One XCubeSAN / Dual Path.....	74
Figure 4-8	Cascade Topology: One XCubeSAN / One XCubeDAS / Dual Path .....	75
Figure 4-9	Cascade Topology: One XCubeSAN / Two XCubeDAS / Dual Path .....	76
Figure 4-10	Reverse Topology: One XCubeSAN / Two XCubeDAS / Dual Path.....	77
Figure 4-11	Tree Topology: One XCubeSAN / Two XCubeDAS / Dual Path.....	78
Figure 4-12	One-Directional Remote Replication .....	79
Figure 4-13	Bi-Directional Remote Replication.....	79
Figure 4-14	One-to-Many Remote Replication.....	79
Figure 4-15	Many-to One Remote Replication.....	80
Figure 4-16	Many-to Many Remote Replication .....	80
Figure 5-1	System Controls and Indicators .....	82
Figure 5-2	Disk Drive Indicators of LFF & SFF Disk Drive Tray.....	84
Figure 5-3	The Controller LEDs.....	85
Figure 5-4	The Power Supply Unit LED .....	86
Figure 5-5	4-port 16Gb Fibre Channel Host Card (SFP+) LEDs.....	87
Figure 5-6	2-port 16Gb Fibre Channel Host Card (SFP+) LEDs.....	88
Figure 5-7	4-port 10GbE iSCSI Host Card (SFP+) LEDs.....	88
Figure 5-8	2-port 10GBASE-T iSCSI Host Card (RJ45) LEDs.....	89
Figure 5-9	4-port 1GBASE-T iSCSI Host Card (RJ45) LEDs.....	90

Figure 5-10	Flash Module LEDs and Button .....	90
Figure 6-1	Warning Message of Failed Controller Module in the SANOS UI.....	93
Figure 6-2	Warning Message of Controller Module by the Status LED .....	94
Figure 6-3	Mechanical Components of the Controller Module.....	94
Figure 6-4	Procedures of Removing the Controller Module.....	95
Figure 6-5	Detailed Procedures of the Controller Module installation .....	96
Figure 6-6	Screenshot of the Controller Module Successfully Installed in SANOS UI .....	96
Figure 6-7	Warning Message of Failed PSU in SANOS UI .....	97
Figure 6-8	Mechanical Components of the PSU .....	98
Figure 6-9	Procedures of Removing the Power Supply Unit .....	99
Figure 6-10	Installing the Power Supply Unit in the System Chassis .....	100
Figure 6-11	Screenshot of the PSU Successfully Installed in the SANOS UI .....	100
Figure 6-12	Warning Message of Failed Fan Module in the SANOS UI .....	101
Figure 6-13	Mechanical Components of the Fan Module .....	102
Figure 6-14	Procedures of Removing the Fan Module .....	103
Figure 6-15	Procedures of Installing the Fan Module.....	104
Figure 6-16	Screenshot of the Fan Module Successfully Installed in the SANOS UI .....	104
Figure 6-17	Example of a Failed Port on the 10GbE iSCSI Host Card .....	105
Figure 6-18	Procedures of Removing the Host Card from the Controller Cage .....	105
Figure 6-19	Procedures of Pull out the Host Card and Install Dummy Host Card Cage.....	106
Figure 6-20	The Finished Installed Dummy Host Card Cage .....	106
Figure 6-21	Example of a Failed Power Module.....	107
Figure 6-22	Example of a Failed Flash Module .....	107
Figure 6-23	Pressing Attention Button of the Flash Module.....	108
Figure 6-24	The Procedure of Removing the Flash Module from the System Chassis .....	108
Figure 6-25	The Procedure of Removing the Power Module from the System Chassis.....	109
Figure 7-1	Download Service Package in the SANOS UI .....	111
Figure 7-2	Appearance of a Console Cable.....	112
Figure 7-3	Connect the Console Cable .....	112
Figure 7-4	The Procedures of Setup Serial Console by HyperTerminal .....	114
Figure 7-5	The Procedures of Setup Serial Console by PuTTY.....	116

## Tables

---

Table 1-1	XCubeSAN Series Storage System 4U 19" Rack Mount Models .....	2
Table 1-2	XCubeSAN Series Storage System 3U 19" Rack Mount Models .....	2
Table 1-3	XCubeSAN Series Storage System 2U 19" Rack Mount Models .....	3
Table 1-4	XS5200 Series Hardware Specifications .....	4
Table 1-5	XS3200 Series Hardware Specifications .....	6
Table 1-6	XS1200 Series Hardware Specifications .....	7
Table 1-7	XCubeSAN Series Accessories .....	9
Table 2-1	Descriptions of System Controls and Indicators .....	14
Table 2-2	LFF & SFF System Front Panel Components .....	15
Table 2-3	Disk Drive Indicators of LFF & SFF Disk Drive Tray .....	16
Table 2-4	Supported Disk Drive Types .....	17
Table 2-5	LFF & SFF Rear Panel Layout .....	19
Table 2-6	Description of the Controller Module Components .....	20
Table 2-7	Location of the Power Supply Unit in the LFF or SFF System .....	23
Table 2-8	Components of the Power Supply Unit .....	23
Table 2-9	Location of Each Fan Module Installed in the LFF or SFF System .....	24
Table 2-10	Mechanical Components of the Fan Module .....	25
Table 2-11	Location of the Cache-to-Flash Module .....	26
Table 2-12	Protection Memory Capacity by Different Cache-to-Flash Module .....	28
Table 3-1	Installation Checklist .....	29
Table 3-2	Front Side Components of LFF & SFF Disk Drive Trays .....	30
Table 3-3	Available Disk Drive Trays for XCubeSAN Series .....	35
Table 3-4	Available Host Cards for XCubeSAN Series .....	36
Table 3-5	Host Card Installation Slots of a Controller .....	37
Table 3-6	Supported Installing Location and Combination of the Host Cards .....	37
Table 3-7	Mechanical Components of a Controller Module .....	41
Table 3-8	Memory Modules for XCubeSAN Series .....	45
Table 3-9	The Installation Sequence for Optional Memory Module in XS3200 and XS5200 ....	46
Table 3-10	The Installation Sequence for Optional Memory Module in XS1200 .....	48
Table 3-11	Available Cache-to-flash Modules for XCubeSAN Series .....	48
Table 3-12	Components of the Cache-to-Flash Modules .....	50
Table 3-13	Available Slide Rails for XCubeSAN Series .....	52
Table 3-14	Available Expansion Cable for XCubeSAN Series .....	62
Table 3-15	Available UPS Cable for XCubeSAN Series .....	64
Table 3-16	Available USB LCM for XCubeSAN Series .....	65
Table 4-1	Deployment Types .....	66
Table 4-2	The List of Available Cable for XCubeSAN Series .....	67

Table 4-3	SAN System and Expansion Enclosure Configuration Rules .....	68
Table 5-1	Descriptions of the System Controls and Indicators LEDs .....	83
Table 5-2	Descriptions of Disk Drive LEDs .....	84
Table 5-3	Descriptions of XCubeSAN Series Controller LEDs .....	85
Table 5-4	Descriptions of the Power Supply Unit LED .....	86
Table 5-5	Descriptions of 4-port 16Gb Fibre Channel Host Card (SFP+) LEDs .....	87
Table 5-6	Descriptions of 2-port 16Gb Fibre Channel Host Card (SFP+) LEDs .....	88
Table 5-7	Descriptions of 4-port 10GbE iSCSI Host Card (SFP+) LEDs .....	89
Table 5-8	Descriptions of 2-port 10GBASE-T iSCSI Host Card (RJ45) LEDs .....	89
Table 5-9	Descriptions of 4-port 1GBASE-T iSCSI Host Card (RJ45) LEDs .....	90
Table 5-10	Descriptions of Flash Module LEDs and Button .....	91
Table 6-1	Mechanical Components of the Controller Module .....	94
Table 6-2	Mechanical Components of the PSU .....	98
Table 6-3	Mechanical Components of the Fan Module .....	102

## Preface

---

### About This Manual

This manual provides technical guidance for designing and implementing QSAN XCubeSAN series SAN system, and it is intended for use by system administrators, SAN designers, storage consultants, or anyone who has purchased these products and is familiar with servers and computer networks, network administration, storage system installation and configuration, storage area network management, and relevant protocols.



**CAUTION:**

Do NOT attempt to service, change, disassemble or upgrade the equipment's components by yourself. Doing so may violate your warranty and expose you to electric shock. Refer all servicing to authorized service personnel. Please always follow the instructions in this owner's manual.

---

### Related Documents

There are related documents which can be downloaded from the website.

- [All XCubeSAN Documents](#)
- [XCubeSAN QIG \(Quick Installation Guide\)](#)
- [XCubeSAN Hardware Manual](#)
- [XCubeSAN Configuration Worksheet](#)
- [XCubeSAN SANOS 4.0 Software Manual](#)
- [Compatibility Matrix](#)
- [White Papers](#)
- [Application Notes](#)

### Technical Support

Do you have any questions or need help trouble-shooting a problem? Please contact QSAN Support, we will reply to you as soon as possible.

- Via the Web: [https://www.qsan.com/technical\\_support](https://www.qsan.com/technical_support)
- Via Telephone: +886-2-7720-2118 extension 136  
(Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
- Via Skype Chat, Skype ID: qsan.support  
(Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
- Via Email: [support@qsan.com](mailto:support@qsan.com)

## Information, Tip, and Caution

This manual uses the following symbols to draw attention to important safety and operational information.



**INFORMATION:**

INFORMATION provides useful knowledge, definition, or terminology for reference.

---



**TIP:**

TIP provides helpful suggestions for performing tasks more effectively.

---



**CAUTION:**

CAUTION indicates that failure to take a specified action could result in damage to the system.

---

## Conventions

The following table describes the typographic conventions used in this manual.

Conventions	Description
<b>Bold</b>	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click the <b>OK</b> button.

<code>&lt;Italic&gt;</code>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy <code>&lt;source-file&gt;</code> <code>&lt;target-file&gt;</code> .
[ ] square brackets	Indicates optional values. Example: [ a   b ] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a   b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments.
/ Slash	Indicates all options or arguments.
underline	Indicates the default value. Example: [ <u>a</u>   b ]

# 1. Overview

---

Thank you for purchasing QSAN Technology, Inc. products. The QSAN XCubeSAN series is a high-performance SAN storage solutions combining outstanding performance with high availability, reliability, flexibility, and simple management.

## 1.1. XCubeSAN Series Product Overview

QSAN XCubeSAN series is a SAN storage system, the system is composed of system hardware and the SANOS operating system, the system hardware is a modular design and FRU (Field Replacement Unit) optimized. All the hardware modules are inside the rack mount chassis including: system controllers, front panel, rear panel, redundant power supply and fan modules, cache-to-flash module ( by using battery backup module or super capacitor module), and expansion slots for optional Fibre Channel or 10GbE / 1GbE iSCSI host cards. This manual will direct you step by step to familiarize you with the XCubeSAN hardware components, how to install the system, carry out the initial configuration, and provide you with some quick maintenance guidelines.



**INFORMATION:**

For how to use the SANOS operating system, please refer to the [XCubeSAN SANOS 4.0 Software Manual](#).

---

XCubeSAN series supports several standard form factors:

- LFF (Large Form Factor): 12-bay 19" rack mount 2U chassis, 16-bay 19" rack mount 3U chassis, and 24-bay 19" rack mount 4U chassis.
- SFF (Small Form Factor): 26-bay 19" rack mount 2U chassis.

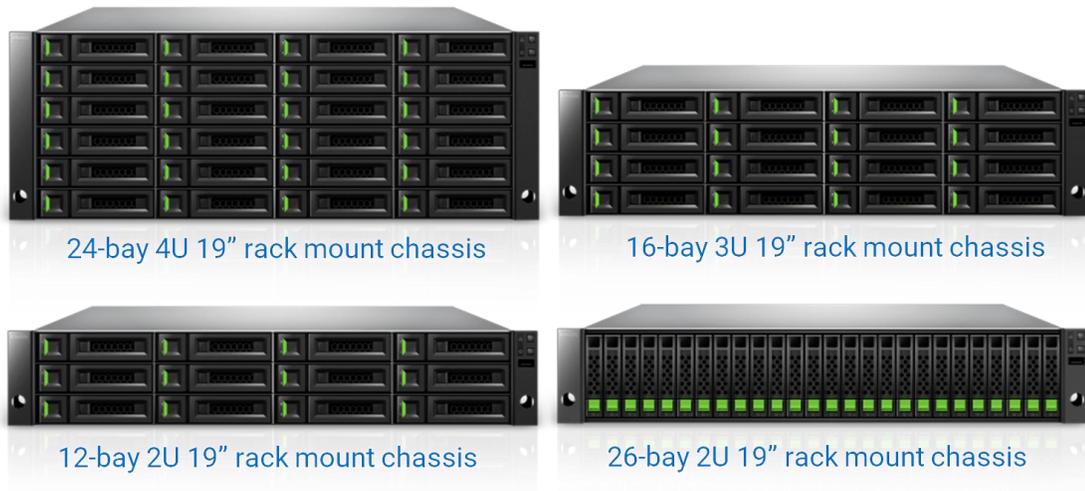


Figure 1-1 Form Factors of All XCubeSAN Series Models

The following tables provide detailed information about all XCubeSAN Series models arranged by form factors.

Table 1-1 XCubeSAN Series Storage System 4U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5224D	Dual Controller	LFF 24-bay 4U Chassis
XS3224D	Dual Controller	LFF 24-bay 4U Chassis
XS3224S	Single Controller	LFF 24-bay 4U Chassis
XS1224D	Dual Controller	LFF 24-bay 4U Chassis
XS1224S	Single Controller	LFF 24-bay 4U Chassis

Table 1-2 XCubeSAN Series Storage System 3U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5216D	Dual Controller	LFF 16-bay 3U Chassis
XS3216D	Dual Controller	LFF 16-bay 3U Chassis
XS3216S	Single Controller	LFF 16-bay 3U Chassis
XS1216D	Dual Controller	LFF 16-bay 3U Chassis
XS1216S	Single Controller	LFF 16-bay 3U Chassis

Table 1-3 XCubeSAN Series Storage System 2U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5212D	Dual Controller	LFF 12-bay 2U Chassis
XS5212S	Single Controller	LFF 12-bay 2U Chassis
XS3212D	Dual Controller	LFF 12-bay 2U Chassis
XS3212S	Single Controller	LFF 12-bay 2U Chassis
XS1212D	Dual Controller	LFF 12-bay 2U Chassis
XS1212S	Single Controller	LFF 12-bay 2U Chassis
XS5226D	Dual Controller	SFF 26-bay 2U Chassis
XS5226S	Single Controller	SFF 26-bay 2U Chassis
XS3226D	Dual Controller	SFF 26-bay 2U Chassis
XS3226S	Single Controller	SFF 26-bay 2U Chassis
XS1226D	Dual Controller	SFF 26-bay 2U Chassis
XS1226S	Single Controller	SFF 26-bay 2U Chassis

## 1.2. XCubeSAN Series Hardware Features

The following is a list of the key hardware components and optional components of the XCubeSAN series for reference.

- Dual-Active (Active/Active) controller design architecture
- Processor
  - XS5200 series: Intel Xeon 4-core processor (8-core processor models are also available)
  - XS3200 series: Intel 4-core processor
  - XS1200 series: Intel 2-core processor
- Standard system memory capacity
  - XS5200 series: DDR4 8GB (2 x 4GB), and up to 128GB (4 x 32GB) per controller
  - XS3200 series: DDR4 4GB (1 x 4GB), and up to 128GB (4 x 32GB) per controller
  - XS1200 series: DDR4 4GB (1 x 4GB), and up to 32GB (2 x 16GB) per controller
- SAS 3.0 backplane board
- Built-in two 10GbE iSCSI ports per controller
- Redundant power supply units
- Redundant fan modules
- Storage capacity expansion with XCubeDAS XD5300 series 12Gb SAS RAID expansion enclosures

- Each controller has two host card slots allowing you to select your desired host cards configuration. Optional host cards are on the following.
  - 4 x 16Gb Fibre Channel (SFP+) ports (Slot 2 provides 20Gb bandwidth)
  - 2 x 16Gb Fibre Channel (SFP+) ports (Slot 2 provides 20Gb bandwidth)
  - 4 x 10GbE iSCSI (SFP+) ports (Slot 2 provides 20Gb bandwidth)
  - 2 x 10GBASE-T iSCSI (RJ45)
  - 4 x 1GBASE-T iSCSI (RJ45)
- A Cache-to-Flash module is also available for the protection of the system cache data in your XCubeSAN system
  - BBM (Battery Backup Module) + flash module (to protect all memory capacity)
  - SCM (Super Capacitor Module) + flash module (to protect up to 16GB memory per controller)
- You can also use SSDs to boost your overall system speed. If you purchase SATA SSDs for your dual controller XCubeSAN system; you have to purchase 6G MUX board from QSAN channel partners. Because there are different LFF and SFF disk drive trays, 6G MUX board is needed to adapt to the type of bracket:
  - SATA 6Gb MUX board for installing 2.5" SATA SSD into LFF 3.5" disk drive tray
  - SATA 6Gb MUX board for installing 2.5" SATA SSD into SFF 2.5" disk drive tray

## 1.3. XCubeSAN Series Hardware Specifications

Following tables are hardware specifications of XCubeSAN series.

Table 1-4 XS5200 Series Hardware Specifications

Model name	XS5224D (Dual)	XS5216D (dual)	XS5212D (Dual) XS5212S (Single)	XS5226D (Dual) XS5226S (Single)
<b>Form Factor</b>	4U 24-bay, LFF	3U 16-bay, LFF	2U 12-bay, LFF	2U 26-bay, SFF
<b>RAID Controller</b>	Dual-active or Single-upgradable controller			
<b>Processor</b>	Intel Xeon 4-core processor (8-core processor models are also available)			
<b>Memory (per Controller)</b>	DDR4 ECC 8GB, up to 128GB (four DIMM slots, insert two DIMMs or more will boost performance)			
<b>Host Connectivity (per Controller)</b>	Optional Host Cards at Slot 1 (PCIe Gen3 x 8) <ul style="list-style-type: none"> <li>• 4 x 16Gb FC (SFP+) ports</li> <li>• 2 x 16Gb FC (SFP+) ports</li> </ul>			

	<ul style="list-style-type: none"> <li>• 4 x 10GbE iSCSI (SFP+) ports</li> <li>• 2 x 10GbE iSCSI (RJ45) ports</li> <li>• 4 x 1GbE iSCSI (RJ45) ports</li> </ul> Optional Host Cards at Slot 2 (PCIe Gen2 x 4) <ul style="list-style-type: none"> <li>• 4 x 16Gb FC (SFP+) ports<sup>1</sup></li> <li>• 2 x 16Gb FC (SFP+) ports<sup>1</sup></li> <li>• 4 x 10GbE iSCSI (SFP+) ports<sup>1</sup></li> <li>• 2 x 10GbE iSCSI (RJ45) ports</li> <li>• 4 x 1GbE iSCSI (RJ45) ports</li> </ul>			
	Built-in 2 x 10GBASE-T iSCSI (RJ45) ports Built-in 1 x 1GbE management port			
<b>Expansion Connectivity (per Controller)</b>	Built-in 2 x 12Gb/s SAS wide ports (SFF-8643, internal) connectors (connect with the SAS cable by using mini-SAS HD SFF-8644 connector)			
<b>Drive Type</b>	Mix & match 3.5" & 2.5" SAS, NL-SAS, SED HDD	2.5" SAS, NL-SAS, SED HDD	2.5" SAS, SATA <sup>2</sup> SSD	2.5" SAS, SATA <sup>2</sup> SSD
<b>Expansion Capabilities</b>	Up to 10 expansion units using XD5300 series 12Gb SAS expansion enclosure <ul style="list-style-type: none"> <li>• XD5324 (4U 24-bay, LFF)</li> <li>• XD5316 (3U 16-bay, LFF)</li> <li>• XD5312 (2U 12-bay, LFF)</li> <li>• XD5326 (2U 26-bay, SFF)</li> </ul>			
<b>Max. Drives Supported</b>	624	616	612	626
<b>Dimension (H x W x D)</b>	19" Rack mount 170.3 x 438 x 515 mm	19" Rack mount 130.4 x 438 x 515 mm	19" Rack mount 88 x 438 x 515 mm	19" Rack mount 88 x 438 x 491 mm
<b>Memory Protection</b>	Cache-to-Flash module (optional) Battery backup module + Flash module (to protect all memory capacity) Super capacitor module + Flash module (to protect up to 16GB memory per controller)			
<b>LCM (LCD Module)</b>	USB LCM (optional)			
<b>Power Supply</b>	770W/850W 1+1 redundant 80 PLUS Platinum			
<b>Fan Module</b>	2 x hot pluggable/redundant fan modules			
<b>Temperature</b>	<ul style="list-style-type: none"> <li>• Operating temperature 0 to 40°C</li> </ul>			

	<ul style="list-style-type: none"> <li>Shipping temperature -10°C to 50°C</li> </ul>
<b>Relative Humidity</b>	<ul style="list-style-type: none"> <li>Operating relative humidity 20% to 80% non-condensing</li> <li>Non-operating relative humidity 10% to 90%</li> </ul>

<sup>1</sup> Slot 2 provides 20Gb bandwidth.

<sup>2</sup> 6Gb MUX board needed for 2.5" SATA drives in dual controller system.

Table 1-5 XS3200 Series Hardware Specifications

Model name	XS3224D (Dual) XS3224S (Single)	XS3216D (Dual) XS3216S (Single)	XS3212D (Dual) XS3212S (Single)	XS3226D (Dual) XS3226S (Single)
<b>Form Factor</b>	4U 24-bay, LFF	3U 16-bay, LFF	2U 12-bay, LFF	2U 26-bay, SFF
<b>RAID Controller</b>	Dual-active or Single-upgradable controller			
<b>Processor</b>	Intel 4-core processor			
<b>Memory (per Controller)</b>	DDR4 ECC 4GB, up to 128GB (four DIMM slots, insert two DIMMs or more will boost performance)			
<b>Host Connectivity (per Controller)</b>	Optional Host Cards at Slot 1 (PCIe Gen3 x 8) <ul style="list-style-type: none"> <li>4 x 16Gb FC (SFP+) ports</li> <li>2 x 16Gb FC (SFP+) ports</li> <li>4 x 10GbE iSCSI (SFP+) ports</li> <li>2 x 10GbE iSCSI (RJ45) ports</li> <li>4 x 1GbE iSCSI (RJ45) ports</li> </ul> Optional Host Cards at Slot 2 (PCIe Gen2 x 4) <ul style="list-style-type: none"> <li>4 x 16Gb FC (SFP+) ports<sup>1</sup></li> <li>2 x 16Gb FC (SFP+) ports<sup>1</sup></li> <li>4 x 10GbE iSCSI (SFP+) ports<sup>1</sup></li> <li>2 x 10GbE iSCSI (RJ45) ports</li> <li>4 x 1GbE iSCSI (RJ45) ports</li> </ul> Built-in 2 x 10GBASE-T iSCSI (RJ45) ports Built-in 1 x 1GbE management port			
<b>Expansion Connectivity (per Controller)</b>	Built-in 2 x 12Gb/s SAS wide ports (SFF-8643, internal) connectors (connect with the SAS cable by using mini-SAS HD SFF-8644 connector)			
<b>Drive Type</b>	Mix & match 3.5" & 2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA <sup>2</sup> SSD			2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA <sup>2</sup> SSD

<b>Expansion Capabilities</b>	Up to 10 expansion units using XD5300 series 12Gb SAS expansion enclosure <ul style="list-style-type: none"> <li>• XD5324 (4U 24-bay, LFF)</li> <li>• XD5316 (3U 16-bay, LFF)</li> <li>• XD5312 (2U 12-bay, LFF)</li> <li>• XD5326 (2U 26-bay, SFF)</li> </ul>			
<b>Max. Drives Supported</b>	624	616	612	626
<b>Dimension (H x W x D)</b>	19" Rack mount 170.3 x 438 x 515 mm	19" Rack mount 130.4 x 438 x 515 mm	19" Rack mount 88 x 438 x 515 mm	19" Rack mount 88 x 438 x 491 mm
<b>Memory Protection</b>	Cache-to-Flash module (optional) Battery backup module + Flash module (to protect all memory capacity) Super capacitor module + Flash module (to protect up to 16GB memory per controller)			
<b>LCM (LCD Module)</b>	USB LCM (optional)			
<b>Power Supply</b>	770W/850W 1+1 redundant 80 PLUS Platinum			
<b>Fan Module</b>	2 x hot pluggable/redundant fan modules			
<b>Temperature</b>	<ul style="list-style-type: none"> <li>• Operating temperature 0 to 40°C</li> <li>• Shipping temperature -10°C to 50°C</li> </ul>			
<b>Relative Humidity</b>	<ul style="list-style-type: none"> <li>• Operating relative humidity 20% to 80% non-condensing</li> <li>• Non-operating relative humidity 10% to 90%</li> </ul>			

<sup>1</sup> Slot 2 provides 20Gb bandwidth.

<sup>2</sup> 6Gb MUX board needed for 2.5" SATA drives in dual controller system.

Table 1-6 XS1200 Series Hardware Specifications

<b>Model name</b>	<b>XS1224D (Dual) XS1224S (Single)</b>	<b>XS1216D (Dual) XS1216S (Single)</b>	<b>XS1212D (Dual) XS1212S (Single)</b>	<b>XS1226D (Dual) XS1226S (Single)</b>
<b>Form Factor</b>	4U 24-bay, LFF	3U 16-bay, LFF	2U 12-bay, LFF	2U 26-bay, SFF
<b>RAID Controller</b>	Dual-active or Single-upgradable controller			
<b>Processor</b>	Intel 2-core processor			
<b>Memory (per Controller)</b>	DDR4 ECC 4GB, up to 32GB (two DIMM slots, insert two DIMMs will boost performance)			

<b>Host Connectivity</b> (per Controller)	Optional Host Cards at Slot 1 (PCIe Gen3 x 8)			
	<ul style="list-style-type: none"> <li>• 4 x 16Gb FC (SFP+) ports</li> <li>• 2 x 16Gb FC (SFP+) ports</li> <li>• 4 x 10GbE iSCSI (SFP+) ports</li> <li>• 2 x 10GbE iSCSI (RJ45) ports</li> <li>• 4 x 1GbE iSCSI (RJ45) ports</li> </ul>			
	Optional Host Cards at Slot 2 (PCIe Gen2 x 4)			
	<ul style="list-style-type: none"> <li>• 4 x 16Gb FC (SFP+) ports<sup>1</sup></li> <li>• 2 x 16Gb FC (SFP+) ports<sup>1</sup></li> <li>• 4 x 10GbE iSCSI (SFP+) ports<sup>1</sup></li> <li>• 2 x 10GbE iSCSI (RJ45) ports</li> <li>• 4 x 1GbE iSCSI (RJ45) ports</li> </ul>			
	Built-in 2 x 10GBASE-T iSCSI (RJ45) ports			
	Built-in 1 x 1GbE management port			
<b>Expansion Connectivity</b> (per Controller)	Built-in 2 x 12Gb/s SAS wide ports (SFF-8643, internal) connectors (connect with the SAS cable by using mini-SAS HD SFF-8644 connector)			
<b>Drive Type</b>	Mix & match 3.5" & 2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA <sup>2</sup> SSD		2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA <sup>2</sup> SSD	
<b>Expansion Capabilities</b>	Up to 10 expansion units using XD5300 series 12Gb SAS expansion enclosure			
	<ul style="list-style-type: none"> <li>• XD5324 (4U 24-bay, LFF)</li> <li>• XD5316 (3U 16-bay, LFF)</li> <li>• XD5312 (2U 12-bay, LFF)</li> <li>• XD5326 (2U 26-bay, SFF)</li> </ul>			
<b>Max. Drives Supported</b>	624	616	612	626
<b>Dimension (H x W x D)</b>	19" Rack mount 170.3 x 438 x 515 mm	19" Rack mount 130.4 x 438 x 515 mm	19" Rack mount 88 x 438 x 515 mm	19" Rack mount 88 x 438 x 491 mm
<b>Memory Protection</b>	Cache-to-Flash module (optional) Battery backup module + Flash module (to protect all memory capacity) Super capacitor module + Flash module (to protect up to 16GB memory per controller)			
<b>LCM (LCD Module)</b>	USB LCM (optional)			

<b>Power Supply</b>	770W/850W 1+1 redundant 80 PLUS Platinum
<b>Fan Module</b>	2 x hot pluggable/redundant fan modules
<b>Temperature</b>	<ul style="list-style-type: none"> <li>Operating temperature 0 to 40°C</li> <li>Shipping temperature -10°C to 50°C</li> </ul>
<b>Relative Humidity</b>	<ul style="list-style-type: none"> <li>Operating relative humidity 20% to 80% non-condensing</li> <li>Non-operating relative humidity 10% to 90%</li> </ul>

<sup>1</sup> Slot 2 provides 20Gb bandwidth.

<sup>2</sup> 6Gb MUX board needed for 2.5" SATA drives in dual controller system.

## 1.4. XCubeSAN Series Package Contents

Following list are the package contents for the XCubeSAN series models.

- System Chassis (x1)
- Disk Drive Trays
  - XS5224 / XS3224 / XS1224 (4U 24-bay, LFF): 3.5" Disk Drive Tray (x24)
  - XS5216 / XS3216 / XS1216 (3U 24-bay, LFF): 3.5" Disk Drive Tray (x16)
  - XS5212 / XS3212 / XS1212 (2U 12-bay, LFF): 3.5" Disk Drive Tray (x12)
  - XS5226 / XS3226 / XS1226 (2U 26-bay, SFF): 2.5" Disk Drive Tray (x26)
- AC Power Cords (x2)
- RS-232 Console Cable (x2) for Dual Controller Model; (x1) for Single Controller Model
- Screws Pack for Disk Drives
- Quick Installation Guide

## 1.5. XCubeSAN Series Optional Accessories

Following list are optional components for all XCubeSAN series models. If you want to purchase these optional components, please contact your nearest local reseller or visit QSAN official web site: <https://qsan.com/location>

Table 1-7 XCubeSAN Series Accessories

Model Name	Picture	Description	Applied Models
DIM-D44GB		DDR4 ECC 4GB Memory Module	XS5200 Series XS3200 Series

DIM-D48GB		DDR4 ECC 8GB Memory Module	XS1200 Series
DIM-D416GB		DDR4 ECC 16GB Memory Module	
DIM-D432GB		DDR4 ECC 32GB Memory Module	XS5200 Series XS3200 Series
C2F-BM128G		Cache-to-Flash Module : C2F-BBMD + C2F-FLHMD	XS5200 Series XS3200 Series XS1200 Series
C2F-SP128G		Cache-to-Flash Module : C2F-SP16G + C2F-FLHMD (Protect up to 16GB memory per controller)	
C2F-BBMD		Battery Backup Module for Cache-to-Flash	
C2F-SP16G		Super Capacitor Module for Cache-to-Flash (Protect up to 16GB memory per controller)	
C2F-FLHMD		Flash Module for Cache-to-Flash	
HQ-16F4S2		4-port 16Gb Fibre Channel Host Card (SFP+)	
HQ-16F2S2		2-port 16Gb Fibre Channel Host Card (SFP+)	
HQ-10G4S2		4-port 10GbE iSCSI Host Card (SFP+)	
HQ-10G2T		2-port 10GBASE-T iSCSI Host Card (RJ45)	
HQ-01G4T		4-port 1GBASE-T iSCSI Host Card (RJ45)	
GBC-SFP+16Gb-J		16G Fibre Channel SFP+ Optical Transceiver	
GBC-SFP+10Gb-F		10GBASE-SR SFP+ Optical Transceiver	

GBC-SFP+8Gb-F		8G Fibre Channel SFP+ Optical Transceiver	
CBL-OPL500		Optical FC Cable, LC-LC, 5 Meters	
CBL-OPL200		Optical FC Cable, LC-LC, 2 Meters	
CBL-CNL		Console Cable, Phone-jack, 1 Meter	
CBL-UPS		UPS Cable, Phone-jack, 1 Meter	
CBL-12SW150		SAS 12G Expansion Cable with Wake-on-SAS, SFF-8644 to SFF-8644, 1.5 Meters (This cable is not suitable for connecting HBA or RAID card)	
CBL-12SH150		SAS 12G Expansion Cable, SFF-8644 to SFF-8644, 1.5 Meters	
LCM-U162		Portable USB LCM	
SLR-RM3640		Slide Rail	
HDT-351		3.5" Disk Drive Tray	XS5224 XS5216 XS5212 XS3224
HDM-351		SATA 6Gb MUX Board and Bracket for HDT-351 (2.5" SATA drives only)	XS3216 XS3212 XS1224 XS1216 XS1212

HDT-251		2.5" Disk Drive Tray	XS5226 XS3226 XS1226
HDM-251		SATA 6Gb MUX Board and Bracket for HDT-251	

## 2. System Components Overview

---

This chapter outlines the key hardware components or modules of the XCubeSAN system. After reading this chapter, you will have a basic understanding of each part of the XCubeSAN hardware and give you the ability to be able to successfully configure and operate your system. Following is the list of key components or modules of XCubeSAN:

- Front Panel
- System Disk Drive Numbering
- Supported Disk Drives and SSDs
- Rear Panel
- Power Unit
- Fan Module
- Cache-to-Flash Module

### 2.1. Front Panel

The XCubeSAN Series features a unique design: the system controls and indicators is located on the right ear. The system controls and indicators module integrates functional buttons and system state indicators, which can be easily operated and read by user. The figure below contains detailed information about the button and indicators module. For a greater understanding of the related colors and behaviors of each indicator on the front panel, please refer to the chapter 5.1, [Front Panel](#) section in the Descriptions of LEDs and Buttons chapter.

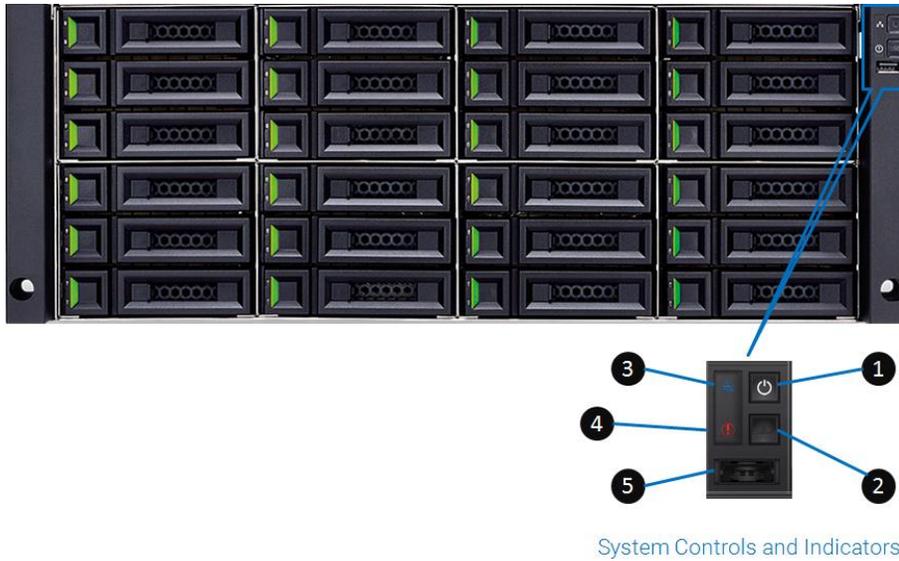


Figure 2-1 System Controls and Indicators

Table 2-1 Descriptions of System Controls and Indicators

Number	Description
1	System Power Button/LED
2	UID (Unique Identifier) Button/LED
3	System Access LED
4	System Status LED
5	USB Port (for USB LCM module)

Figures and the table below illustrate LFF & SFF system front panel components.





Figure 2-2 LFF & SFF System Front Panel Components

Table 2-2 LFF & SFF System Front Panel Components

Number	Description
1	System Left Ear
2	Disk Drive Tray
3	System Right Ear
4	The System Controls and Indicators

- Disk Drive Tray Indicators: figures and the table below illustrate LFF and SFF disk drive tray indicators.

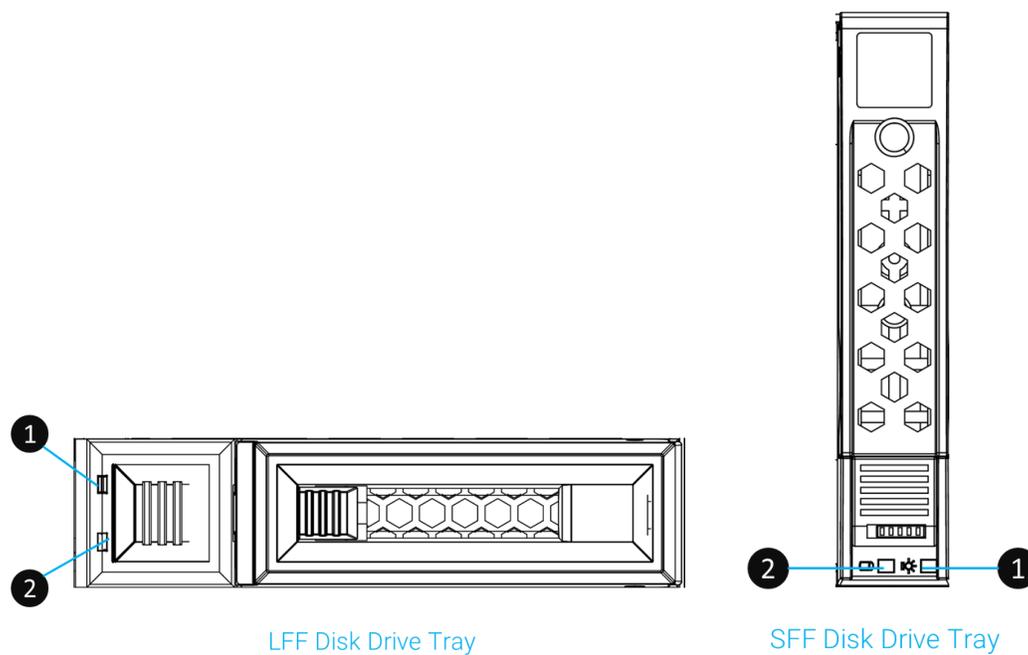


Figure 2-3 Disk Drive Indicators of LFF & SFF Disk Drive Tray

Table 2-3 Disk Drive Indicators of LFF & SFF Disk Drive Tray

Number	Description
1	Disk Drive Power LED
2	Disk Drive Status LED

For a greater understanding of the related color and the behavior of the disk drive, please refer to the chapter 5.1, [Front Panel](#) section in the Descriptions of LEDs and Buttons chapter.

## 2.2. System Disk Drive Numbering

Figures below illustrate the XCubeSAN system disk drive numbering. The disk drive numbering for LFF system starts from the top of first row in left column; this kind of disk drive numbering rule helps to balance the system weight distribution and enable easy management of disk drives zoning. The SFF system disk drive numbering is single row from left to right. If you want to check the disk drive numbering rule while installing the disk drives into the system, for LFF, you can find a disk drive numbering sticker on the right side of the system chassis top cover; for SFF system, the disk drive numbering is printed on the lower part of the system front.





Figure 2-4 System Disk Drive Numbering for the XCubeSAN Series



**TIP:**

Please plug-in any of the first four hard drives, then event logs can be saved and displayed in next system boot up. Otherwise, the event logs cannot be saved.

## 2.3. Supported Disk Drives and SSDs

The table below shows supported disk drives and SSDs for all XCubeSAN series models. This can be a reference for you to purchase suitable disk drives or SSDs for your system.

QSAN has qualified the popular SAS HDDs and SAS/SATA SSDs available in the market; to ensure that you have the highest level of flexibility in choosing the most advanced HDDs or SSDs available from the manufacturers or purchase the best cost/performance SAS HDDs or SAS/SATA SSDs from the market, to suit your budget/performance. We hope that this will significantly reduce your IT infrastructure investment cost. If you want to check the compatible HDDs or SSDs for your XCubeSAN system, please refer to the [Compatibility Matrix](#) table.

Table 2-4 Supported Disk Drive Types

Form Factor of Disk Drive Tray	Drive Type	Connection Interface
LFF 3.5"	HDD	SAS, NL-SAS
	SSD	SAS, SATA <sup>3</sup>
SFF 2.5"	HDD	SAS, NL-SAS
	SSD	SAS, SATA <sup>4</sup>



**INFORMATION:**

<sup>3</sup> When installing SATA SSDs in dual controller models, it needs to install optional SATA 6Gb MUX board and bracket for 3.5" disk drive tray (model name: HDM-351).

<sup>4</sup> When installing SATA SSDs in dual controller models, it needs to install optional SATA 6Gb MUX board and bracket for 2.5" disk drive tray (model name: HDM-251).

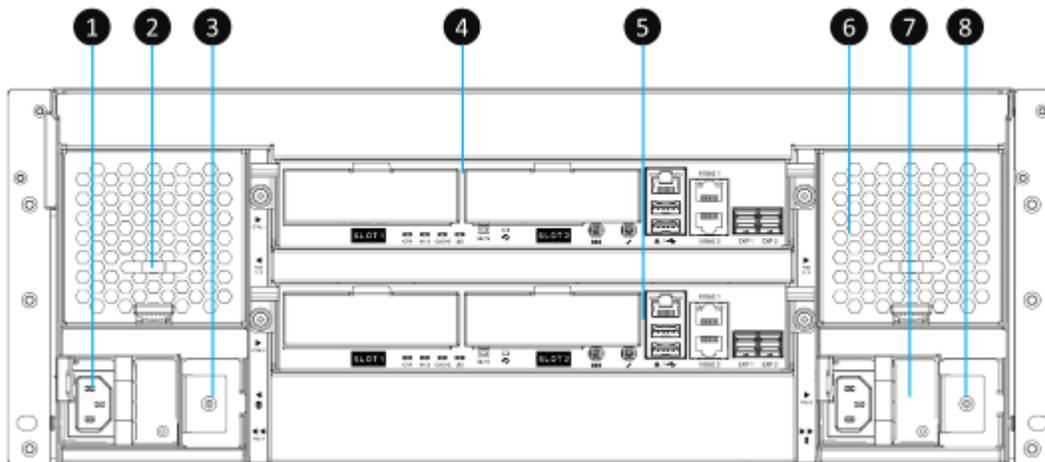
Please contact a QSAN authorized reseller for details purchasing information.

## 2.4. Rear Panel

The following content outlines the detail of the XCubeSAN series rear panel and components. In this section, you will learn the name and location of the key components and modules in the rear panel.

### 2.4.1. Rear Panel Layout

Figures and the table below illustrate the LFF and SFF system rear panel layout.



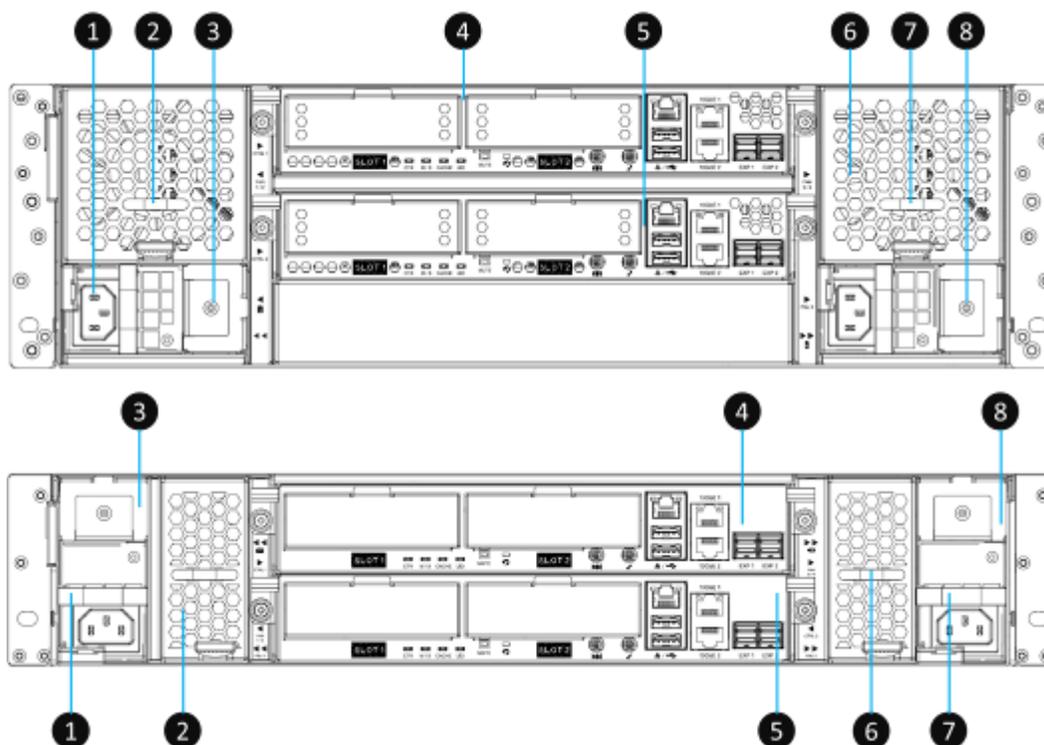


Figure 2-5 LFF & SFF Rear Panel Layout

Table 2-5 LFF & SFF Rear Panel Layout

Number	Description
1	Power Supply Unit 1
2	Fan Module 1
3	Slot for Cache-to-Flash Module: Flash Module
4	Controller Module 1 <sup>5</sup>
5	Controller Module 2
6	Fan Module 2
7	Power Supply Unit 2
8	Slot for Cache-to-Flash Module: Power Module



**INFORMATION:**

<sup>5</sup> If the XCubeSAN chassis is configured with a single controller module, the controller module MUST be installed in the upper slot.

## 2.4.2. Controller Module

The following image and table illustrate each component of a controller module. In this section, you will learn the name and location of each port, LED and host cards (optional parts).

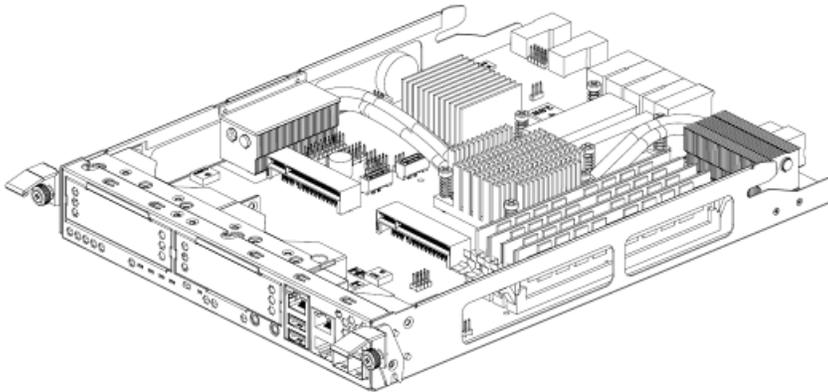


Figure 2-6 General View of the Controller Module

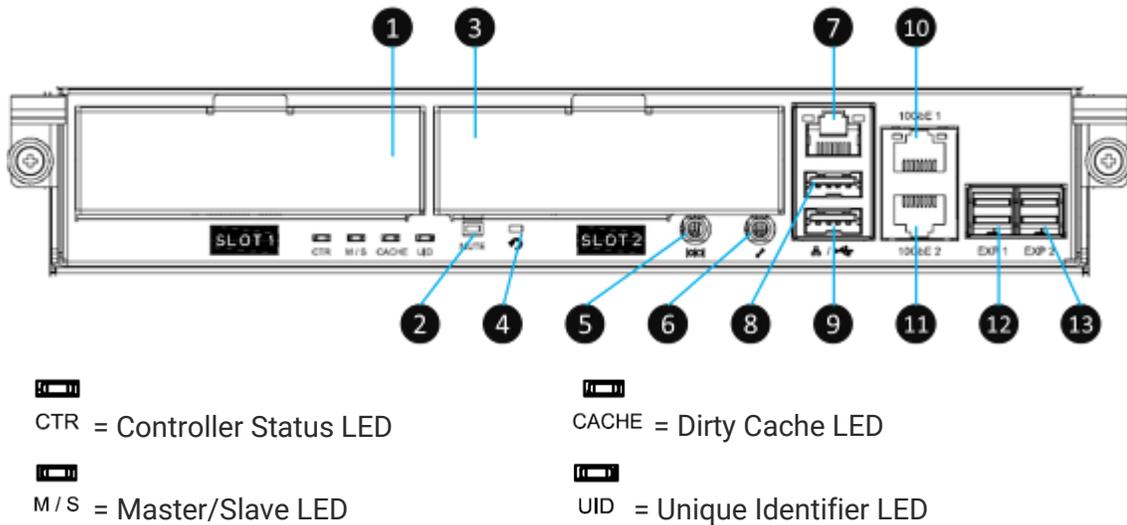


Figure 2-7 Components of the Controller Module

Table 2-6 Description of the Controller Module Components

Number	Description
1	Host Card Slot 1 (host card is an optional part)
2	Buzzer Mute Button
3	Host Card Slot 2 (host card is an optional part)

4	Reset Button <sup>6</sup>
5	Console Port (3.5mm jack to RS232) <sup>7</sup>
6	Service Port (UPS) <sup>8</sup>
7	Management Port
8	USB Port 1
9	USB Port 2
10	10GbE iSCSI (RJ45) Port 1
11	10GbE iSCSI (RJ45) Port 2
12	12Gb/s SAS Wide Port 1 (SFF8644)
13	12Gb/s SAS Wide Port 2 (SFF8644)



**INFORMATION:**

<sup>6</sup> Press the button for 3 seconds to progress reset the management port IP and admin’s password immediately. The default settings are:

- Reset **Management Port** IP address to DHCP, and then fix IP address: 169.254.1.234/16. It is recommended to confirm the IP address obtained by DHCP through the optional USB LCM.
- Reset admin’s **Password** to 1234.

<sup>7</sup> Console cable (NULL modem cable) to connect from console port of the storage system to a RS 232 port on the management PC. The console settings are on the following: Baud rate: 115,200, 8 data bit, no parity, 1 stop bit, and no flow control; terminal Type: vt100.

<sup>8</sup> XCubeSAN series supports traditional UPS via a serial port and network UPS via SNMP. If using the UPS with a serial port, connect the system to the UPS via the included cable for communication. (The cable plugs into the serial cable that comes with the UPS.) Then set up the shutdown values for when the power goes out.

For a greater understanding of the related color and the behavior of the controller module, please refer to the chapter 5.2, [Rear Panel](#) section in the Descriptions of LEDs and Buttons chapter.

## 2.5. Power Supply Unit

All XCubeSAN series models are equipped with two redundant and hot swappable PSUs (Power Supply Units). The PSU for 3U/4U systems and 2U systems are the same, but the installation direction is different. (If you pull out the PSU from the system chassis, for 4U/3U system, the sticker on the PSU will be at down side; for 2U system, the sticker will be at right side). The images and the table below illustrate the location of PSU in the LFF or SFF system.

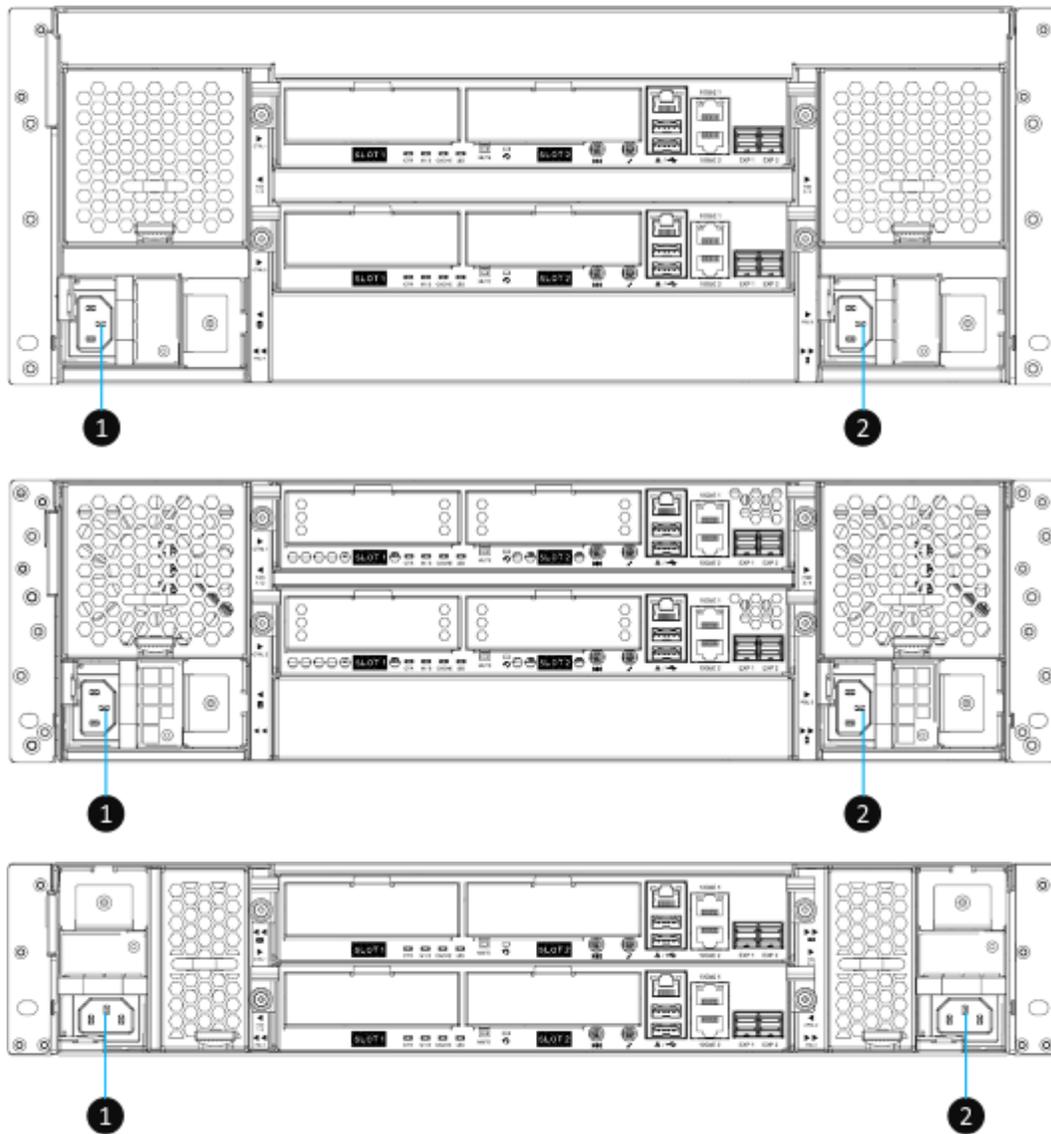


Figure 2-8 Location of the Power Supply Unit in the LFF or SFF System

Table 2-7 Location of the Power Supply Unit in the LFF or SFF System

Number	Description
1	PSU 1
2	PSU 2

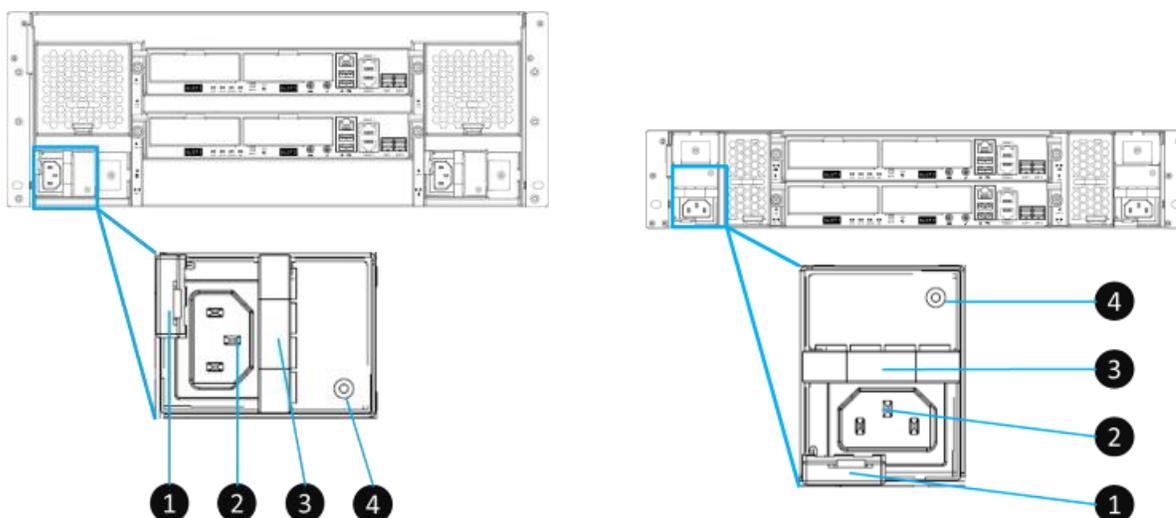


Figure 2-9 Components of the Power Supply Unit

Table 2-8 Components of the Power Supply Unit

Number	Description
1	PSU Release Tab
2	PSU Power Cord Connect
3	PSU Handle
4	PSU LED Indicator

If you want to learn more about the related color and behavior of the PSU LED, please refer to the chapter 5.2, [Rear Panel](#) section in the Descriptions of LEDs and Buttons chapter.

## 2.6. Fan Module

All XCubeSAN series models are equipped with two redundant and hot swappable fan modules. The fan module for 4U/3U systems are the same, however 2U systems are different. Each fan module includes two fans. Images and tables below illustrate the

location and mechanical components of the fan module that is installed in the LFF and SFF system.

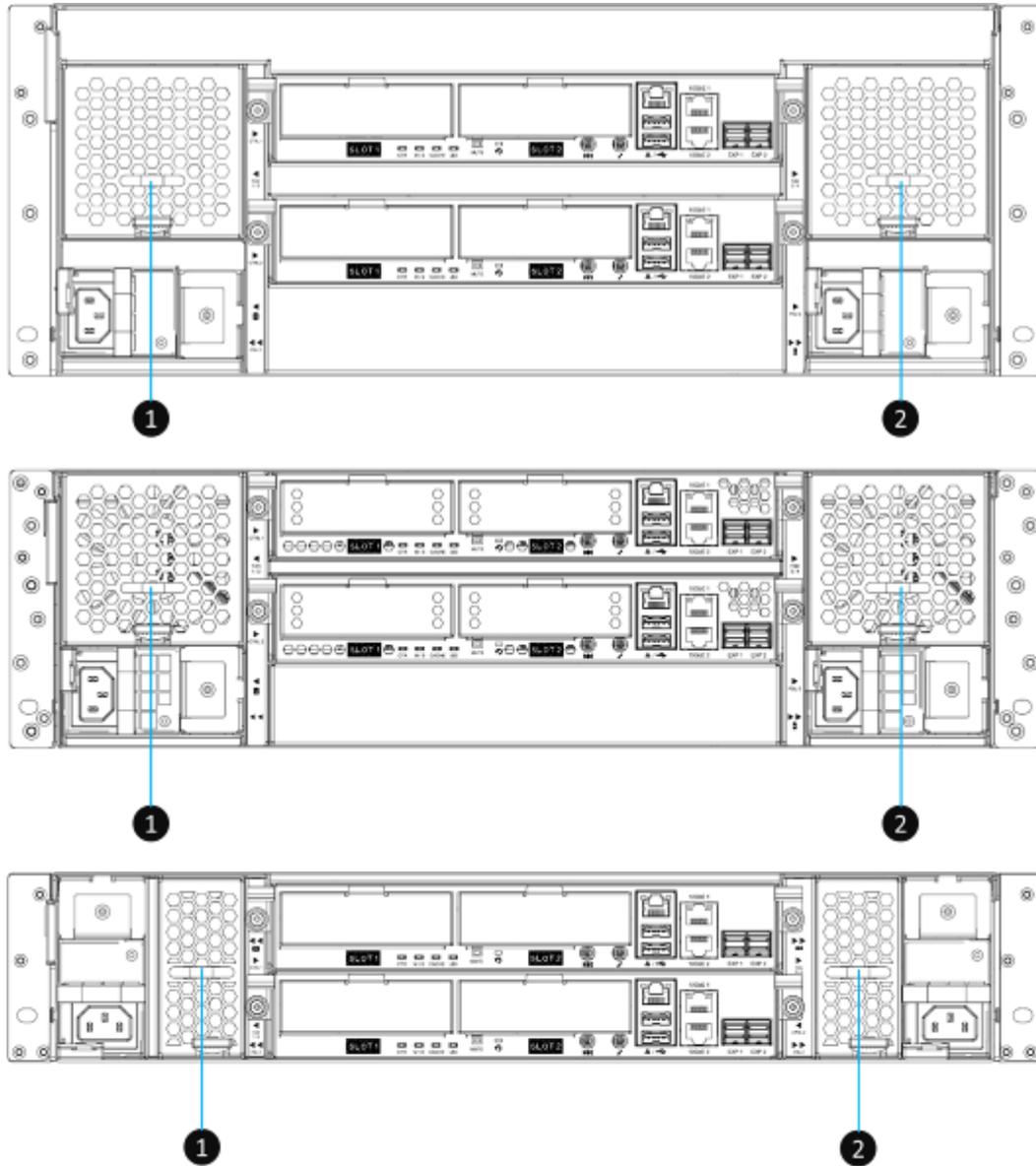


Figure 2-10 Location of Each Fan Module Installed in the LFF or SFF System

Table 2-9 Location of Each Fan Module Installed in the LFF or SFF System

Number	Description
1	Fan 1 and Fan 2
2	Fan 3 and Fan 4

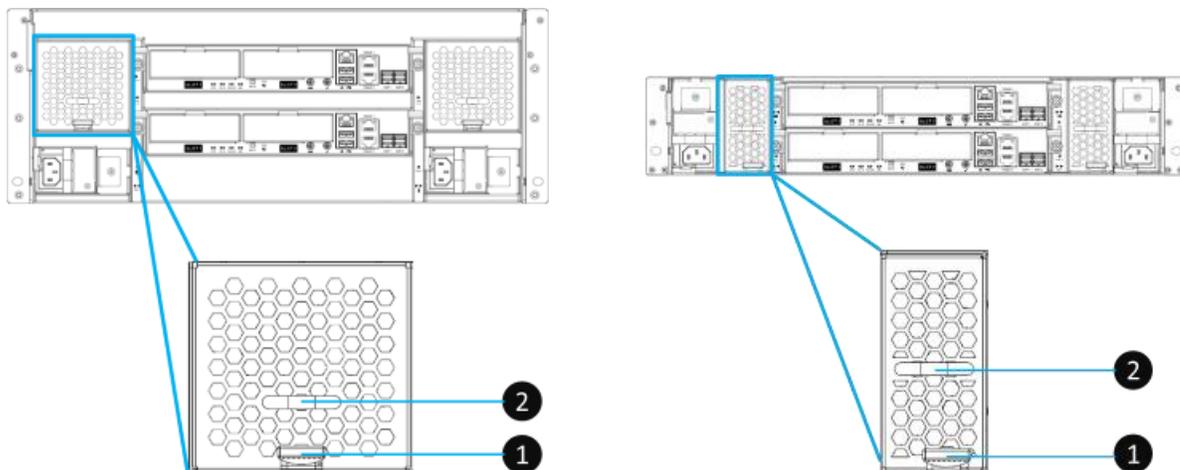


Figure 2-11 Mechanical Components of the Fan Module

Table 2-10 Mechanical Components of the Fan Module

Number	Description
1	Fan Module Release Tab
2	Fan Module Handle

## 2.7. Cache-to-Flash Memory Protection

In the event of power loss, the I/O cache data stored in the volatile memory will be lost; this can cause data inconsistency especially in database applications. The XCubeSAN series can provide an optional Cache-to-Flash memory protection function that will safely transfer the memory cache data to a non-volatile flash device for permanent preservation. The optional Cache-to-Flash module comes with an M.2 flash module and either a BBM (Battery Backup Module) or a SCM (Super Capacitor Module).

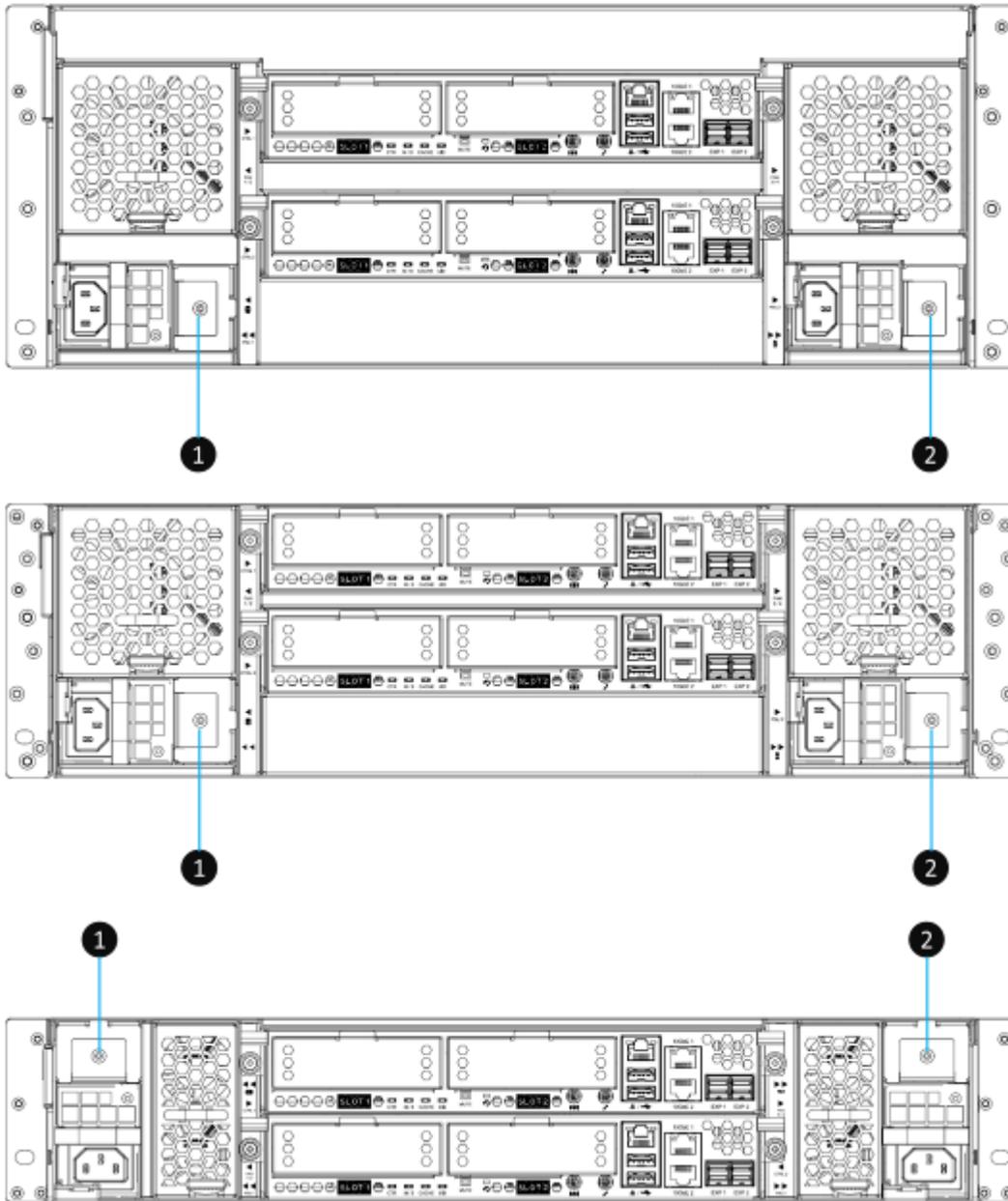


Figure 2-12 Location of the Cache-to-Flash Module

Table 2-11 Location of the Cache-to-Flash Module

Number	Description
1	Slot for Flash Module
2	Slot for Power Module



Figure 2-13 The Cache-to-flash Module – BBM (Battery Backup Module) Pack

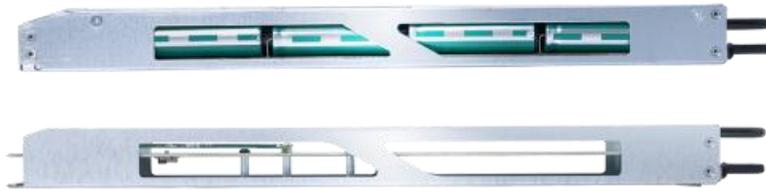


Figure 2-14 The Cache-to-flash Module – SCM (Super Capacitor Module) Pack

### 2.7.1. Mechanism of Cache Data Protection

The following image is the working sequence of QSAN Cache-to-Flash workflow.

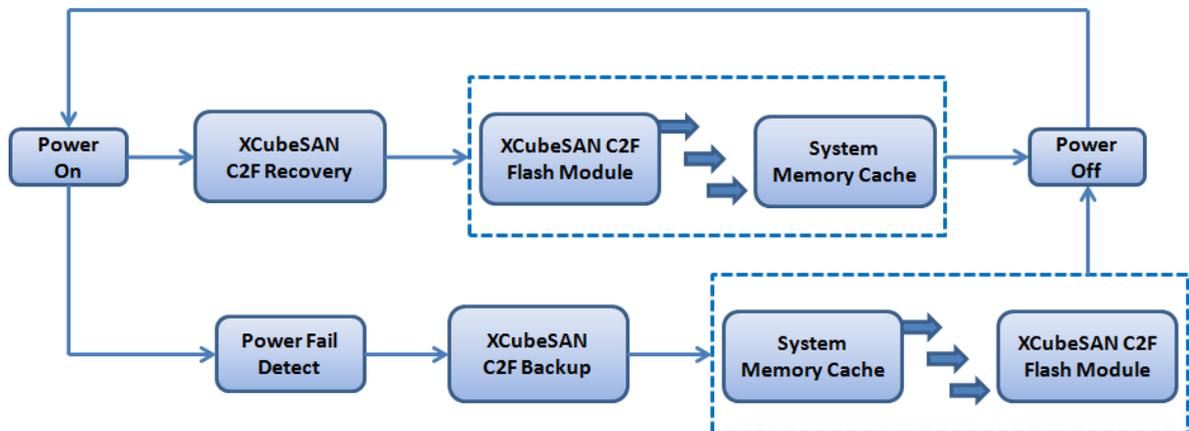


Figure 2-15 Cache-to-Flash Workflow

Cache-to-Flash technology will first flush CPU cache to memory RAM, then flush memory RAM to M.2 flash module to maintain the upmost data consistency. It leverages the strength of both BIOS and CPU to quickly backup memory RAM data to the flash module. In order to quickly move data from memory RAM to flash module, M.2 PCI-Express interface

flash module is selected for better performance and less power consumption. In Cache-to-Flash recovery phase, BIOS will check C2F flag status. If C2F flag is ON, I/O cache data will be recovered from the M.2 flash module and then continue normal booting. If C2F flag is OFF, the normal booting process continues. Compared with traditional BBM solution of 72 hours standard, Cache-to-Flash technology is more efficient, less risky and consumes less power.

## 2.7.2. Features of the Cache-to-Flash Module

The optional Cache-to-Flash module comes with a M.2 flash module and either a BBM or a SCM. All modules are hot pluggable with zero system downtime for extra availability and reliability. M.2 flash module can be plugged in on the left hand side from the rear of the chassis. Power module can be plugged in on the right hand side from the rear of the chassis.

Please be noted that the BBM can protect all memory capacity. But the SCM can protect up to 16GB memory per controller. If your controller memory is higher than 16GB, please select BBM solution.

*Table 2-12 Protection Memory Capacity by Different Cache-to-Flash Module*

Device	Protection Memory Capacity
Battery Backup Module + Flash Module	Protect all memory capacity
Super Capacitor Module + Flash Module	Protect up to 16GB memory per controller

## 3. Installing the System Hardware

---

This chapter will show you the detailed procedure of the XCubeSAN series hardware installation and initial configuration.

### 3.1. Installation Checklist

To ensure a successful system installation and initial configuration, you can follow the procedures in the checklist below by order.

Table 3-1 Installation Checklist

Step	Task	Where to Find the Detail Procedure
1	Installing disk drives into the trays	<a href="#">Chapter 3.2</a>
2	Installing the optional host cards	<a href="#">Chapter 3.3</a>
3	Installing the optional memory modules	<a href="#">Chapter 3.4</a>
4	Installing the optional cache-to-flash modules	<a href="#">Chapter 3.5</a>
5	Installing the optional slide rails	<a href="#">Chapter 3.6</a>
6	Installing the trays into the system	<a href="#">Chapter 3.7</a>
7	Connecting the system to a host	<a href="#">Chapter 3.8</a>
8	Connecting power cords and powering on the system	<a href="#">Chapter 3.9</a>
9	Connecting a UPS	<a href="#">Chapter 3.12</a>
10	Connecting the optional USB LCM	<a href="#">Chapter 3.13</a>
11	Discover and carry out the initial configure for the system	<a href="#">Chapter 3.14</a>

### 3.2. Installing Disk Drives into the Trays

#### Key Components of the Disk Drive Tray

The following content illustrates the key components of both LFF and SFF disk drive trays.

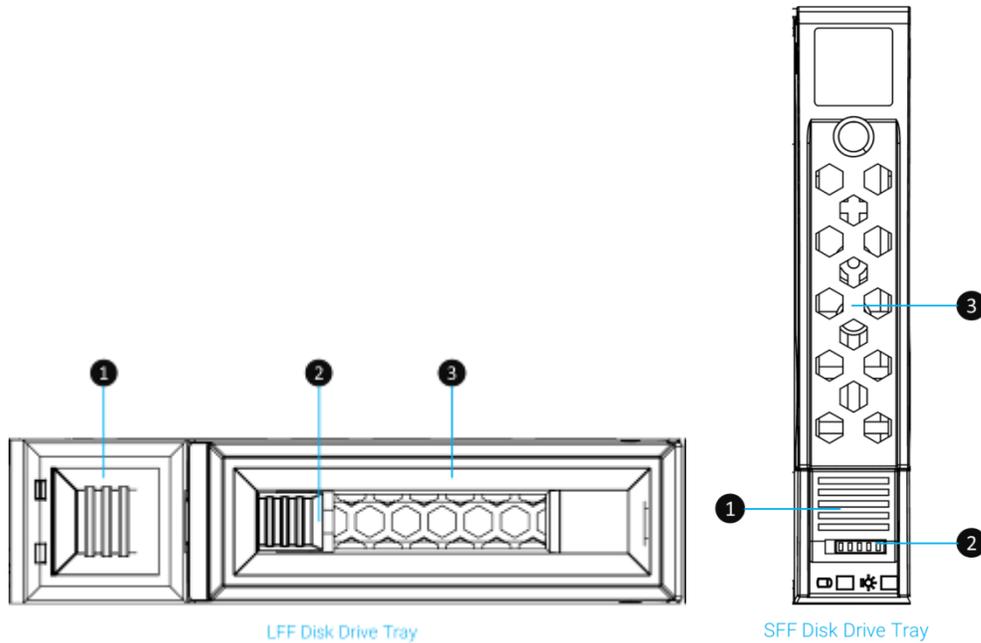


Figure 3-1 Front Side Components of LFF & SFF Disk Drive Trays

Table 3-2 Front Side Components of LFF & SFF Disk Drive Trays

Item Number	Description
1	Carrier Handle Release Button
2	Release Button Lock
3	Carrier Handle

### Unlock the Disk Drive Tray and Remove from the System

The standard position of the disk drive tray is locked to prevent damage during transport. You must unlock disk drive trays before starting to install drives into the system chassis. The following content is the detailed steps for removing a disk drive tray from the system:

- Unlock release button lock: shift the lock from left to right. (LFF and SFF trays)
- Procedure of opening the LFF disk drive tray carrier handle: shift the carrier handle release button from right to left; then carrier handle will automatically pop out.
- Procedure of opening the SFF disk drive tray carrier handle: shift the carrier handle release button from up to down; then carrier handle will automatically pop out.

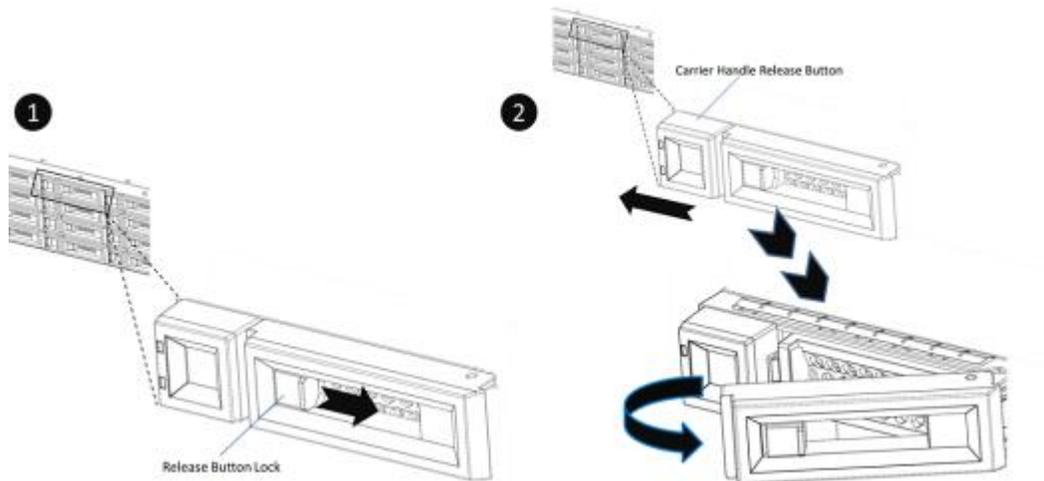


Figure 3-2 Unlock and Open the Carrier Handle of a Disk Drive Tray (LFF)

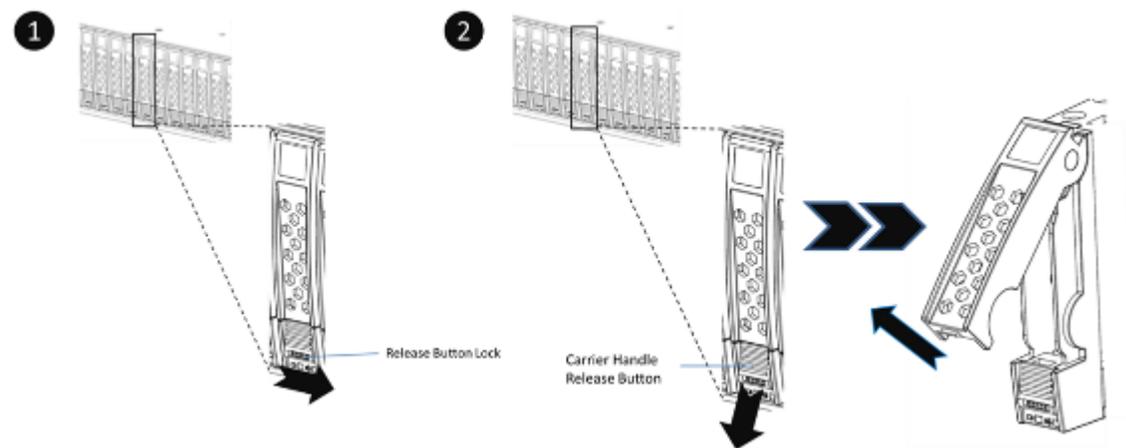


Figure 3-3 Unlock and Open the Carrier Handle of a Disk Drive Tray (SFF)

- The following content is the procedure for removing disk drive trays from the system:
  - Hold the carrier handle and pull the disk drive tray out until it is free of the disk drive bay.
  - Repeat steps above for another empty disk drive trays that you would like to remove.

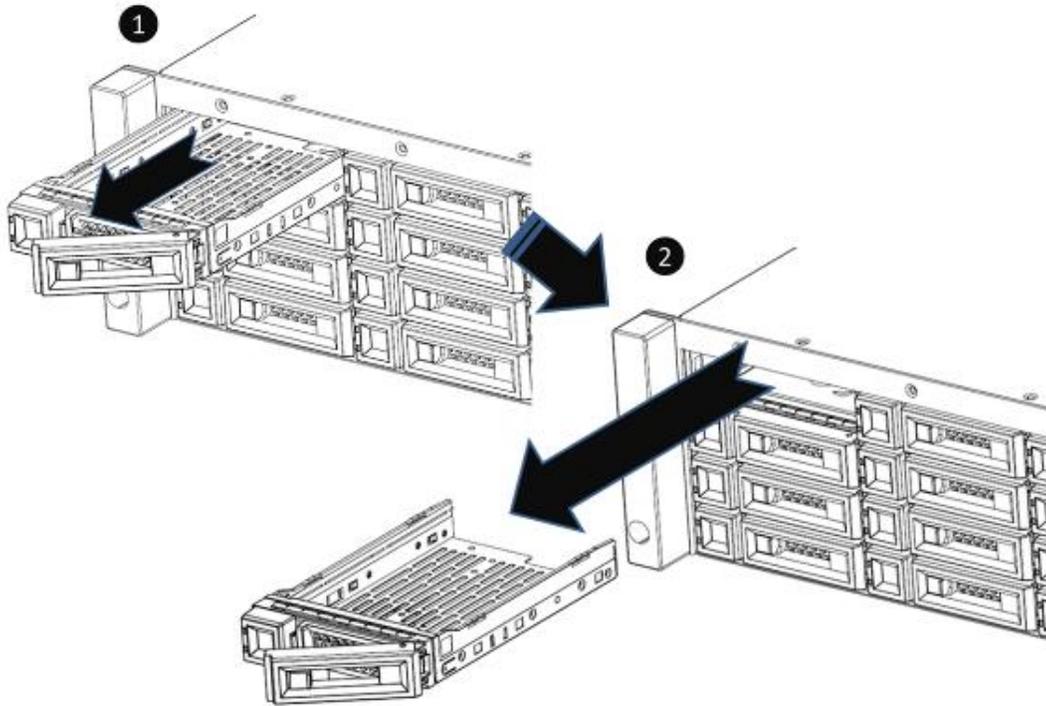


Figure 3-4 Hold the Carrier Handle and Pull out the Disk Drive Tray (LFF)

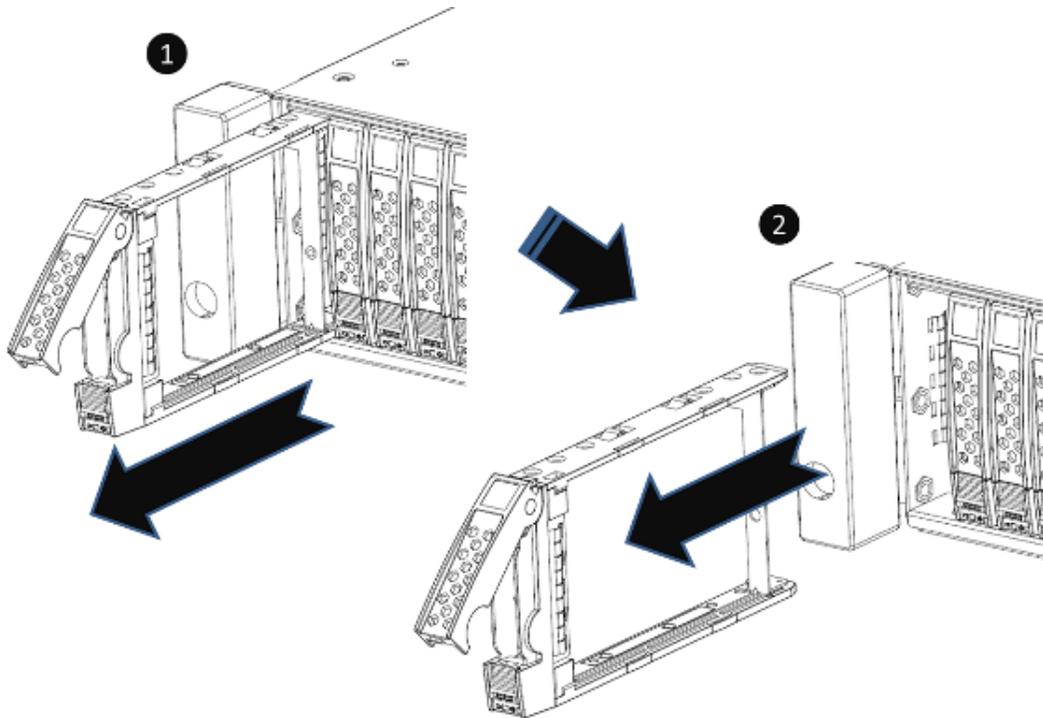


Figure 3-5 Hold the Carrier Handle and Pull out the Disk Drive Tray (SFF)

## Installing a Disk Drive into a Tray

Following contents and figures are detail steps of installing a disk drive into the tray.

- For installing an LFF disk drive into an LFF tray
  - Place a disk drive tray onto a stable surface.
  - Align the disk drive to the tray (with disk connector facing away from carrier handle) and align four disk drive tray screw holes located on both sides of the hard drive
  - Install and tighten all four screws to secure the disk drive within the tray.

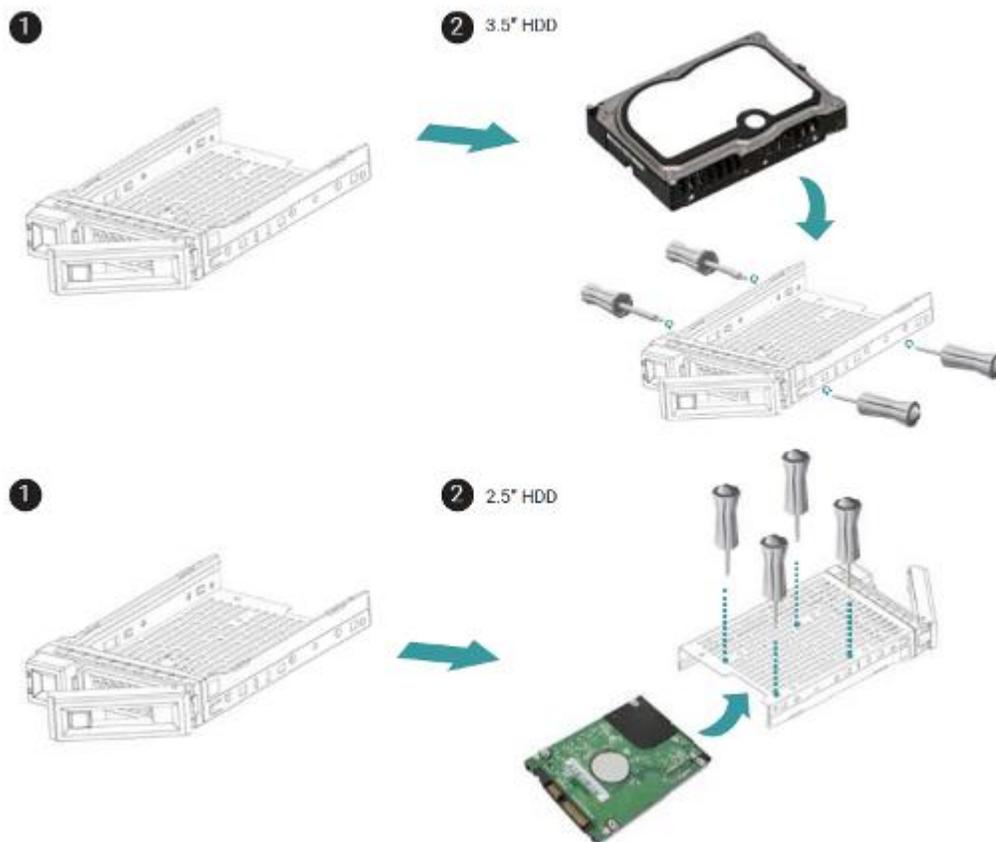


Figure 3-6 Align a Disk Drive & Install into a Tray (LFF-to-LFF)

- For installing an SFF disk drive into an LFF tray
  - Place a disk drive tray onto a stable surface.
  - Align the disk drive to the tray with the connector facing away from the carrier handle.
  - Align four disk drive tray screw holes (front row at the bottom side of the tray for SAS interface disk drive; a rear row for SATA interface SSD) to the disk drive.

- Install and tighten all four screws to secure disk drive.

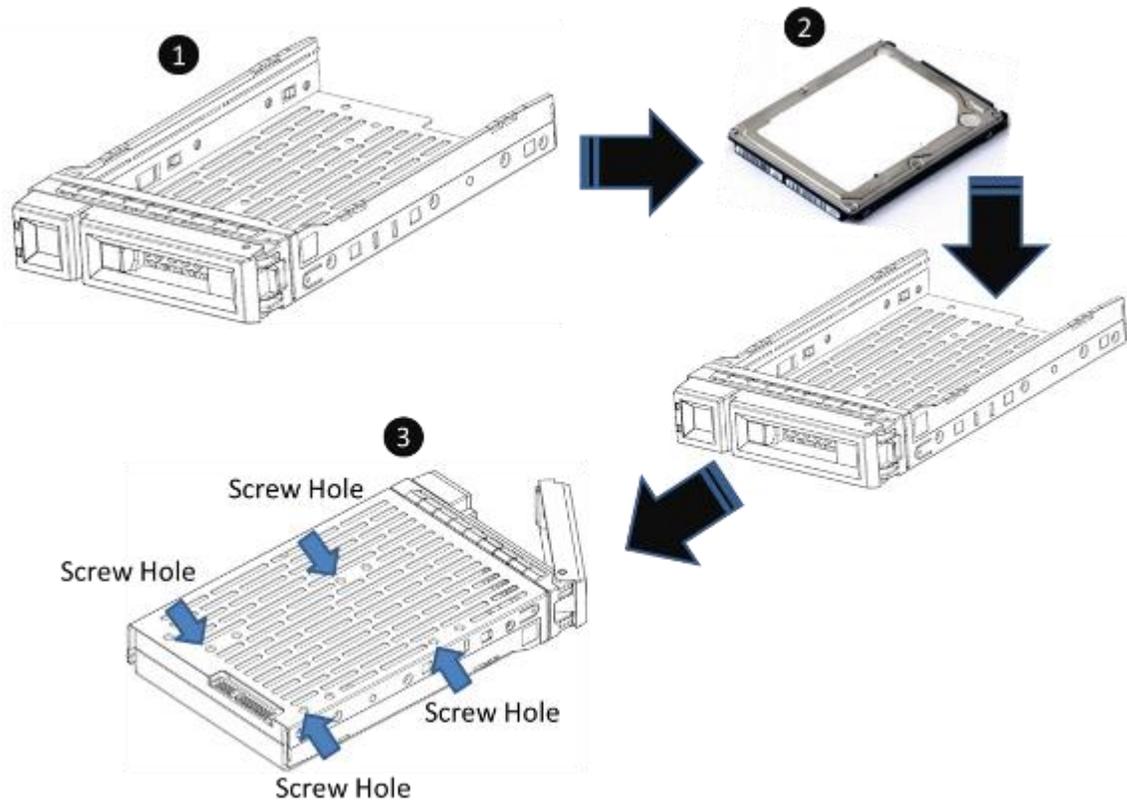


Figure 3-7 Align a Disk Drive & Install into a Tray (SFF-to-LFF)

- For installing an SFF disk drive into an SFF tray
  - Place a disk drive tray onto a stable surface.
  - Remove the supporting bracket. Then align the disk drive with the connector facing away from the carrier handle.
  - Align four disk drive tray screw holes on both sides of the disk tray.
  - Install and tighten all four screws to secure disk drive within the tray.

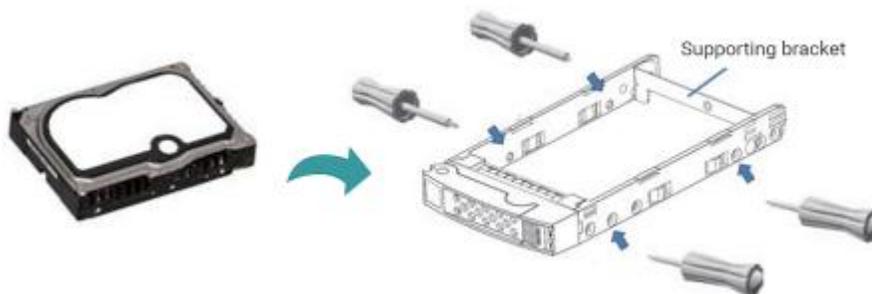


Figure 3-8 Align a Disk Drive & Install into a Tray (SFF-to-SFF)



**TIP:**

Please plug-in any of the first four hard drives, then event logs can be saved and displayed in next system boot up. Otherwise, the event logs cannot be saved.

The table below shows the available disk drive trays, MUX board with bracket, and their descriptions.

Table 3-3 Available Disk Drive Trays for XCubeSAN Series

Model Name	Picture	Description	Applied Models
HDT-351		3.5" Disk Drive Tray	XS5224 XS5216 XS5212 XS3224
HDM-351		SATA 6Gb MUX Board and Bracket for HDT-351 (2.5" SATA drives only)	XS3216 XS3212 XS1224 XS1216 XS1212
HDT-251		2.5" Disk Drive Tray	XS5226 XS3226 XS1226
HDM-251		SATA 6Gb MUX Board and Bracket for HDT-251	

## 3.3. Installing the Optional Host Cards

The XCubeSAN series comes with two on-board 10GbE iSCSI ports on each controller. If you want to expand the number of host ports, purchase QSAN host cards (optional components) will be the fastest and most cost-efficiency choice.

There are several types of host cards that are available for selection. You can configure a Fibre Channel SAN by using QSAN 16Gb Fibre Channel host cards; you can choose a iSCSI SAN by using 10GbE via SFP+, 10GBASE-T, or 1GBASE-T iSCSI host cards. The table below shows the available host card types, model names, and their descriptions.

Table 3-4 Available Host Cards for XCubeSAN Series

Model Name	Picture	Description	Applied Models
HQ-16F4S2		4-port 16Gb Fibre Channel Host Card (SFP+)	XS5200 Series XS3200 Series XS1200 Series
HQ-16F2S2		2-port 16Gb Fibre Channel Host Card (SFP+)	
HQ-10G4S2		4-port 10GbE iSCSI Host Card (SFP+)	
HQ-10G2T		2-port 10GBASE-T iSCSI Host Card (RJ45)	
HQ-01G4T		4-port 1GBASE-T iSCSI Host Card (RJ45)	



**CAUTION:**

You must remove the controller module from the system chassis before starting the host card installing procedures.

Host card can NOT hot plug in the controller module. Hot plug in the host card might cause system hang up. You should remove the controller module from the system chassis before installing / removing host card. Please DO NOT attempt to hot plug in the host card.

Following figure is the overview of the host card installation slots.

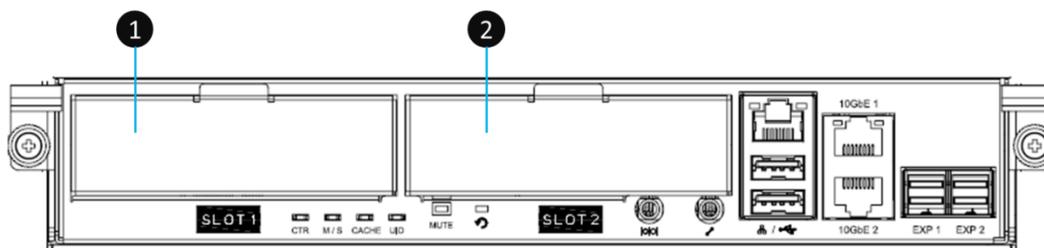


Figure 3-9 Host Card Installation Slots

Table 3-5 Host Card Installation Slots of a Controller

Item Number	Description
1	Host Card Slot 1
2	Host Card Slot 2

Please refer to following tables for supported installing location and combination of host cards to keep the optimized system performance and prevent any unexpected incidents.

Table 3-6 Supported Installing Location and Combination of the Host Cards

Connection Type	Model Type	Controller Number	Slot 1	Slot 2
FC SAN 16Gb FC (SFP+)	Single Controller	CTRL 1	HQ-16F4S2	N/A
		N/A		
	Single Controller	CTRL 1	HQ-16F4S2	HQ-16F4S2 <sup>9</sup>
		N/A		
	Single Controller	CTRL 1	HQ-16F4S2	HQ-16F2S2 <sup>9</sup>
		N/A		
	Single Controller	CTRL 1	HQ-16F2S2	N/A
		N/A		
	Single Controller	CTRL 1	HQ-16F2S2	HQ-16F2S2 <sup>9</sup>
		N/A		
	Dual Controller	CTRL 1	HQ-16F4S2	N/A
		CTRL 2	HQ-16F4S2	N/A
	Dual Controller	CTRL 1	HQ-16F4S2	HQ-16F4S2 <sup>9</sup>
		CTRL 2	HQ-16F4S2	HQ-16F4S2 <sup>9</sup>
Dual Controller	CTRL 1	HQ-16F4S2	HQ-16F2S2 <sup>9</sup>	
	CTRL 2	HQ-16F4S2	HQ-16F2S2 <sup>9</sup>	
Dual Controller	CTRL 1	HQ-16F2S2	N/A	

	Dual Controller	CTRL 2	HQ-16F2S2	N/A
		CTRL 1	HQ-16F2S2	HQ-16F2S2 <sup>9</sup>
		CTRL 2	HQ-16F2S2	HQ-16F2S2 <sup>9</sup>
<b>iSCSI SAN</b> 10GbE (SFP+)	Single Controller	CTRL 1	HQ-10G4S2	N/A
		N/A		
	Single Controller	CTRL 1	HQ-10G4S2	HQ-10G4S2 <sup>9</sup>
		N/A		
	Dual Controller	CTRL 1	HQ-10G4S2	N/A
		CTRL 2	HQ-10G4S2	N/A
	Dual Controller	CTRL 1	HQ-10G4S2	HQ-10G4S2 <sup>9</sup>
		CTRL 2	HQ-10G4S2	HQ-10G4S2 <sup>9</sup>
<b>iSCSI SAN</b> 10GBASE-T (RJ45)	Single Controller	CTRL 1	HQ-10G2T	N/A
		N/A		
	Single Controller	CTRL 1	HQ-10G2T	HQ-10G2T
		N/A		
	Dual Controller	CTRL 1	HQ-10G2T	N/A
		CTRL 2	HQ-10G2T	N/A
	Dual Controller	CTRL 1	HQ-10G2T	HQ-10G2T
		CTRL 2	HQ-10G2T	HQ-10G2T
<b>iSCSI SAN</b> 1GBASE-T (RJ45)	Single Controller	CTRL 1	HQ-01G4T	N/A
		N/A		
	Single Controller	CTRL 1	HQ-01G4T	HQ-01G4T
		N/A		
	Dual Controller	CTRL 1	HQ-01G4T	N/A
		CTRL 2	HQ-01G4T	N/A
	Dual Controller	CTRL 1	HQ-01G4T	HQ-01G4T
		CTRL 2	HQ-01G4T	HQ-01G4T
<b>iSCSI SAN</b> 10GbE (SFP+) + 10GBASE-T (RJ45)	Single Controller	CTRL 1	HQ-10G4S2	HQ-10G2T
		N/A		
	Dual Controller	CTRL 1	HQ-10G4S2	HQ-10G2T
		CTRL 2	HQ-10G4S2	HQ-10G2T
<b>iSCSI SAN</b> 10GbE (SFP+) + 1GBASE-T (RJ45)	Single Controller	CTRL 1	HQ-10G4S2	HQ-01G4T
		N/A		
	Dual Controller	CTRL 1	HQ-10G4S2	HQ-01G4T
		CTRL 2	HQ-10G4S2	HQ-01G4T
<b>iSCSI SAN</b>	Single Controller	CTRL 1	HQ-10G2T	HQ-01G4T

10GBASE-T (RJ45) + 1GBASE-T (RJ45)	Dual Controller	N/A		
		CTRL 1	HQ-10G2T	HQ-01G4T
		CTRL 2	HQ-10G2T	HQ-01G4T
<b>Mix SAN</b> 16Gb FC (SFP+) + 10GbE (SFP+)	Single Controller	CTRL 1	HQ-16F4S2	HQ-10G4S2 <sup>9</sup>
		N/A		
	Dual Controller	CTRL 1	HQ-16F4S2	HQ-10G4S2 <sup>9</sup>
		CTRL 2	HQ-16F4S2	HQ-10G4S2 <sup>9</sup>
<b>Mix SAN</b> 10GbE (SFP+) + 16Gb FC (SFP+)	Single Controller	CTRL 1	HQ-10G4S2	HQ-16F2S2 <sup>9</sup>
		N/A		
	Dual Controller	CTRL 1	HQ-10G4S2	HQ-16F2S2 <sup>9</sup>
		CTRL 2	HQ-10G4S2	HQ-16F2S2 <sup>9</sup>
<b>Mix SAN</b> 16Gb FC (SFP+) + 10GBASE-T (RJ45)	Single Controller	CTRL 1	HQ-16F4S2	HQ-10G2T
		N/A		
	Single Controller	CTRL 1	HQ-16F2S2	HQ-10G2T
		N/A		
	Dual Controller	CTRL 1	HQ-16F4S2	HQ-10G2T
		CTRL 2	HQ-16F4S2	HQ-10G2T
	Dual Controller	CTRL 1	HQ-16F2S2	HQ-10G2T
		CTRL 2	HQ-16F2S2	HQ-10G2T
<b>Mix SAN</b> 16Gb FC (SFP+) + 1GBASE-T (RJ45)	Single Controller	CTRL 1	HQ-16F4S2	HQ-01G4T
		N/A		
	Single Controller	CTRL 1	HQ-16F2S2	HQ-01G4T
		N/A		
	Dual Controller	CTRL 1	HQ-16F4S2	HQ-01G4T
		CTRL 2	HQ-16F4S2	HQ-01G4T
	Dual Controller	CTRL 1	HQ-16F2S2	HQ-01G4T
		CTRL 2	HQ-16F2S2	HQ-01G4T

<sup>9</sup> Slot 2 provides 20Gb bandwidth.

**CAUTION:**

If you change the host card type in the same slot, the system needs to be reset to factory default to make the host card change effective. If you want to learn more about how to reset your system to factory, please refer to the chapter 6.5.5, Rest to Factory Default section in the [XCubeSAN SANOS 4.0 Software Manual](#).

All dual controller XCubeSAN series models must have installed the same type of host cards into the same slot number to keep the optimized system performance.

---

**INFORMATION:**

Due to the total bandwidth of slot 2 is 20Gb. It CAN NOT satisfy four ports of 10GbE iSCSI with full speed, we strongly recommend combining two ports by enabling link aggregation for failover. Such as combining port 1 and port 2 as LAG (Link Aggregation Group) 1, port 3 and port4 as LAG 2. If you want to learn more about how to setup link aggregation, please refer to the chapter 7.3.1, Configure iSCSI Ports section in the [XCubeSAN SANOS 4.0 Software Manual](#).

---

## Procedures of the Host Card Installation

The following content and images are detailed steps for installing a host card into the system.

- Remove the controller from the system chassis.

The following image and table are the introduction of the mechanical components of a controller module.

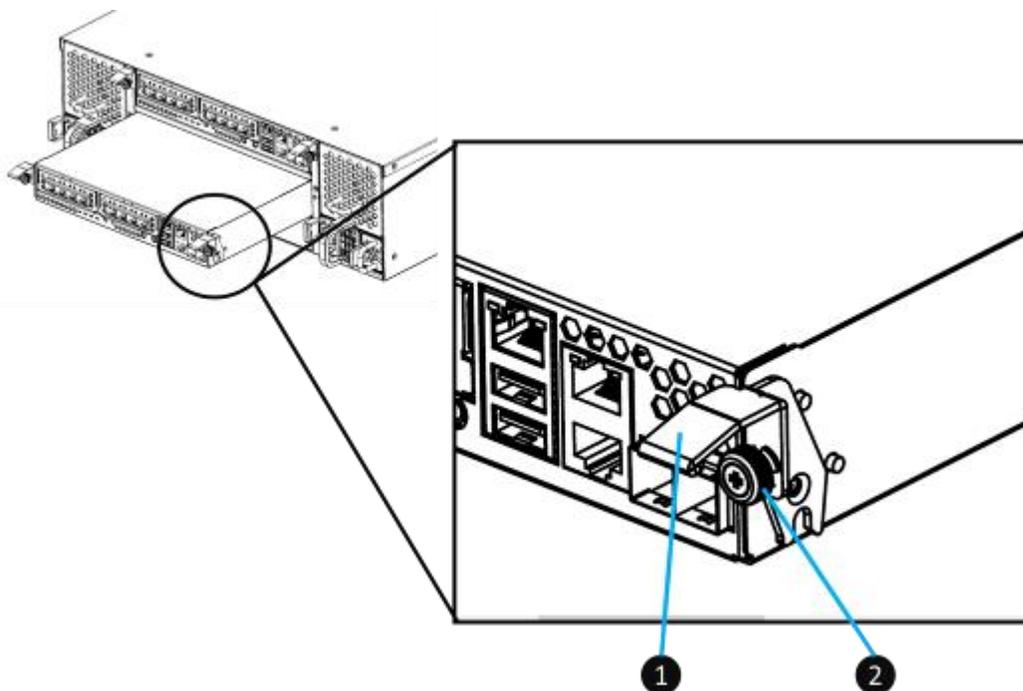


Figure 3-10 Mechanical Components of the Controller Module

Table 3-7 Mechanical Components of a Controller Module

Number	Description
1	Release Lever
2	Screw

- The following content and images are detailed steps for removing the controller module from the system chassis.
- Use a Phillips screwdriver to loosen the thumb screws on each release levers.
- Pull down both levers at the same time and then pull out about half length of the controller module by holding two release levers.
- Use one hand to hold one end of the controller module (the side with release levers) and the other hand hold the bottom of the controller; pull out the controller module until it is free from the system chassis.

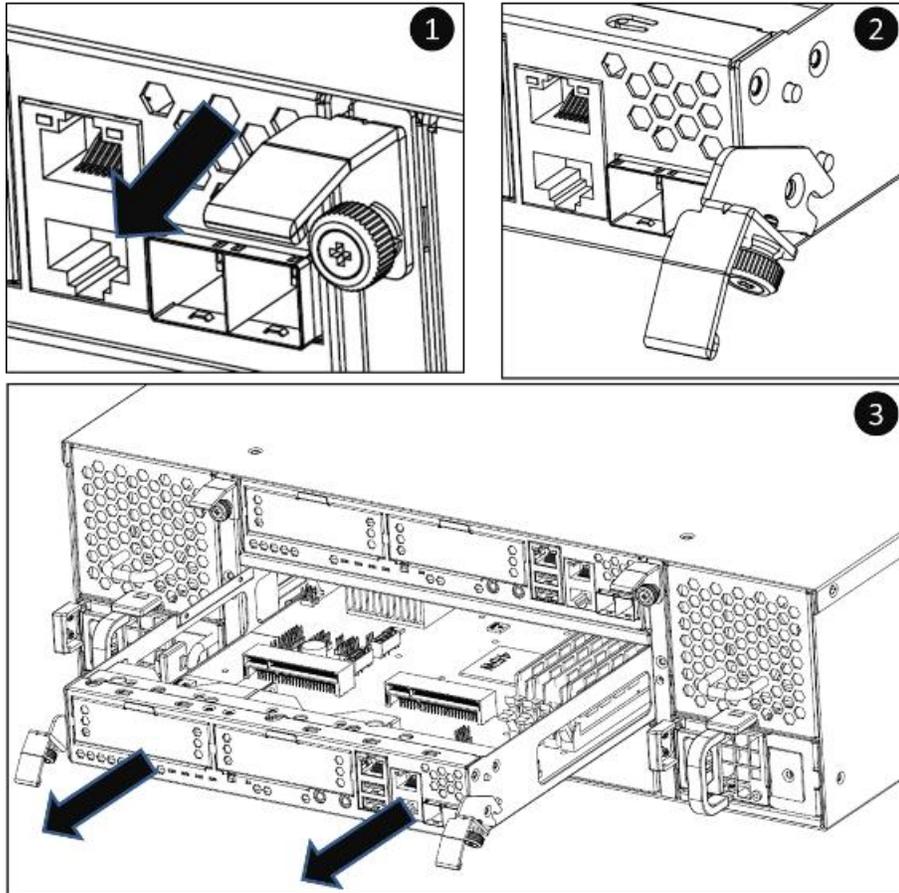


Figure 3-11 Steps of Removing the Controller Module

- Remove the dummy host card cage by loosening two screws of the dummy host card cage and then take dummy host card cage from controller module.

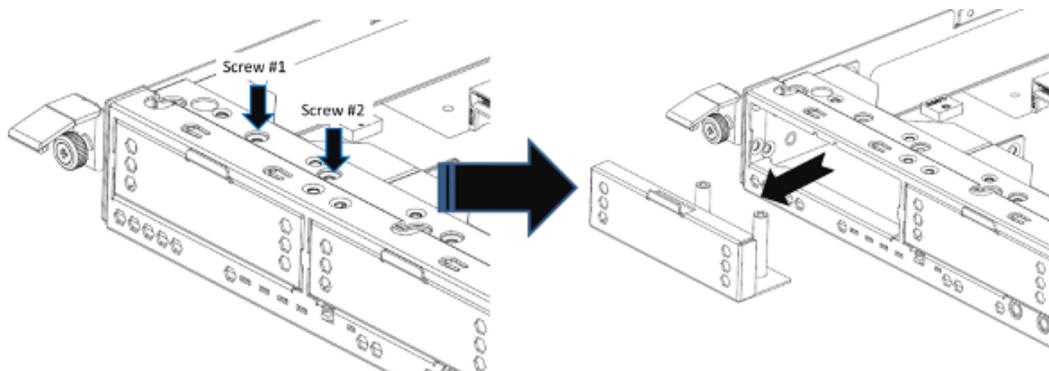


Figure 3-12 Procedures of Removing the Host Card Dummy Cage

- Align the host card to the slot to be installed and then push all the way into the controller cage until hear a “click” sound and make sure the host card is well connected with the connector in the controller module.

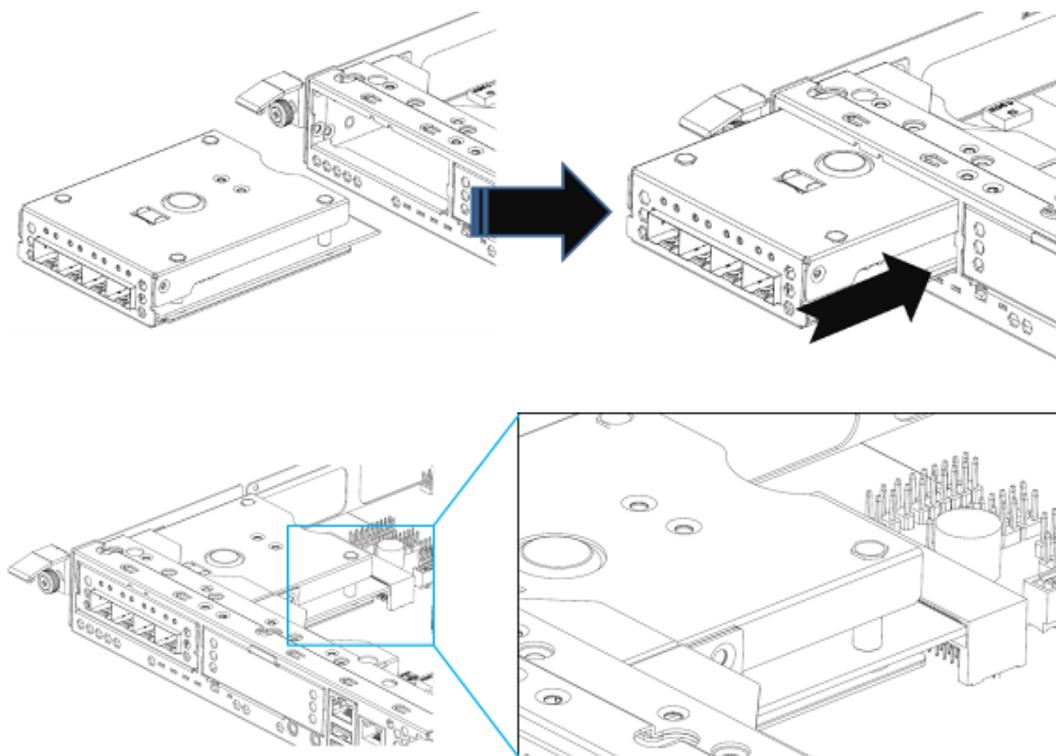


Figure 3-13 Procedures of Installing the Host Card

- Repeat procedures above if there are other host adapter cards need to be installed.
- You must install GBIC (s) for the Fibre Channel or 10GbE host cards before connecting the cables from the storage system to the host sides.
- Install the controller module into the system chassis if the host card installation completed.

### Confirm the Host Card Installation

If the host card is installed properly, you can check the host card connections status in SANOS UI -> **HOST CONNECTIVITY** -> **Overview**. If your host cards are properly installed, the status column will show the connection speed.

Controller 1			
Location	Name	Status	MAC Address/WWPN
Onboard	LAN1 (10Gb)	Down	00:13:78:ff:88:02
Onboard	LAN2 (10Gb)	Down	00:13:78:ff:88:03
Slot2	LAN1 (1Gb)	1 Gb/s	00:13:78:ff:88:04
Slot2	LAN2 (1Gb)	1 Gb/s	00:13:78:ff:88:05
Slot2	LAN3 (1Gb)	1 Gb/s	00:13:78:ff:88:06
Slot2	LAN4 (1Gb)	1 Gb/s	00:13:78:ff:88:07
Slot1	FC1 (16Gb)	16Gb/s	2100001378FF8800
Slot1	FC2 (16Gb)	16Gb/s	2200001378FF8800
Slot1	FC3 (16Gb)	16Gb/s	2300001378FF8800
Slot1	FC4 (16Gb)	16Gb/s	2400001378FF8800
Controller 2			
Location	Name	Status	MAC Address/WWPN
Onboard	LAN1 (10Gb)	Down	00:13:78:ff:88:0c
Onboard	LAN2 (10Gb)	Down	00:13:78:ff:88:0d
Slot2	LAN1 (1Gb)	1 Gb/s	00:13:78:ff:88:0e
Slot2	LAN2 (1Gb)	1 Gb/s	00:13:78:ff:88:0f
Slot2	LAN3 (1Gb)	1 Gb/s	00:13:78:ff:88:10
Slot2	LAN4 (1Gb)	1 Gb/s	00:13:78:ff:88:11
Slot1	FC1 (16Gb)	16Gb/s	2900001378FF8800
Slot1	FC2 (16Gb)	16Gb/s	2A00001378FF8800
Slot1	FC3 (16Gb)	16Gb/s	2B00001378FF8800
Slot1	FC4 (16Gb)	16Gb/s	2C00001378FF8800

Figure 3-14 Connection and Status of the Host Cards

### 3.4. Installing the Optional Memory Modules

Standard system memory capacity for XCubeSAN series models: 4GB DDR4 for XS3200 / XS1200 and 8GB DDR4 for XS5200. If you purchase additional optional memory module for your storage system, please refer to the following image and table for the suggested sequence of memory module installation. It is requested that the installation slot and capacity of the memory module MUST be exactly the same for both controller.

The table below shows the available memory modules and their descriptions.

Table 3-8 Memory Modules for XCubeSAN Series

Model Name	Picture	Description	Applied Models
DIM-D44GB		DDR4 ECC 4GB Memory Module	XS5200 Series XS3200 Series XS1200 Series
DIM-D48GB		DDR4 ECC 8GB Memory Module	
DIM-D416GB		DDR4 ECC 16GB Memory Module	
DIM-D432GB		DDR4 ECC 32GB Memory Module	XS5200 Series XS3200 Series

In XS3200 and XS5200, there are four DIMM slots for expansion of memory capacity. The installation sequence for the memory module with the same capacity should be: #3 → #2 → #4 due to slot #1 and #2 are memory bank 1; slot #3 and #4 are bank 2. Balance the memory size of two banks will keep the optimized system performance. The installation sequence is applicable for dual or single controller module.

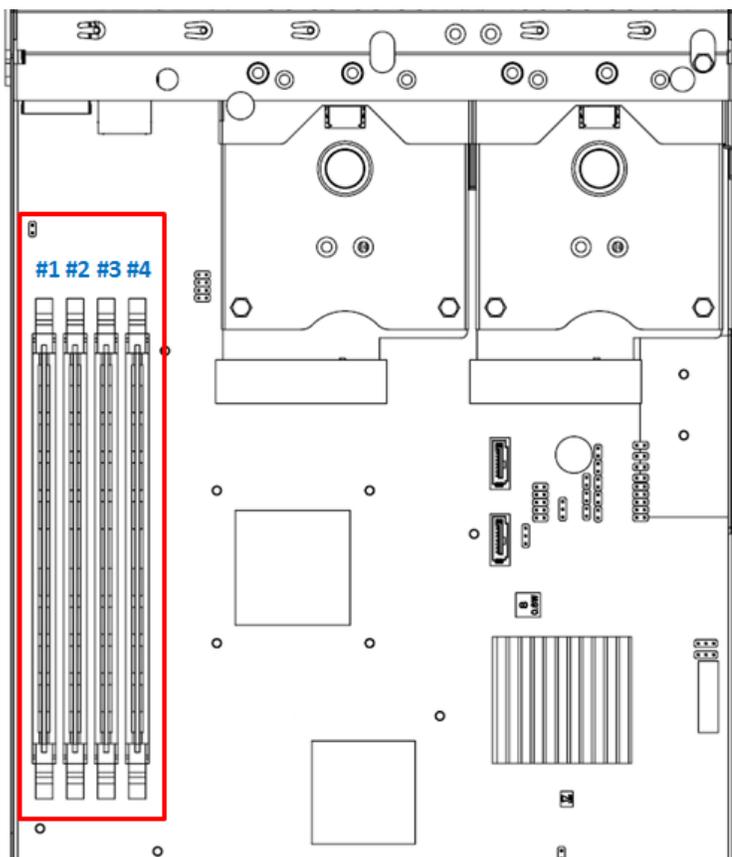


Figure 3-15 The Installation Sequence of the Memory Module in XS3200 and XS5200

The following table is the suggested installation sequence for optional memory module.

Table 3-9 The Installation Sequence for Optional Memory Module in XS3200 and XS5200

Bank 1		Bank 2		Total Memory
Slot #1	Slot #2	Slot #3	Slot #4	
4GB	-	-	-	4GB
4GB	-	4GB	-	8GB
4GB	-	8GB	-	12GB
4GB	-	8GB	8GB	20GB
4GB	-	16GB	-	20GB
4GB	-	16GB	16GB	36GB
4GB	4GB	4GB	-	12GB
4GB	4GB	4GB	4GB	16GB
4GB	4GB	8GB	-	16GB
4GB	4GB	8GB	8GB	24GB
4GB	4GB	16GB	-	24GB
4GB	4GB	16GB	16GB	40GB
8GB	-	-	-	8GB
8GB	-	8GB	-	16GB
8GB	-	16GB	-	24GB
8GB	-	16GB	16GB	40GB
8GB	8GB	8GB	-	24GB
8GB	8GB	8GB	8GB	32GB
8GB	8GB	16GB	-	32GB
8GB	8GB	16GB	16GB	48GB
16GB	-	-	-	16GB
16GB	-	16GB	-	32GB
16GB	16GB	16GB	-	48GB
16GB	16GB	16GB	16GB	64GB
32GB	-	-	-	32GB
32GB	-	32GB	-	64GB
32GB	32GB	32GB	-	96GB
32GB	32GB	32GB	32GB	128GB



**CAUTION:**

To ensure the system stability, you **MUST** install genuine QSAN memory modules for system memory size expansion. In addition, the DIMM type of 32GB is RDIMM, and the others are UDIMM. The platform does not support mixing of DIMM, so there are not allowed the combinations of mixing 32GB.



**TIP:**

Insert two DIMMs or more will boost performance.

In XS1200, there are two DIMM slots for expansion of memory capacity. The installation sequence is also applicable for dual or single controller module.

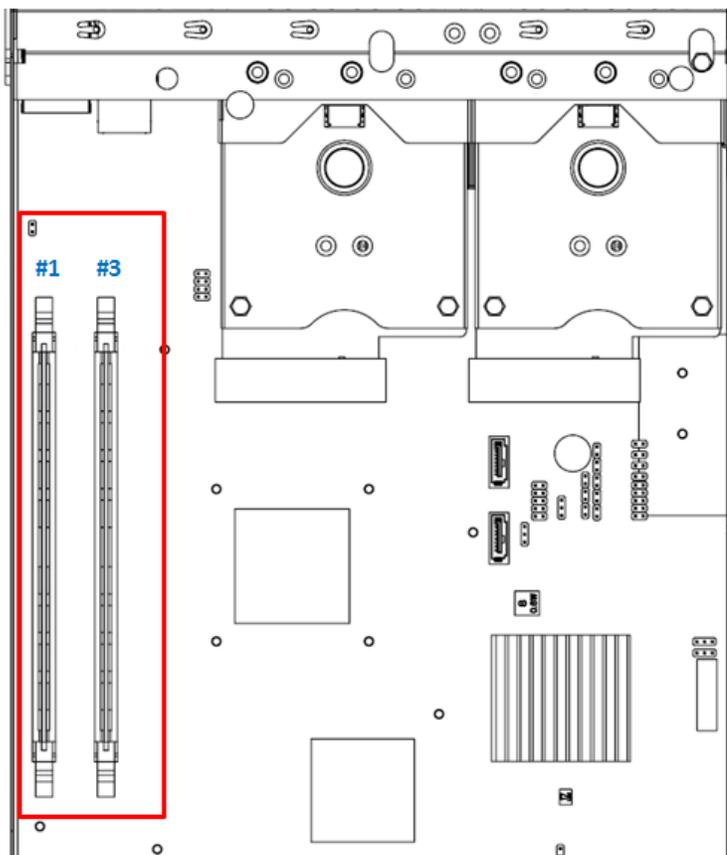


Figure 3-16 The Installation Sequence of the Memory Module in XS1200

The following table is the suggested installation for optional memory module.

*Table 3-10 The Installation Sequence for Optional Memory Module in XS1200*

Bank 1 / Slot #1	Bank 2 / Slot #3	Total Memory
4GB	-	4GB
4GB	4GB	8GB
4GB	8GB	12GB
4GB	16GB	20GB
8GB	8GB	16GB
8GB	16GB	24GB
16GB	-	16GB
16GB	16GB	32GB

### 3.5. Installing the Optional Cache-to-Flash Modules

The Cache-to-Flash module is a combination of a flash memory and a power module for write-back data protection in the event of a sudden and unexpected power loss. The table below is the available Cache-to-Flash module list. If you want to purchase cache-to-flash module, please contact your nearest local reseller or visit QSAN official web site:

<https://qsan.com/location>

The table below shows the available cache-to-flash modules and their descriptions.

*Table 3-11 Available Cache-to-flash Modules for XCubeSAN Series*

Model Name	Picture	Description	Applied Models
C2F-BM128G		Cache-to-Flash Module : C2F-BBMD + C2F-FLHMD	XS5200 Series XS3200 Series XS1200 Series
C2F-SP128G		Cache-to-Flash Module : C2F-SP16G + C2F-FLHMD (Protect up to 16GB memory per controller)	
C2F-BBMD		Battery Backup Module for Cache-to-Flash	
C2F-SP16G		Super Capacitor Module for Cache-to-Flash (Protect up to 16GB memory per controller)	

C2F-FLHMD		Flash Module for Cache-to-Flash	
-----------	---	---------------------------------	--



**CAUTION:**

The flash module of Cache-to-Flash is hot swappable because it is a PCIe device. Before removing the flash module from the system chassis, you must press the attention button until the flash module status LED finished blinking. Otherwise, the flash module maybe damage. For more information about Cache-to-Flash modules, please refer to the chapter 5.2.4, [Cache-to-Flash Module LEDs and Button](#) section and the chapter 6.5, [Removing the Cache-to-Flash Modules](#) section.

**Installing Cache-to-Flash Modules**

The following content and images are steps for installing cache-to-flash modules.

- Install locations for the cache-to-flash modules

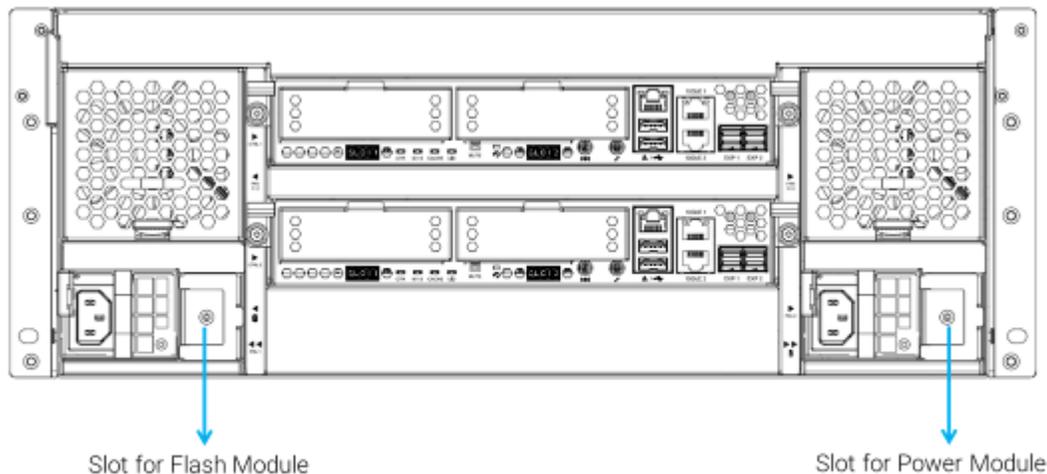


Figure 3-17 Location of the Cache-to-Flash Module

- Components of the cache-to-flash modules

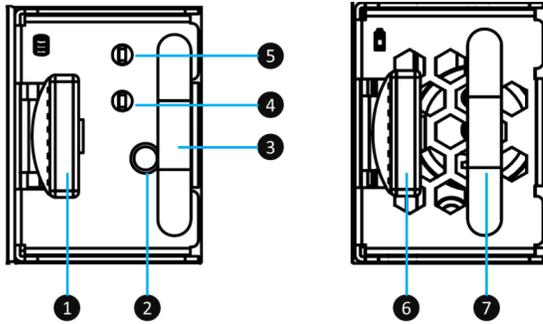


Figure 3-18 Components of the Cache-to-Flash Modules

Table 3-12 Components of the Cache-to-Flash Modules

Item	Number	Description
Flash Module	1	Flash Module Release Tab
	2	Flash Module Attention Button
	3	Flash Module Handle
	4	Flash Module Status LED
	5	Flash Module Power LED
Power Module	6	Power Module Release Tab
	7	Power Module Handle

- Remove the dummy cache-to-flash cage by losing the screw on it and then remove the dummy cage from the system chassis. Follow the same procedure for both sides.

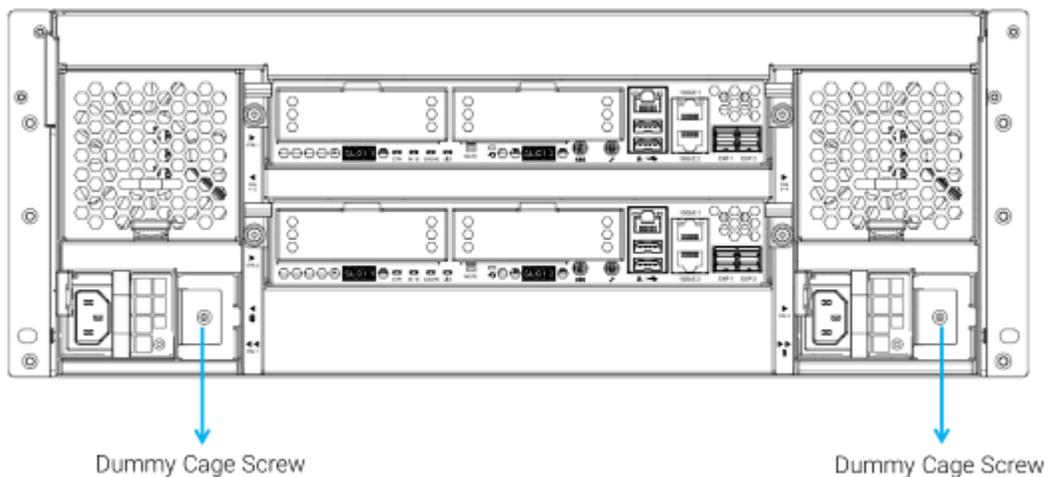


Figure 3-19 The Dummy Cage Screw Location of the Cache-to-Flash Module

- Align the flash module cage to the slot and then push it all the way into the system chassis until hear a “click” sound (for 4U/3U chassis, release tabs of both flash and power modules are facing left hand side while installing into the system; 2U chassis release tabs of both flash and power modules are facing upward while installing into the system).

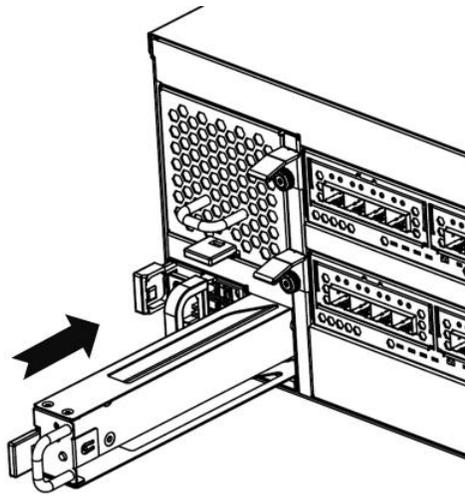


Figure 3-20 Installing the Flash Module

- Align the power module cage to the slot and then push it all the way into the system chassis until hear a “click” sound.

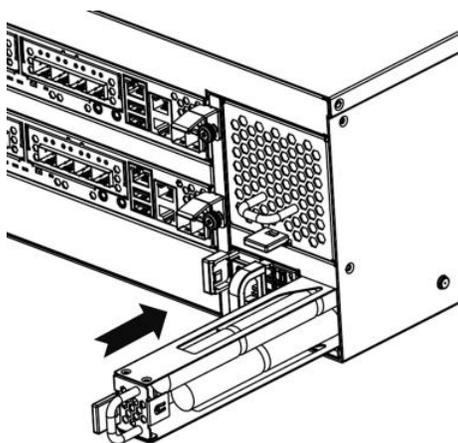


Figure 3-21 Installing the Power Module

## Confirm the Cache-to-Flash Module Installation

After the cache-to-flash modules are installed, you can check the status and information about cache-to-flash module in the SANOS UI -> **SYSTEM SETTINGS** -> **Power** -> **Cache to Flash**. If the flash module and power module are properly installed, the status will display **Good**.

Power Module	
Item	Information
Status	Good
Type	BBM
Power Level	100%
Temperature	+32.0(C)

Flash Module	
Item	Information
Status	Good

Figure 3-22 Status and Information of Cache-to-Flash Module

## 3.6. Installing the Optional Slide Rails

If you did not purchase QSAN qualified slide rails, please skip this section. The table below shows the available slide rail, model name, and its description.

Table 3-13 Available Slide Rails for XCubeSAN Series

Model Name	Picture	Description	Applied Models
SLR-RM3640		Slide Rail	XS5200 Series XS3200 Series XS1200 Series



### INFORMATION:

Slide rails is an optional part of all XCubeSAN series models, if you did not purchase QSAN qualified slide rails, you can skip the fourth step of the system installation tasks. If you want to purchase QSAN qualified slide rails: full extension and thin slide with tool-less bracket: AA612508 series, please contact QSAN authorized reseller.



**CAUTION:**

The populated XCubeSAN system can be very heavy, to avoid any potential injury or harm to installers, or damage to the system, we strongly recommend at least two certified operators or engineers perform the system installation.



**TIP:**

Install the disk drive trays into the system after the system chassis is mounted in the rack. Doing this can reduce the loading of the overall weight when you mount the system chassis in the rack.

1. First step of the slide rails installation

- Take the slide rails from the carton.
- Pull the inner rail out and slide the intermediate rail back.

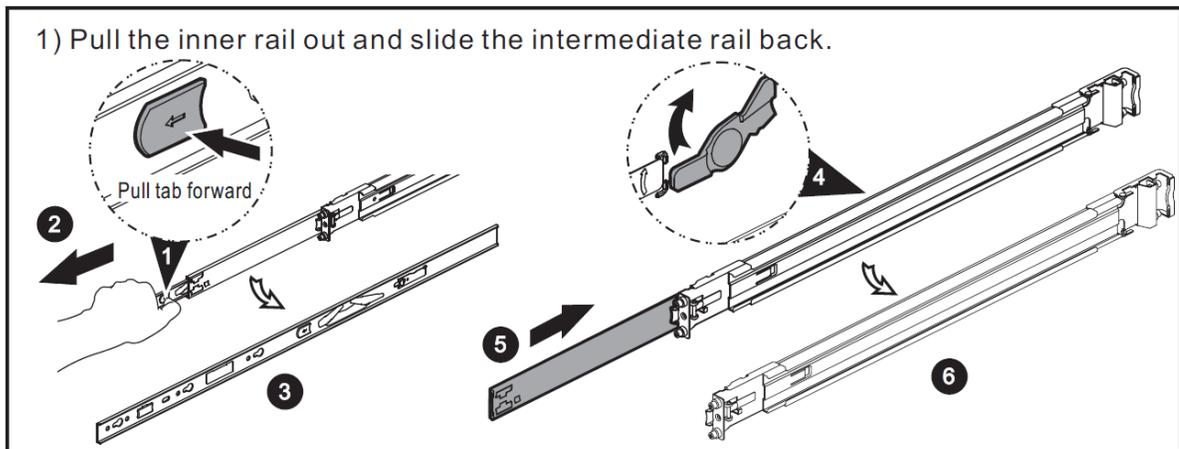


Figure 3-23 First Step of the Slide Rails Installation

2. Second step of the slide rails installation

- Install the inner member onto the chassis.

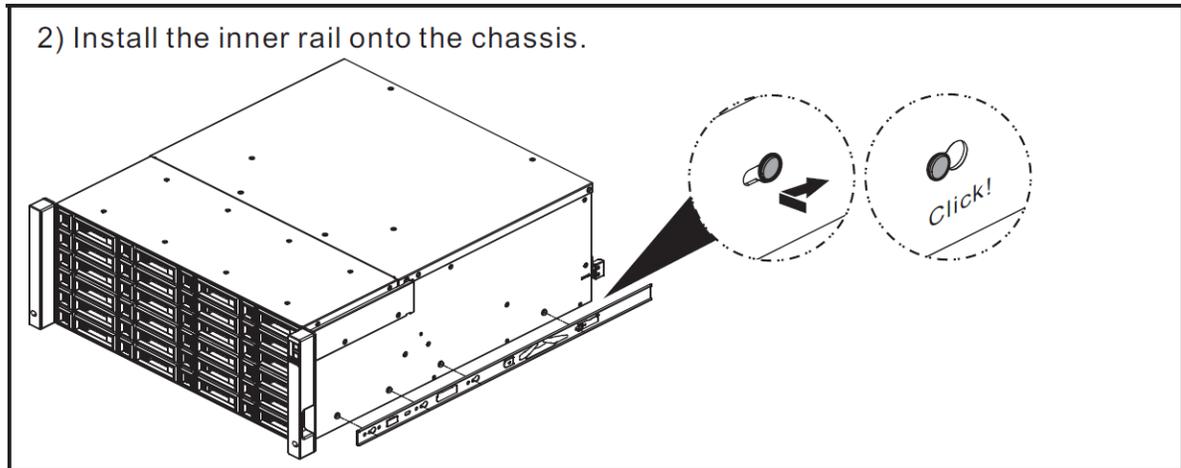


Figure 3-24 Second Step of the Slide Rails Installation

### 3. Third step of the slide rails installation

- Install the outer rail/bracket assembly to the frame.
- Repeat this installation step for the other side.

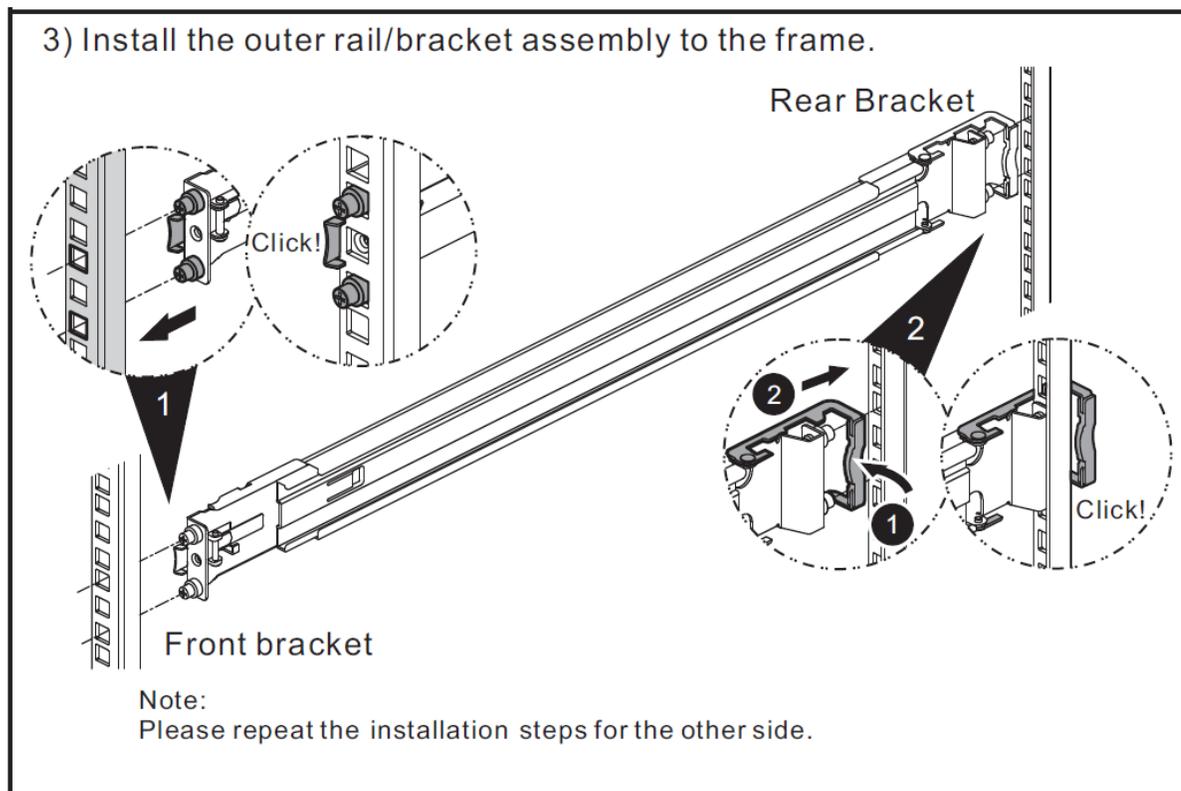


Figure 3-25 Third Step of the Slide Rails Installation

#### 4. Fourth step of the slide rails installation

- Pull the middle member fully extended in locked position.
- Ensure ball bearing retainer is located at the front of the middle member.
- Insert chassis into middle-outer member.
- When hitting the stop, pull/push release tab to unlock and retract chassis into rack.
- Use M5x20 screws to fasten the chassis ear.<sup>10</sup>



#### INFORMATION:

<sup>10</sup> If you purchase optional slide rails, M5x20 screws that are dedicated for optional slide rails are packed in the screws pack.

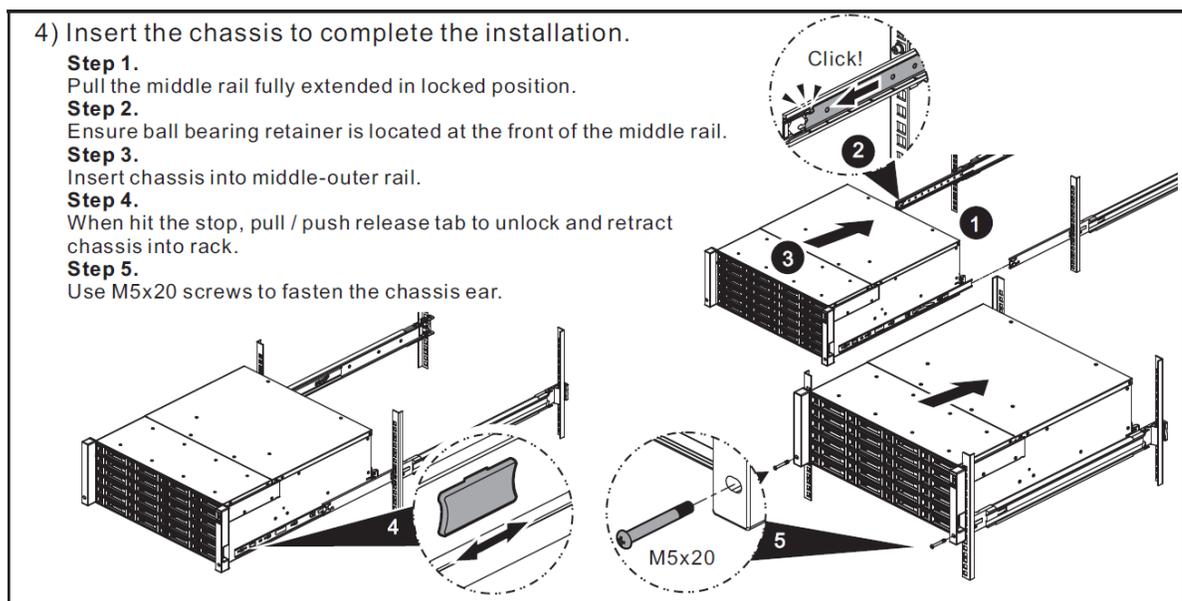


Figure 3-26 Fourth Step of the Slide Rails Installation

### 3.7. Installing the Trays into the System

Before installing, please check if the carrier handle is at the open position. The following procedure is for installing a tray into both LFF and SFF systems.

The following content and images are detailed steps for installing a tray into the system.

- Align a disk drive with the tray to the empty bay you would like to install and then push it all the way into the disk drive bay until the carrier handle is at closed position.
- Lock the release button lock by pushing the lock from right to left.

- Refer to the label on the system chassis for disk drive numbering. (Disk drive numberings of 2U 26-bay are printed on the chassis.)

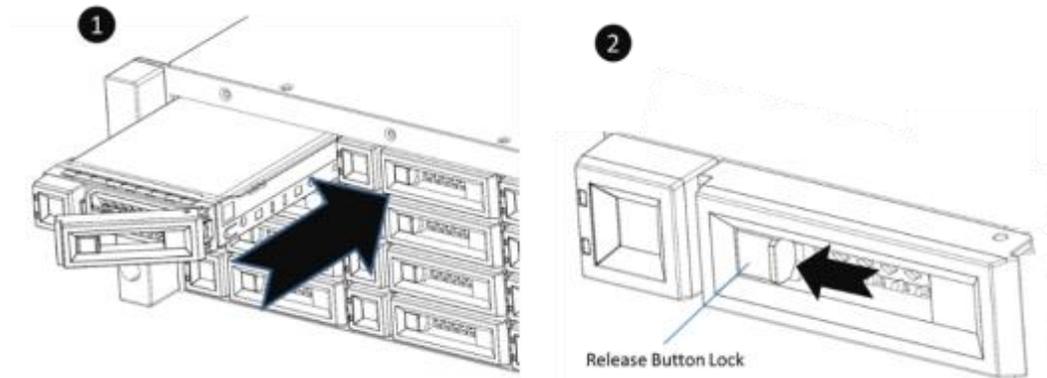


Figure 3-27 Install a Tray into the System and Lock the Release Button Lock (LFF)

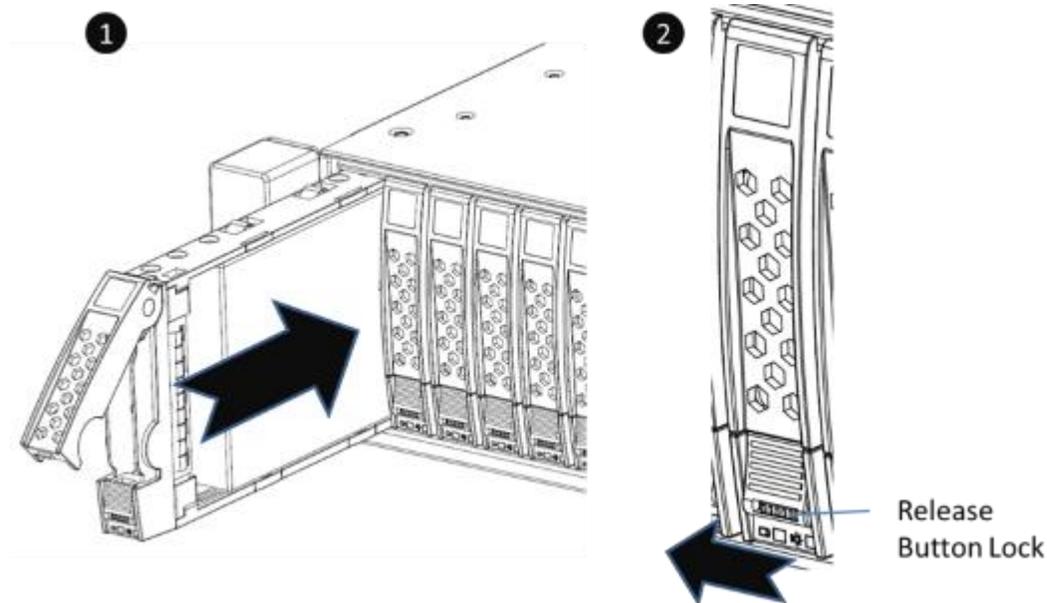


Figure 3-28 Install a Tray into the System and Lock the Release Button Lock (SFF)

### 3.8. Connecting the System to a Host

The XCubeSAN series products are equipped with two on-board 10GbE iSCSI (RJ45) ports per controller for data host connections and dual SAS3 expansion ports for expansion by adding up to nine XCubeDAS series enclosures. To learn more about advanced types of cabling, please refer to the chapter 4, [Deployment Types and Cabling](#).

### 3.8.1. Connecting to the Management Ports

XCubeSAN series models are equipped with one 1Gb BASE-T (RJ45) management port onboard per controller to allow access to the web based SANOS management system. The following image is the example of the cabling for the XCubeSAN management ports.

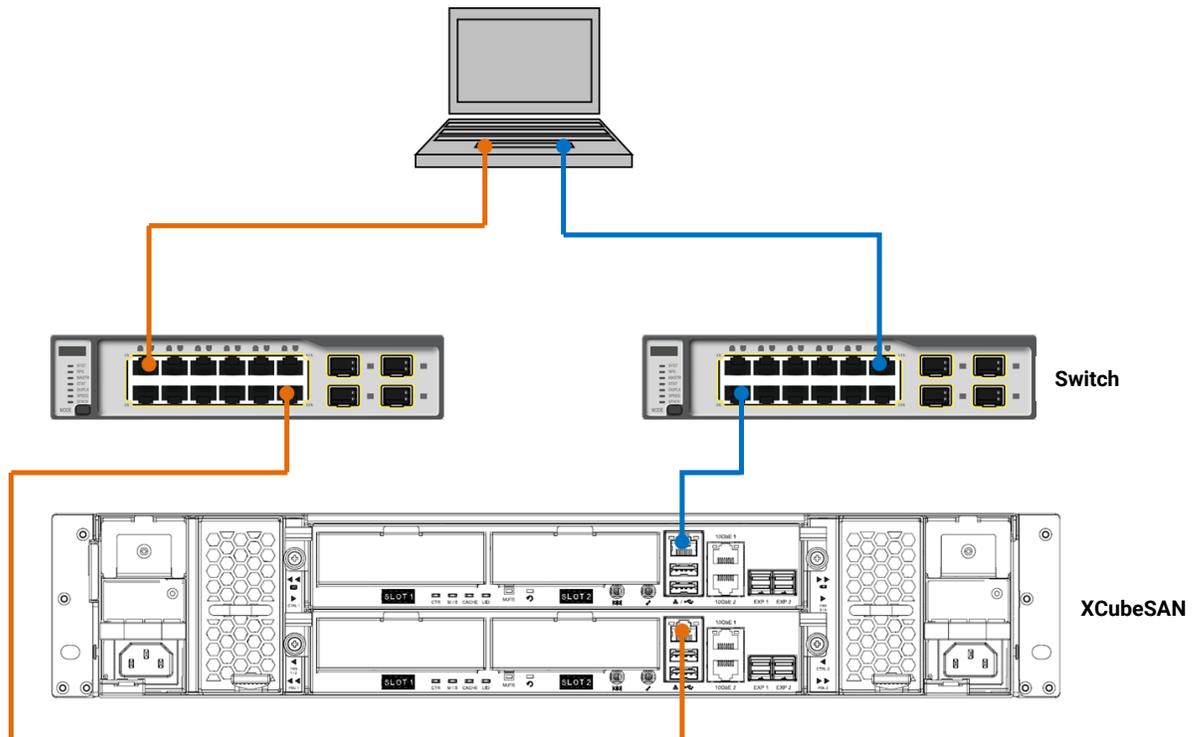


Figure 3-29 Cabling Example of the Administrator to the XCubeSAN Management Port

### 3.8.2. Dual Path (MPIO) Deployment

The following images illustrate some examples of deployment types for dual controller XCubeSAN series. MPIO (MultiPath I/O) configurations are designed to provide HA (High Availability) data connections to ensure data consistency in the rare event of a failure in the host connectivity from a single path.

## One Server / One HBA / Two Switches / One XCubeSAN / Dual Path

The following figure shows an example of a dual controller, connect enclosure configuration with one server accessing the storage via switches. One server is connected to a dual controller XCubeSAN series using CAT 6 network cables.

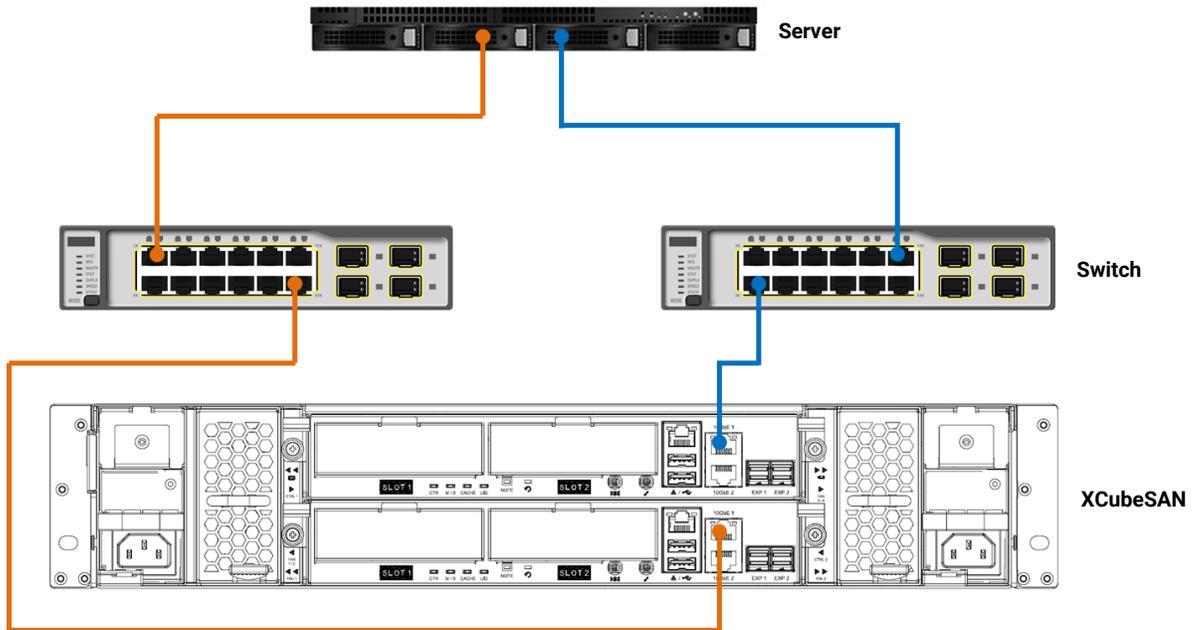


Figure 3-30 One Server / One HBA / Two Switches / One XCubeSAN / Dual Path

### 3.8.3. Expansion Deployment

#### One Server / One HBA / One XCubeSAN / One XCubeDAS / Dual Path

The following figure shows an example of a dual controller, connect enclosure configuration with one server accessing the storage. One server is connected to a dual controller XCubeSAN series using CAT 6 network cables. And a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).

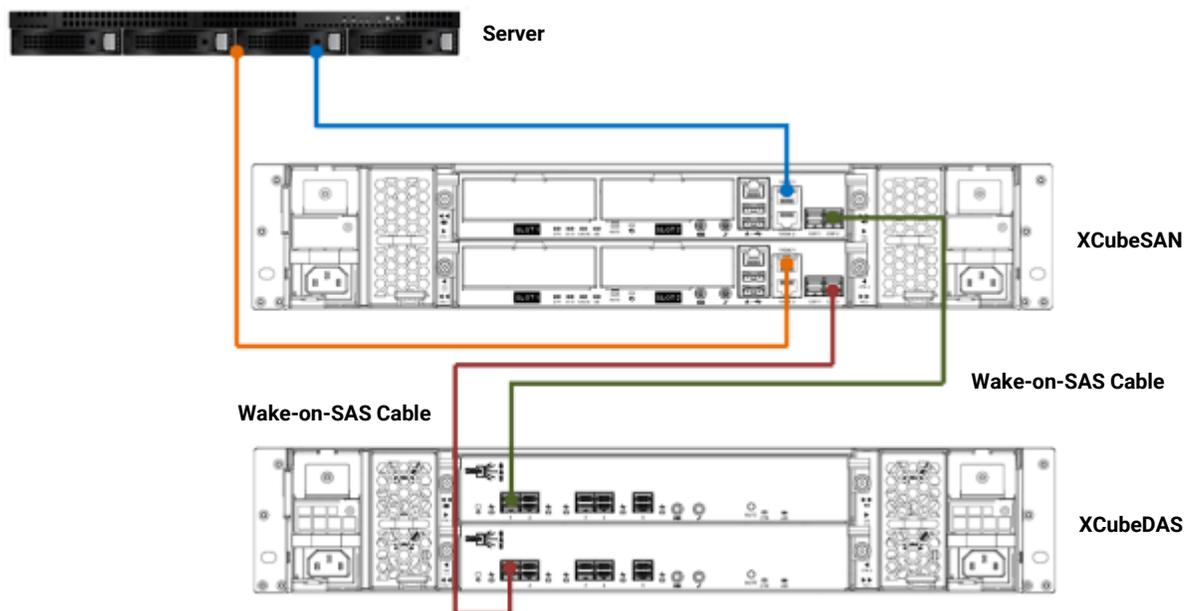


Figure 3-31 One Server / One HBA / One XCubeSAN / One XCubeDAS / Dual Path

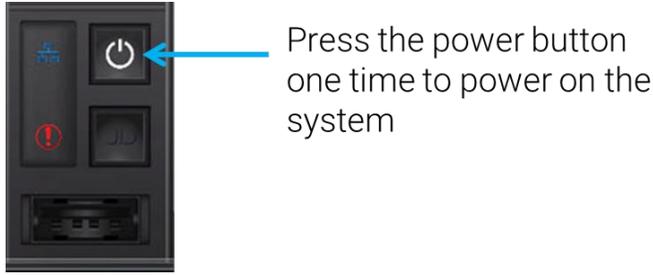
### 3.9. Connecting Power Cords and Powering ON the System

Before you power on your XCubeSAN system for the first time, please make sure following tasks are done:

- Check the power cord type. The power cords for the XCubeSAN series will vary depending on your country/region. If you find the power cords included with your XCubeSAN system doesn't match your current country/region, you may need to buy an adapter for each power cord to connect the power outlet.

Power cord ratings:

- 100 – 127V~ 10A
- 200 – 240 V~ 5A
- Install all disk drives in the system so the controllers can identify and configure them at power-up.
- Connect cables that connect the management port and data ports to your network, and then power cords to the system; finally press the power button once to power on the XCubeSAN.



Press the power button one time to power on the system

Figure 3-32 Press the Power Button One Time to Power on the System



**INFORMATION:**

The power cord rating is the minimum requirement. The rating of the power cord that you purchase must equal to or higher than the minimum requirement to ensure the system safety and reliability.

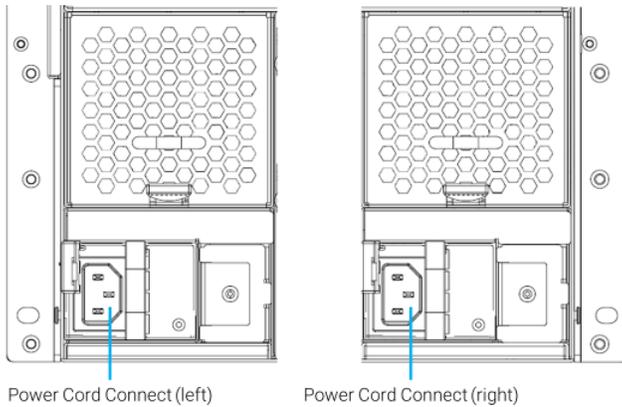


Figure 3-33 PSU Power Cord Connects



**INFORMATION:**

The Following are the operational conditions for all XCubeSAN series models:

Temperature:

- Operating temperature 0 to 40°C
- Shipping temperature -10°C to 50°C

Relative Humidity:

- Operating Relative Humidity 20% to 80% non-condensing
- Non-Operating Relative Humidity 10% to 90%



**TIP:**

The XCubeSAN series will remember the current power state when the power failed by accident. If the system is online state, after power is recovered, the system will power on automatically. If the system is offline, the system will keep power off.

### 3.10. Powering OFF the System

To power off the system, please follow the steps outlined below:

- Stop all I/O from all hosts to the SAN systems.
- Shut down the SAN system by one of the methods that are described below:
  - Press and hold the power button for **4 seconds**.



Press and hold the power button for **4 seconds** to power off the system

Figure 3-34 Power off the System by Power Button

- Via SANOS UI to shut down the system power. If you want to power off the system via Web UI, please go to **SYSTEM SETTINGS** -> **Maintenance** -> **Reboot / Shutdown**; click Shutdown to power off the system.

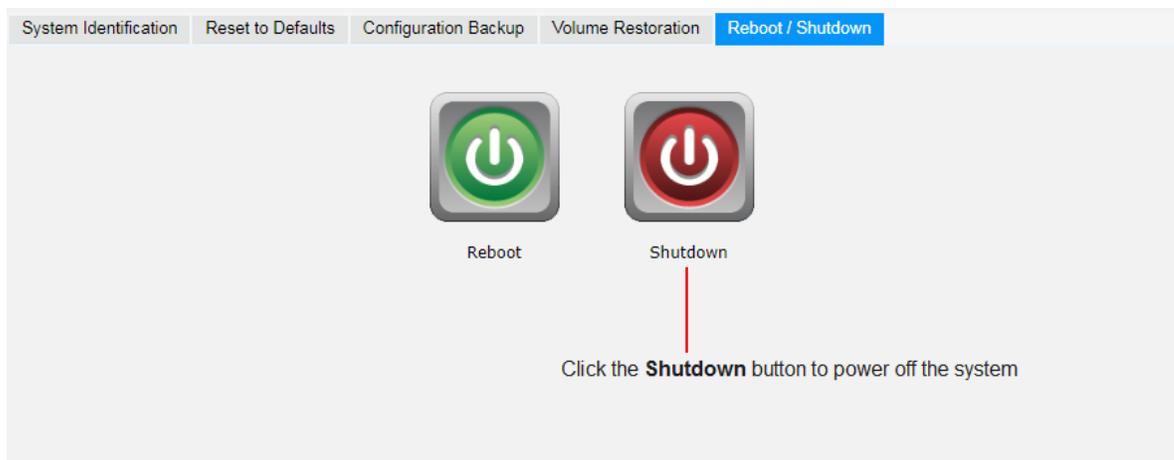


Figure 3-35 Power off the System via Web UI

### 3.11. Wake-on-LAN / Wake-on-SAS to Power ON / OFF the System

QSAN's Wake-on-SAS technology allows you to remotely power on/off all cascaded XD5300 expansion enclosures by using QSAN proprietary SAS cables. You can power on the XCubeSAN system remotely using the Wake-on-LAN feature. The XCubeSAN can work with any available Wake-on-LAN freeware and shareware. Wake-on-SAS ensures that expansion enclosures will not run idly, consuming electricity after the SAN storage system is shut down for maintenance or other purposes. Wake-on-SAS can avoid unnecessary electricity waste by allowing your devices to be on only when it is necessary. A further advantage of Wake-on-SAS is that when you turn on the SAN, the expansion enclosures will wake automatically, so there is no need to worry about degrading a volume if you forget to turn them on first.

The table below shows the available expansion cable, model name, and its description.

Table 3-14 Available Expansion Cable for XCubeSAN Series

Model Name	Picture	Description	Applied Models
CBL-12SW150		SAS 12G Expansion Cable with Wake-on-SAS, SFF-8644 to SFF-8644, 1.5 Meters (This cable is not suitable for connecting HBA or RAID card)	XS5200 Series XS3200 Series XS1200 Series

The following diagram shows that after the XCubeSAN storage receives the magic packet being sent from the client's computer, it powers on automatically and uses Wake-on-SAS functionality to power-on the attached XD5300 expansion enclosures.

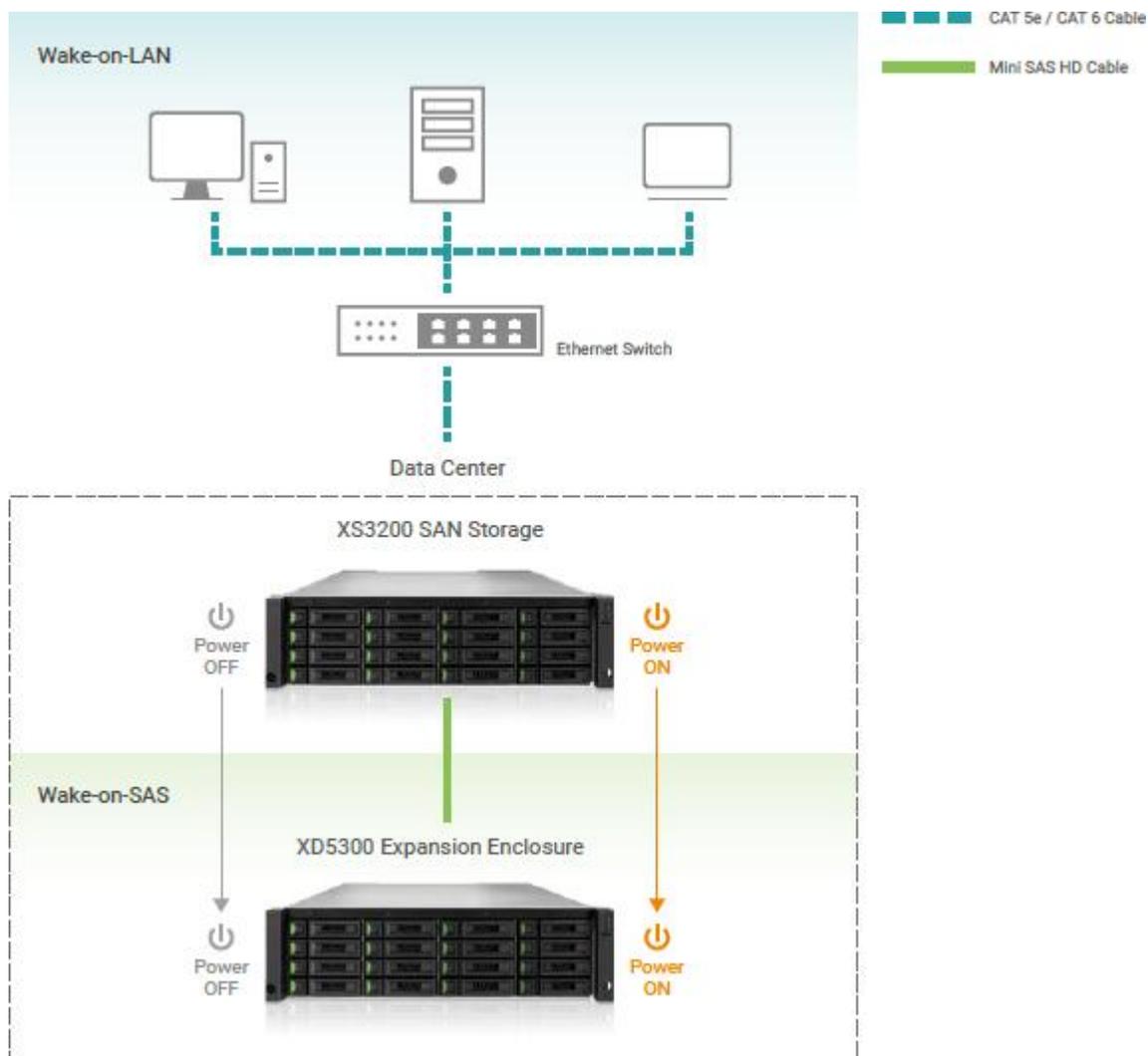


Figure 3-36 Wake-on-LAN and Wake-on-SAS Technology

### 3.12. Connecting a UPS

If users want to install a UPS (uninterruptible power supply) to provide clean power and also offer protection against mains power failures, please follow the following instructions.

- Before you purchase a UPS system, please check QSAN XCubeSAN series supported UPS interfaces and communication types.

- Supported types → UPS via SNMP, Serial UPS with COM port, and USB UPS.
- Communication types → network UPS via SNMP, Serial UPS with COM port, and USB UPS. Serial communication is the only supported type.
- Connect the UPS to the XCubeSAN.

The following image is the location for the UPS connection.

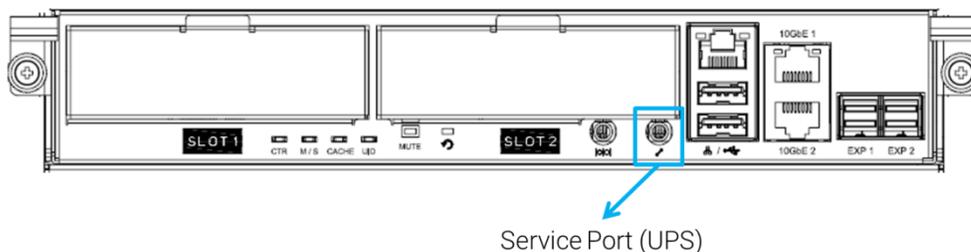


Figure 3-37 Location for the UPS System Connection

The table below shows the available UPS cable, model name, and its description.

Table 3-15 Available UPS Cable for XCubeSAN Series

Model Name	Picture	Description	Applied Models
CBL-UPS		UPS Cable, Phone-jack, 1 Meter	XS5200 Series XS3200 Series XS1200 Series

For checking the UPS connection and status, please refer to the chapter 6.3.3, UPS Settings and Status in the [XCubeSAN SANOS 4.0 Software Manual](#).

### 3.13. Connecting the Optional USB LCM

If you purchased the USB LCM, please use the enclosed USB extension cable (A-male to A-female) to connect to the system. The Following procedures are for the USB LCM connection:

- Connect the USB LCM to the female side of the USB extension cable.
- Connect the male side of the USB extension cable to the USB port on the system front pillar.

The table below shows the available USB LCM, model name, and its description.

Table 3-16 Available USB LCM for XCubeSAN Series

Model Name	Picture	Description	Applied Models
LCM-U162		Portable USB LCM	XS5200 Series XS3200 Series XS1200 Series

To learn more how to use USB LCM, please refer to the chapter 4.4, Accessing the Management USB LCM in the [XCubeSAN SANOS 4.0 Software Manual](#).

### 3.14. Discover and Carry Out the Initial Configuration for the System

After powering on the system, the next step is to discover the system on the network and start the initial configuration. To discover the system, we suggest downloading our QFinder application from the QSAN web site; this will hunt the network for your new SAN and allow you to access it via the SANOS GUI. For more information about discovering your system and the initial configuration, please refer to the chapter 3, Getting Started in the [XCubeSAN SANOS 4.0 Software Manual](#).

## 4. Deployment Types and Cabling

This chapter will show detailed deployment types and cabling for the XCubeSAN series. You can start to build up a deployment plan for your Fibre channel or iSCSI storage environment by deploying your XCubeSAN systems to your desired host. For expansion you can also attach the XCubeDAS series RAID expansion enclosures.

### 4.1. Deployment Types

XCubeSAN series supports following deployment types:

Table 4-1 Deployment Types

Deployment Type	Description
Single Path (for single or dual controller models)	In a single path deployment, one path is connected from the host/server to the XCubeSAN system. In this deployment, only one controller in the enclosure is used.
Dual Path (for dual controller models)	In a dual path deployment, two paths are connected from the host/server to the XCubeSAN system. In this deployment, both controllers in the system are used. Because dual path deployments provide two paths to the XCubeSAN system for redundancy even in the event of device, cable, or power failure. In dual-path deployment environment, disk drives must support dual paths I/O (SAS interface).
Server Attached (for single or dual controller models)	In multi-server attached deployment, more than one server is connected to the XCubeSAN system. In multi-server attached deployment, both single and dual path deployment modes are supported.

For more detail deployment type and cabling, please refer following sections.

## 4.2. Cabling the System

The following examples illustrate how to configure the cabling for the XCubeSAN series. Recommended SAS cable length for the host connection is less than 3 meters. If you want to enable wake on SAS for the XCubeDAS enclosures, the QSAN genuine SAS cable with sideband is required to enable this feature. The XCubeSAN supports a maximum of up to 626 drives for the system storage space expansion; both single and dual path cabling are supported.

The table below shows the available cable, model name, and its description.

Table 4-2 The List of Available Cable for XCubeSAN Series

Model Name	Picture	Description	Applied Models
CBL-12SW150		SAS 12G Expansion Cable with Wake-on-SAS, SFF-8644 to SFF-8644, 1.5 Meters (This cable is not suitable for connecting HBA or RAID card)	XS5200 Series XS3200 Series XS1200 Series
CBL-12SH150		SAS 12G Expansion Cable, SFF-8644 to SFF-8644, 1.5 Meters	

### 4.2.1. Expansion Configuration Rules

The table below shows the rule of configuration for the XCubeSAN series and XCubeDAS expansion enclosures. You can refer the table below for maximum number of extension enclosures and disk drives prior to performing system deployment.

Table 4-3 SAN System and Expansion Enclosure Configuration Rules

SAN Models	Expansion Enclosures	Max. No. of Expansion Units	Max. No. of Disk Drives	Max. Raw Capacity	
				(LFF 10TB, SFF 2.4TB)	(LFF 14TB, SFF 15.36TB)
XS5212 / XS3212 / XS1212 (2U 12-bay, LFF)	XD5312 (2U 12-bay, LFF)	10	12 + 10 x 12 = 132	1,320TB	1,848TB
	XD5316 (3U 16-bay, LFF)	10	12 + 10 x 16 = 172	1,720TB	2,408TB
	XD5324 (4U 24-bay, LFF)	10	12 + 10 x 24 = 252	2,520TB	3,528TB
	XD5326 (2U 26-bay, SFF)	10	12 + 10 x 26 = 272	744TB	4,161.6TB
	XD5360 (4U 60-bay, LFF)	10	12 + 10 x 60 = 612	6,120TB	8,568TB
XS5216 / XS3216 / XS1216 (3U 16-bay, LFF)	XD5312 (2U 12-bay, LFF)	10	16 + 10 x 12 = 136	1,360TB	1,940TB
	XD5316 (3U 16-bay, LFF)	10	16 + 10 x 16 = 176	1,760TB	2,464TB
	XD5324 (4U 24-bay, LFF)	10	16 + 10 x 24 = 256	2,560TB	3,584TB
	XD5326 (2U 26-bay, SFF)	10	16 + 10 x 26 = 276	784TB	4,217.6TB
	XD5360 (4U 60-bay, LFF)	10	16 + 10 x 60 = 616	6,160TB	8,624TB
XS5224 / XS3224 / XS1224 (4U 24-bay, LFF)	XD5312 (2U 12-bay, LFF)	10	24 + 10 x 12 = 144	1,440TB	2,016TB
	XD5316 (3U 16-bay, LFF)	10	24 + 10 x 16 = 184	1,840TB	2,576TB
	XD5324 (4U 24-bay, LFF)	10	24 + 10 x 24 = 264	2,640TB	3,696TB
	XD5326 (2U 26-bay, SFF)	10	24 + 10 x 26 = 284	864TB	4,329.6TB
	XD5360 (4U 60-bay, LFF)	10	24 + 10 x 60 = 624	6,240TB	8,736TB
XS5226 / XS3226 / XS1226 (2U 26-bay, LFF)	XD5312 (2U 12-bay, LFF)	10	26 + 10 x 12 = 146	1,262.4TB	2,079.36TB
	XD5316 (3U 16-bay, LFF)	10	26 + 10 x 16 = 186	1,662.4TB	2,639.36TB

SFF)	XD5324 (4U 24-bay, LFF)	10	26 + 10 x 24 = 266	2,462.4TB	3759.36TB
	XD5326 (2U 26-bay, SFF)	10	26 + 10 x 26 = 286	686.4TB	4,392.96TB
	XD5360 (4U 60-bay, LFF)	10	26 + 10 x 60 = 626	6,062.4TB	8,799.36TB

## 4.2.2. Single Path Deployment

The following images illustrate some examples of deployment types for single controller XCubeSAN series.

### One Server / One XCubeSAN / Single Path

The following figure shows an example of a single controller, direct connect enclosure configuration with one server accessing the storage. One server is direct connected to the built-in 10GBASE-T iSCSI port in a single controller XCubeSAN series using CAT 6 network cable.

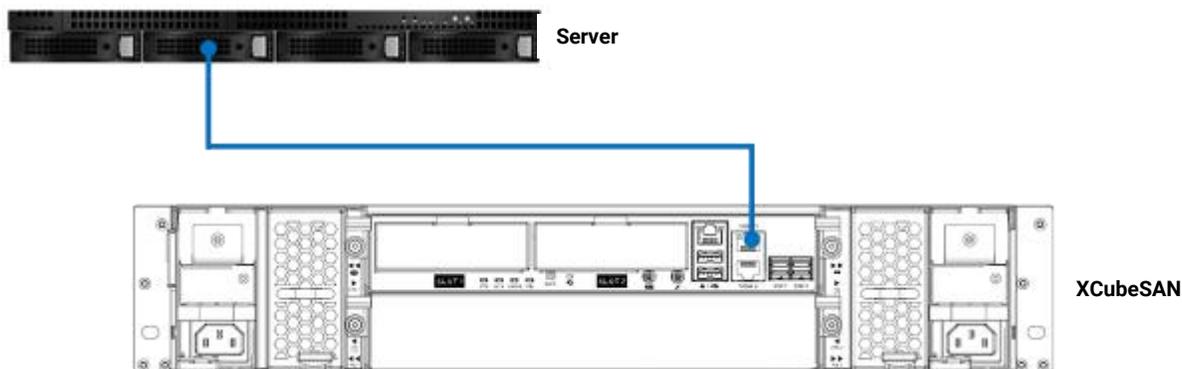


Figure 4-1 One Server / One XCubeSAN / Single Path

### One Server / One XCubeSAN / One XCubeDAS / Single Path

The following figure shows an example of a single controller XCubeSAN series connected to a single controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).

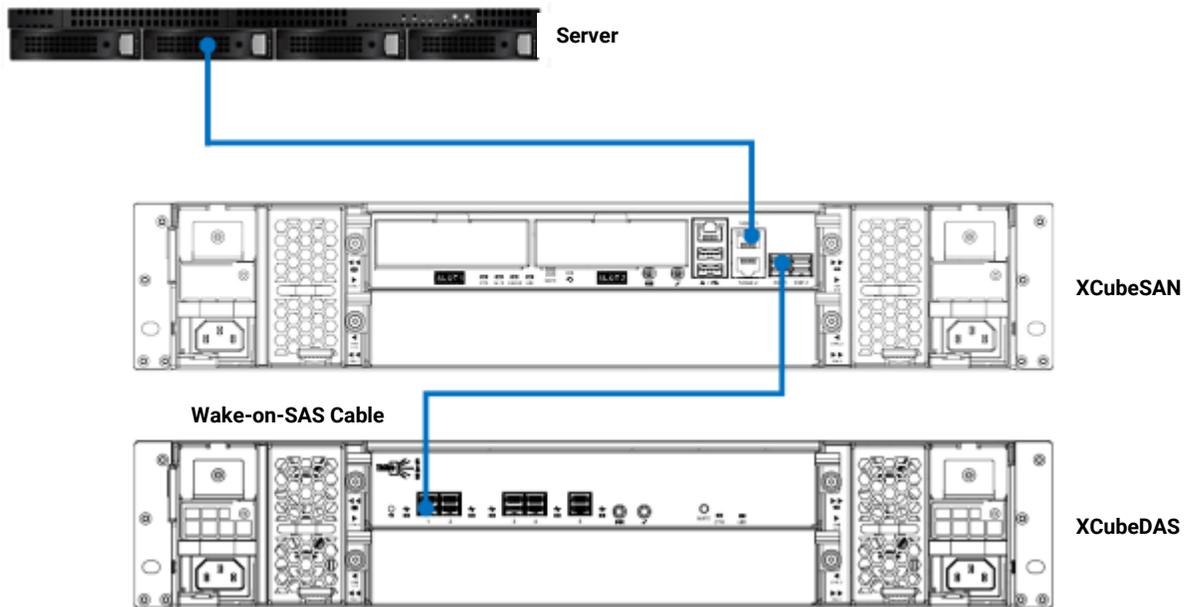


Figure 4-2 One Server / One XCubeSAN / One XCubeDAS / Single Path

### 4.2.3. Dual Path (MPIO) Deployment

The following images illustrate some examples of deployment types for dual controller XCubeSAN series. MPIO (MultiPath I/O) configurations are designed to provide HA (High Availability) data connections to ensure data consistency in the rare event of a failure in the host connectivity from a single path.

#### **One Server / One HBA / Two Switches / One XCubeSAN / Dual Path**

The following figure shows an example of a dual controller, connect enclosure configuration with one server accessing the storage via switches. One server is connected to a dual controller XCubeSAN series using CAT 6 network cables.

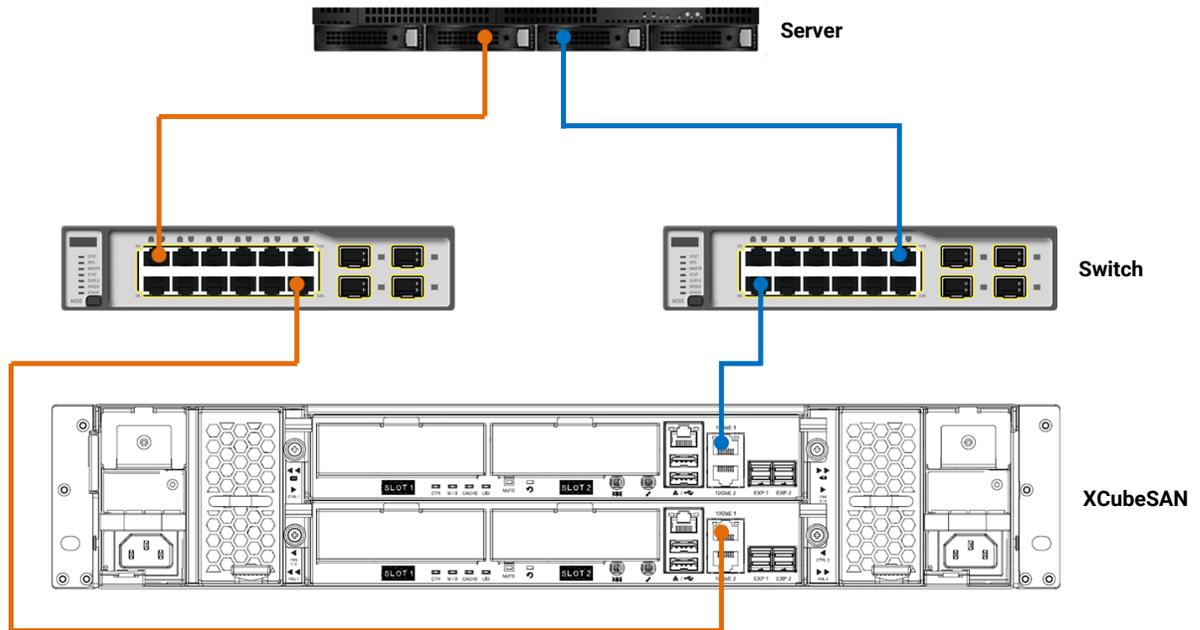


Figure 4-3 One Server / One HBA / Two Switches / One XCubeSAN / Dual Path

**One Server / One HBA / One XCubeSAN / One XCubeDAS / Dual Path**

The following figure shows an example of a dual controller, connect enclosure configuration with one server accessing the storage. One server is connected to a dual controller XCubeSAN series using CAT 6 network cables. And a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).

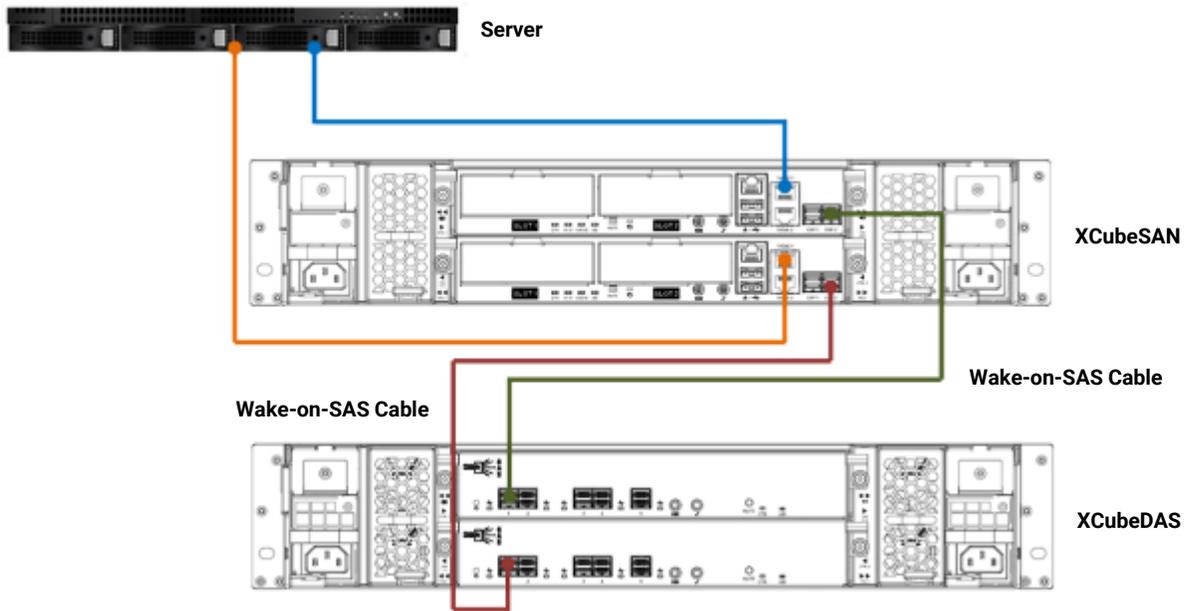


Figure 4-4 One Server / One HBA / One XCubeSAN / One XCubeDAS / Dual Path

## 4.2.4. Multi-server Attached Cabling Deployment

The following images illustrate some examples of multi-server deployment types.

### Two Servers / One HBA per Server / One XCubeSAN / Single Path

The following figure shows an example of a single controller, direct connect enclosure configuration with two servers accessing the storage. Two servers are direct connected to the built-in 10GBASE-T iSCSI port in a single controller XCubeSAN series using CAT 6 network cables.

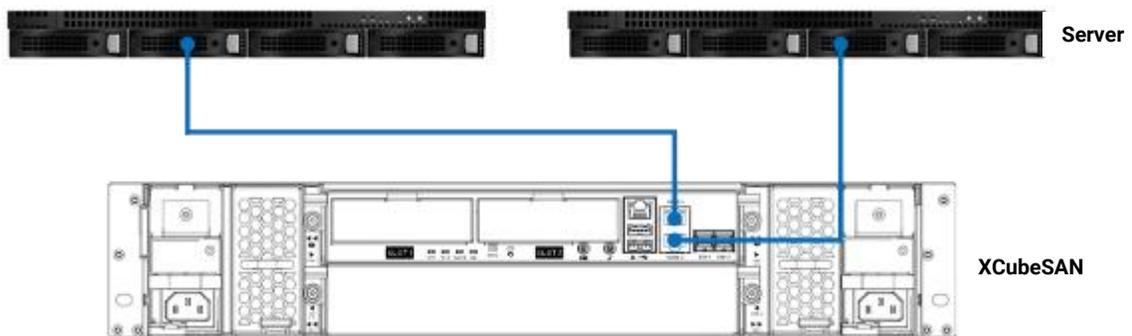


Figure 4-5 Two Servers / One HBA per Server / One XCubeSAN / Single Path

**Two Servers / One HBA per Server / Two Switches / One XCubeSAN / Dual Path**

The following figure shows an example of a dual controller, connect enclosures configuration with two servers accessing the storage via switches. Two servers are connected to a dual controller XCubeSAN series using CAT 6 network cables.

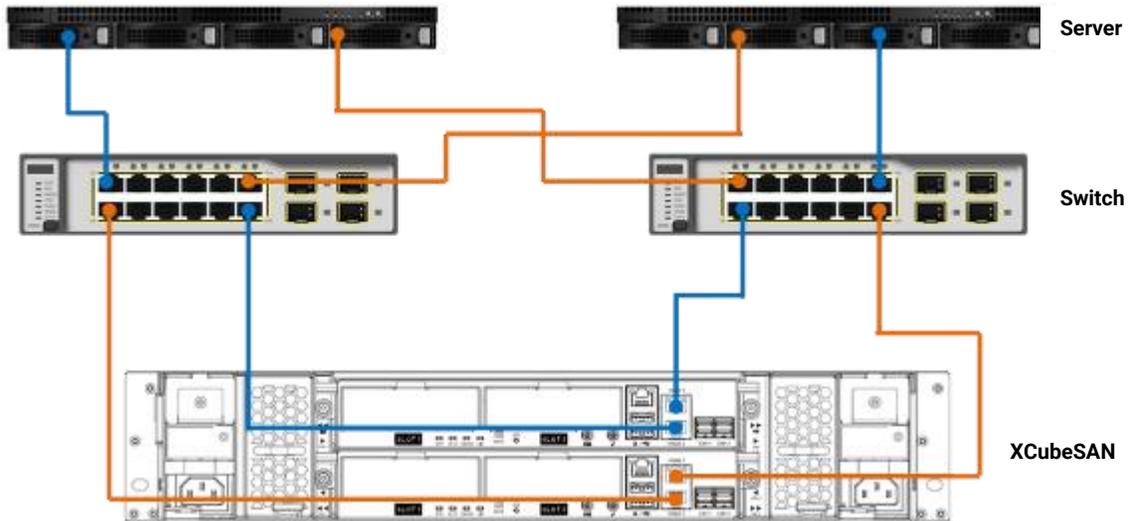


Figure 4-6 Two Servers / One HBA per Server / Two Switches / One XCubeSAN / Dual Path

## Ten Servers / One HBA per Server / One XCubeSAN / Dual Path

If customers purchase optional host cards, the following is the cabling example. The following figure shows an example of a dual controller, direct connect enclosure configuration with ten servers accessing the storage. Two servers connect to the on-board 10GbE iSCSI (RJ45) ports. Eight servers connect to the optional host cards. To learn more about host cards support and installation, please refer to the chapter 3.3, [Installing the Optional Host Cards](#).

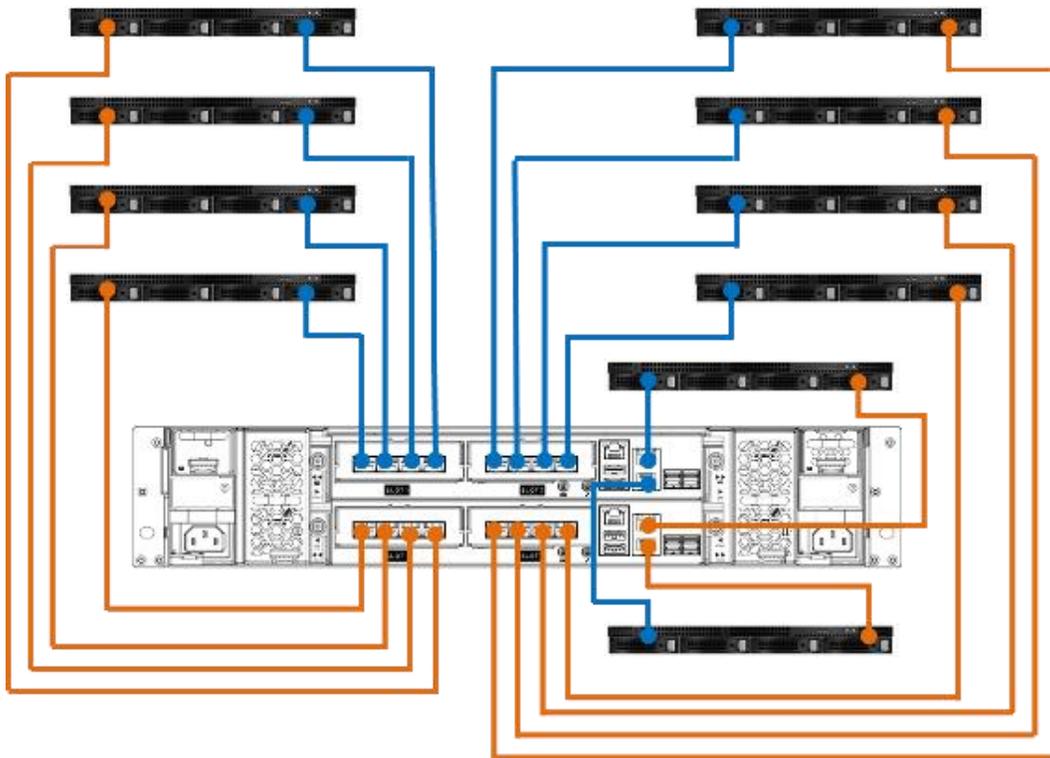


Figure 4-7 Ten Servers / One HBA per Server / One XCubeSAN / Dual Path

### 4.2.5. Expansion Topology and Deployment

The following images illustrate some examples of expansion topology and deployment types for dual controller XCubeSAN series.

#### Cascade Topology: One XCubeSAN / One XCubeDAS / Dual Path

The following figure shows an example of a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).

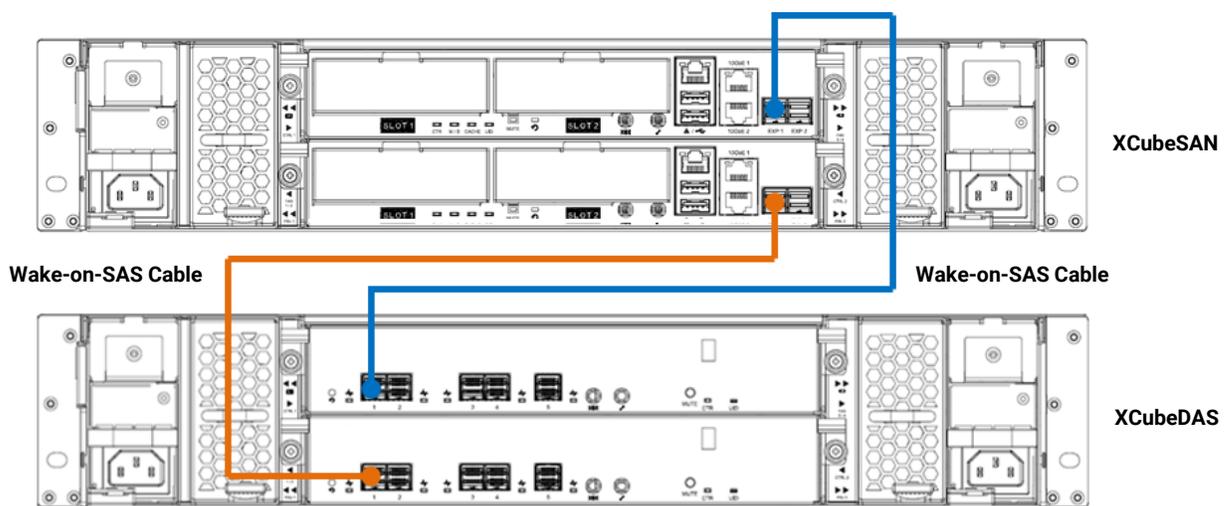


Figure 4-8 Cascade Topology: One XCubeSAN / One XCubeDAS / Dual Path

## Cascade Topology: One XCubeSAN / Two XCubeDAS / Dual Path

The following figure shows an example of a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series which is in turn connected to the second dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).

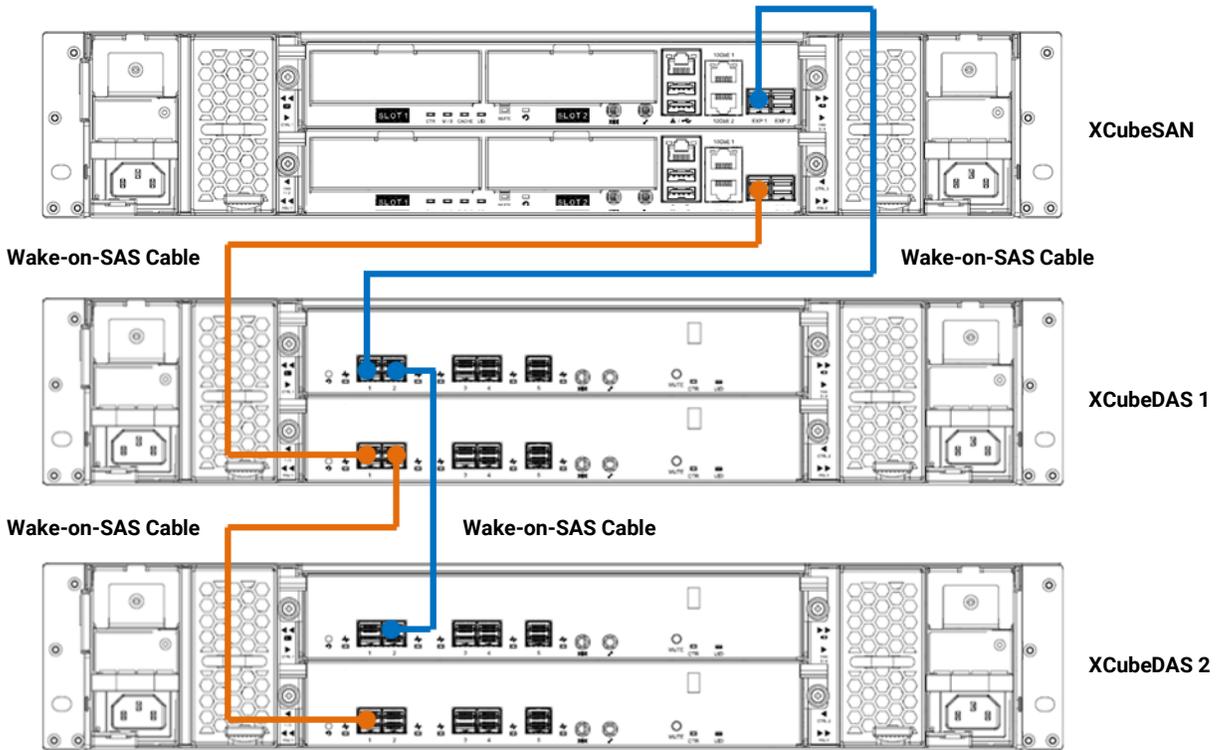


Figure 4-9 Cascade Topology: One XCubeSAN / Two XCubeDAS / Dual Path

### Reverse Topology: One XCubeSAN / Two XCubeDAS / Dual Path

The XCubeDAS can be connected in redundant connection mode based on forward direction and backward direction. This provides the optimal networking reliability.

The following figure shows an example of a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series which is in turn connected to the second dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644). The connection in forward direction is shown as blue cables. The connection in backward direction is shown as orange cables.

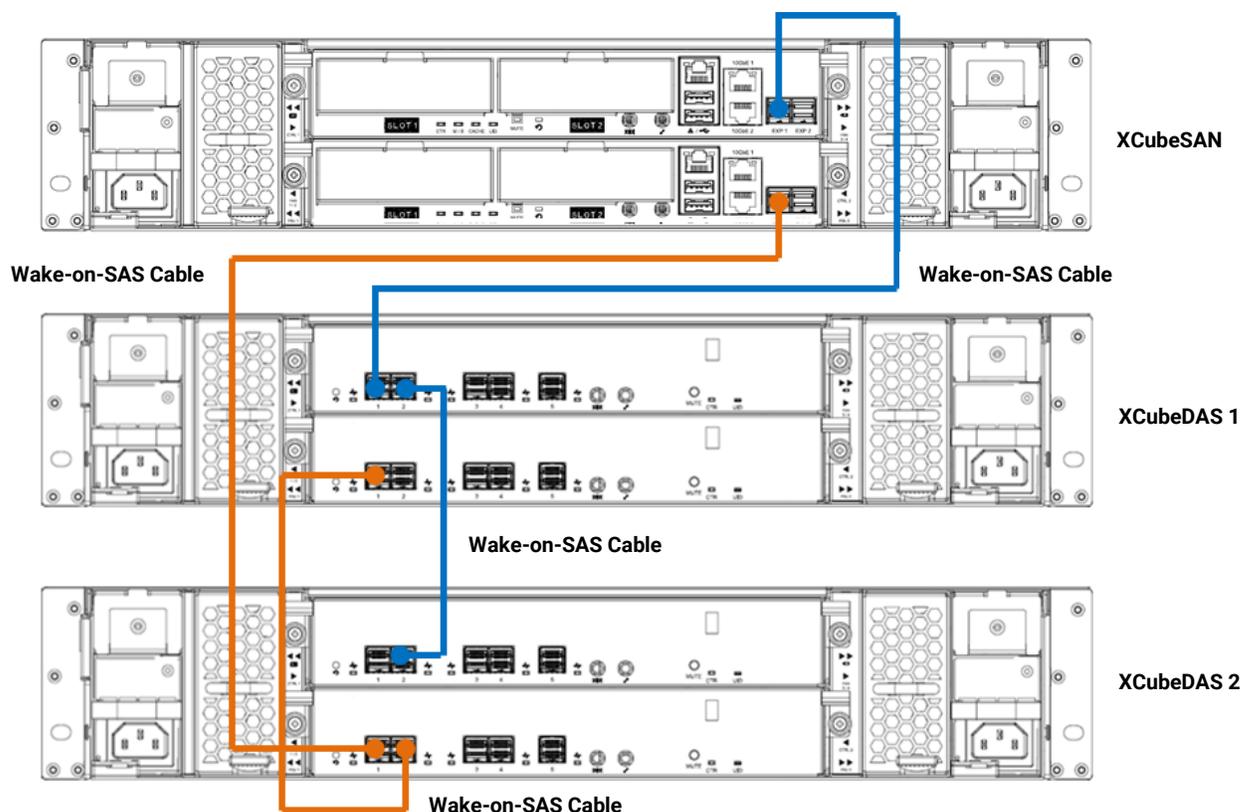


Figure 4-10 Reverse Topology: One XCubeSAN / Two XCubeDAS / Dual Path



#### INFORMATION:

Reverse topology is available in SANOS firmware 1.1.0.

## Tree Topology: One Server / Two XCubeDAS

The XCubeDAS can be connected in tree topology to reduce the latency.

The following figure shows an example of a dual controller XCubeSAN series connected to two dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).

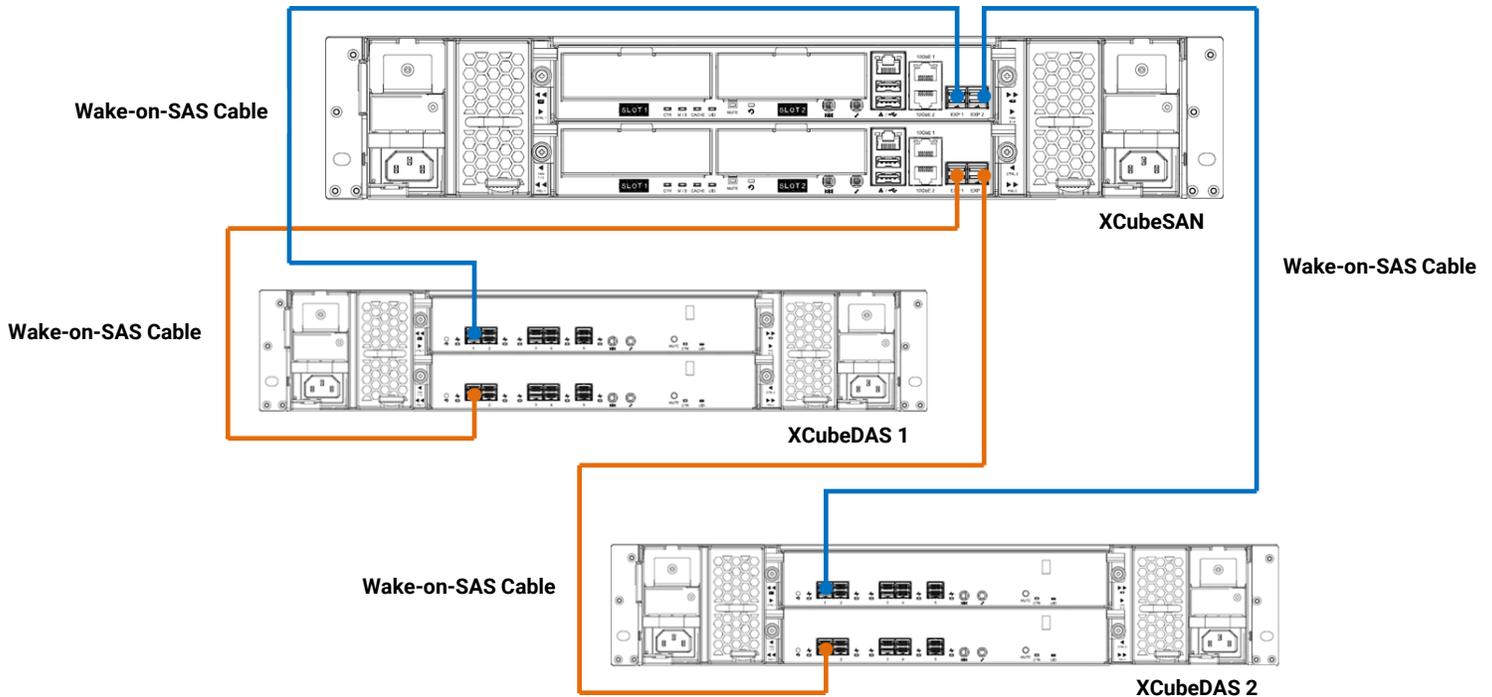


Figure 4-11 Tree Topology: One XCubeSAN / Two XCubeDAS / Dual Path



### INFORMATION:

Tree topology is available in SANOS firmware 1.1.0.

## 4.2.6. Introduction of Remote Replication

If users purchase two or more XCubeSAN series systems and plan to deploy them in different locations, the **Remote Replication** function in QSAN SANOS supports multiple topologies to suit various disaster recovery configurations. The following remote replication topologies are possible using native replication:

**One-Directional**



Figure 4-12 One-Directional Remote Replication

A Source Volume (S) in Site A is replicating to a Target Volume (T) in Site B. This is the most basic remote replication topology.

**Bi-Directional**

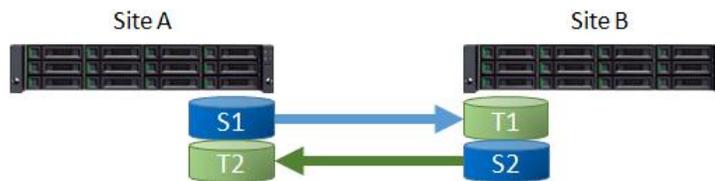


Figure 4-13 Bi-Directional Remote Replication

Each system in a two system topology acts as a replication target for the other's production data. A Source Volume (S1) in Site A is replicating to a Target Volume (T1) in Site B. And a Source Volume (S2) in Site B is replicating to a Target Volume (T2) in Site A.

**One-to-Many**

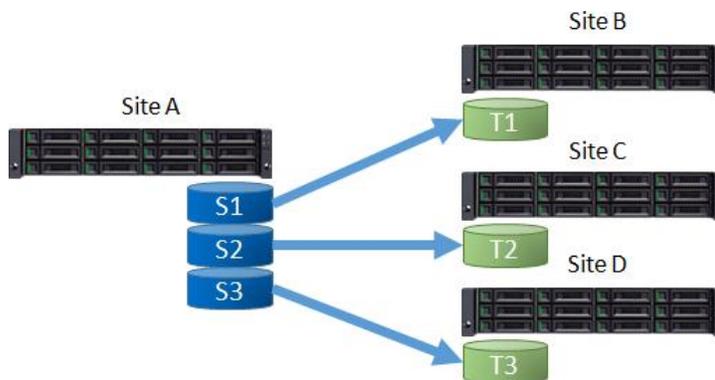


Figure 4-14 One-to-Many Remote Replication

A single source system replicates different storage resources to multiple target systems. A Source Volume (S1) in Site A is replicating to a Target Volume (T1) in Site B. At the same time, a Source Volume (S2) in Site A is replicating to a Target Volume (T2) in Site C. So does S3 in Site A to T3 in Site D.

## Many-to-One

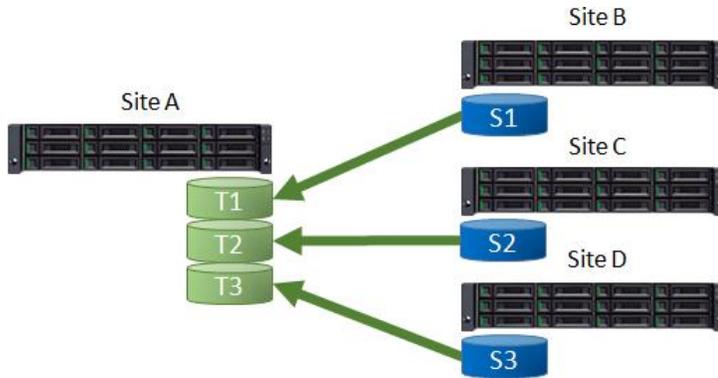


Figure 4-15 Many-to One Remote Replication

Multiple source systems replicate to a single target system. A Source Volume (S1) in Site B is replicating to a Target Volume (T1) in Site A. At the same time, a Source Volume (S2) in Site C is replicating to a Target Volume (T2) in Site A. So does S3 in Site D to T3 in Site A.

## Many-to-Many

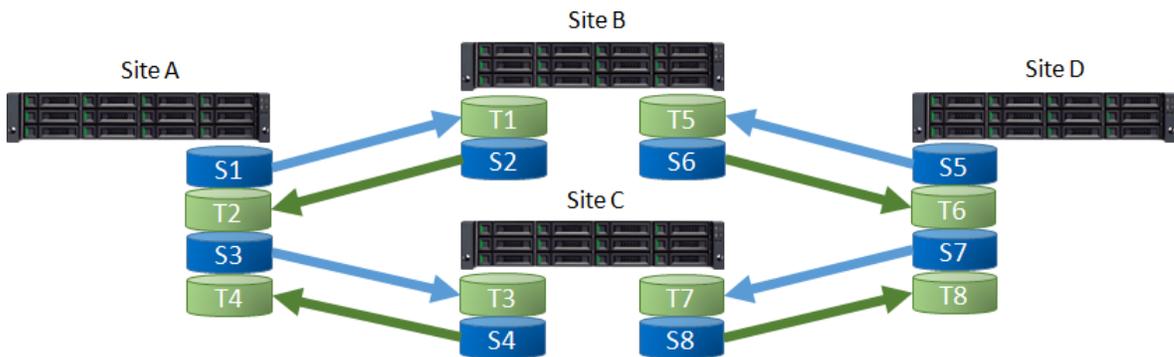


Figure 4-16 Many-to Many Remote Replication

Combination with bi-Directional, one-to-many, and many-to-one, remote replication also supports Many-to-Many topology. Multiple source systems replicate to multiple target

systems. A Source Volume (S1) in Site A is replicating to a Target Volume (T1) in Site B. At the same time, a Source Volume (S2) in Site B is replicating to a Target Volume (T2) in Site A. And does S3 to T3, S4 to T4, ..., S8 to T8.

**TIP:**

Note that all supported topologies have a 1-to-1 configuration for each individual replication session in the topology.

The maximum replication task quantity per system is 32. It means that 32 systems are the maximum quantity of any many-to-one or one-to-many replication configuration.

---

If you want to learn more about the operations on remote replication, please refer to the Chapter 12.3, Managing Remote Replications in the [XCubeSAN SANOS 4.0 Software Manual](#).

## 5. Descriptions of LEDs and Buttons

In this chapter, you can find all LED definitions and button behaviors of the XCubeSAN series models. By reviewing this chapter, you will have a basic understanding about the current status of the system or specific components by recognizing the LED status.

### 5.1. Front Panel

In this session, we will describe the system controls and indicators, and the disk drive LEDs in the front panel.

#### 5.1.1. System Controls and Indicators

XCubeSAN features the button and indication module on the right ear. Please refer to the following content for definitions of LED behaviors.

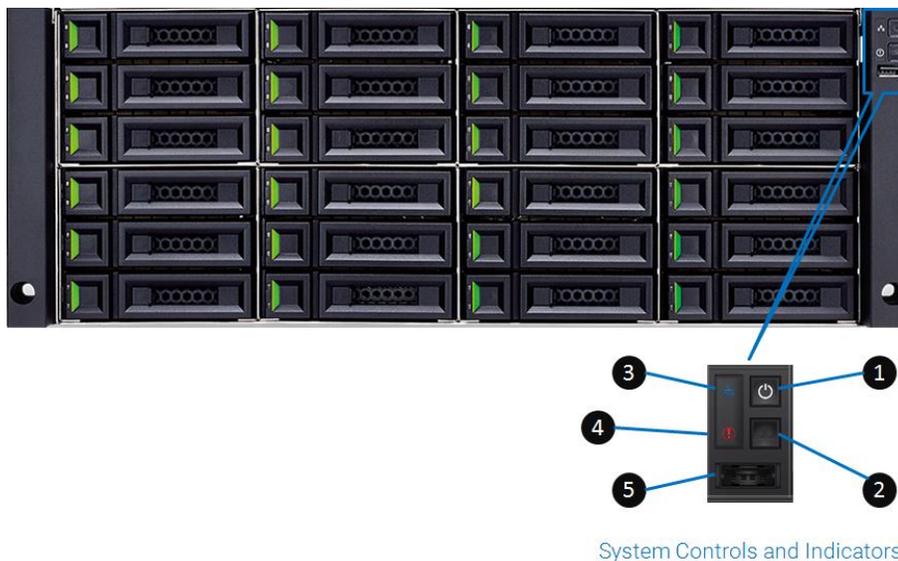


Figure 5-1 System Controls and Indicators

Table 5-1 Descriptions of the System Controls and Indicators LEDs

Number	Description	Definition
1	Enclosure Power Button/LED	<p><b>Power Button</b></p> <ul style="list-style-type: none"> <li>Press the button one time to turn ON the system power and keep pressing for 4 seconds to turn OFF the system power.</li> </ul> <p><b>Power LED</b></p> <ul style="list-style-type: none"> <li>Solid <b>White</b>: Power is ON (at least one power supply unit is supplying power to the system).</li> <li>Blinking <b>White</b>: The system is in the stage of boot or shutdown.</li> <li>Off: The system is shutdown.</li> </ul>
2	UID Button/LED	<p><b>UID (Unique Identifier) button</b></p> <ul style="list-style-type: none"> <li>Press the button one time to turn it ON; press it again to turn it OFF.</li> </ul> <p><b>UID (Unique Identifier) LED</b></p> <ul style="list-style-type: none"> <li>Press the button to turn it ON, and press it again to turn it OFF.</li> <li>Solid <b>Blue</b>: The system has been identified.</li> <li>Off: The system has not been identified.</li> </ul>
3	Enclosure Access LED	<p><b>Enclosure Access LED</b> (Indicate the host interface connectivity.)</p> <ul style="list-style-type: none"> <li>Blinking <b>Blue</b>: The host interface activity is on-going.</li> <li>Off: There is no host interface activity.</li> </ul>
4	Enclosure Status LED	<p><b>Status LED</b> (Indicate current health status of the system.)</p> <ul style="list-style-type: none"> <li>Solid <b>Amber</b>: System has errors including PSU failure, abnormal voltage, abnormal temperature, any fan module failed or removed, controller degraded, pool degraded, pool failure, SSD cache pool degraded, or SSD cache pool failure.</li> <li>Off: The system is healthy.</li> </ul>
5	USB Port	The USB port can be plug in the LCM (LCD Module).

## 5.1.2. Disk Drive LEDs

Please refer to the following content for definitions of LED behaviors.

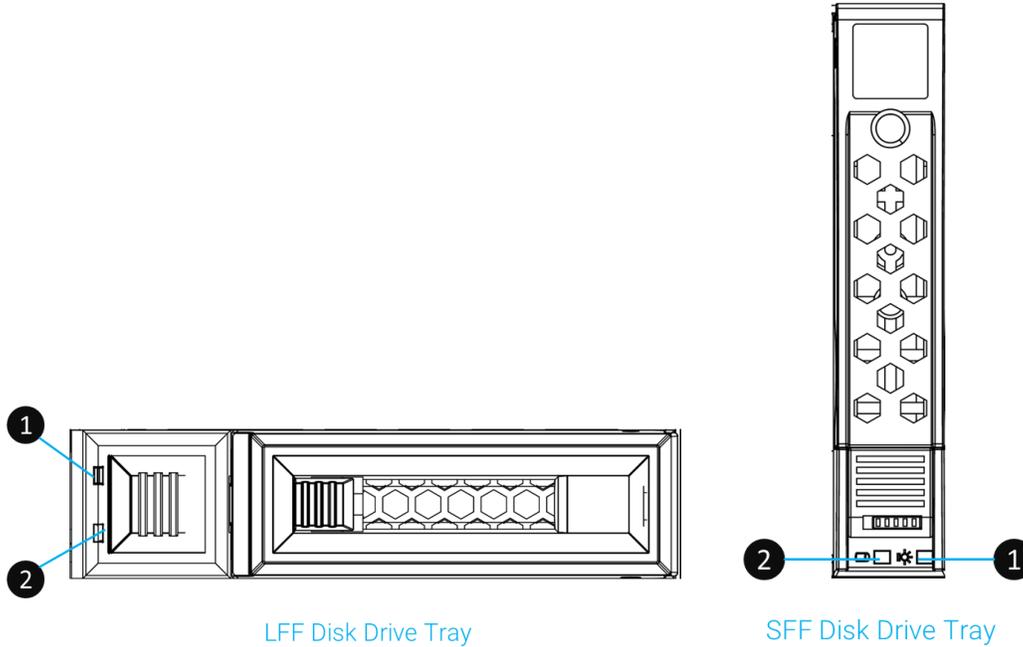


Figure 5-2 Disk Drive Indicators of LFF & SFF Disk Drive Tray

Table 5-2 Descriptions of Disk Drive LEDs

Number	Description	Definition
1	Disk Drive Power LED	<ul style="list-style-type: none"> <li>• Solid <b>Blue</b>: The disk drive is inserted and no data access.</li> <li>• Blinking <b>Blue</b>: The disk drive is accessing data.</li> <li>• Off: There is no disk drive inserted.</li> </ul>
2	Disk Drive Status LED	<ul style="list-style-type: none"> <li>• Solid <b>Amber</b>: There is disk drive error.</li> <li>• Blinking <b>Amber</b> (interval of 0.5 sec): The disk drive is rebuilding.</li> <li>• Blinking <b>Amber</b> (interval of 0.05 sec): Identify the disk drive.</li> <li>• Off: The disk drive is healthy.</li> </ul>

## 5.2. Rear Panel

In this session, we will describe the system control LEDs, PSU LEDs, host card LEDs, and the cache-to-flash module LED in the rear panel.

### 5.2.1. Controller LEDs

Please refer to the following content for definitions of the LED behaviors.

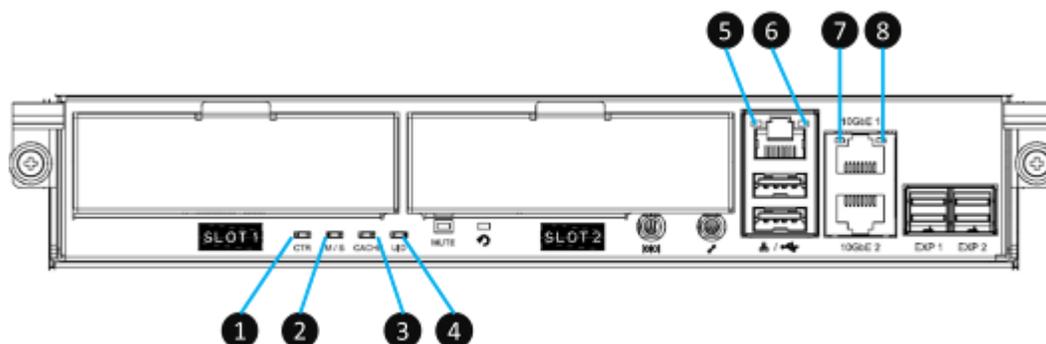


Figure 5-3 The Controller LEDs

Table 5-3 Descriptions of XCubeSAN Series Controller LEDs

Number	Description	Definition
1	Controller Status LED	<ul style="list-style-type: none"> <li>Solid <b>Green</b>: Controller status is normal.</li> <li>Solid <b>Red</b>: System is booting or the controller is failed.</li> </ul>
2	Master / Slave LED (only for dual controllers)	<ul style="list-style-type: none"> <li>Solid <b>Green</b>: This is the Master controller.</li> <li>Off: This is the Slave controller.</li> </ul>
3	Dirty Cache LED	<ul style="list-style-type: none"> <li>Solid <b>Amber</b>: Data on the cache is waiting for flush to disks.</li> <li>Off: There is no data on the cache.</li> </ul>
4	UID (Unique Identifier) LED	<ul style="list-style-type: none"> <li>Solid <b>Blue</b>: The enclosure has been identified.</li> <li>Off: The enclosure is not being identified.</li> </ul>
5	Management Port Connection LED	<ul style="list-style-type: none"> <li>Solid <b>Green</b>: The connection is built and normal.</li> <li>Off: No connection is built.</li> </ul>

6	Management Port Accessing LED	<ul style="list-style-type: none"> <li>Blinking <b>Amber</b>: Data is accessing.</li> </ul>
7	10GbE iSCSI Port 1 LED	<ul style="list-style-type: none"> <li>Blinking <b>Amber</b>: Data is accessing.</li> </ul>
8	10GbE iSCSI Port 2 LED	<ul style="list-style-type: none"> <li>Blinking <b>Amber</b>: Data is accessing.</li> </ul>

## 5.2.2. Power Supply Unit LED

Please refer to the following content for definitions of the LED behaviors.

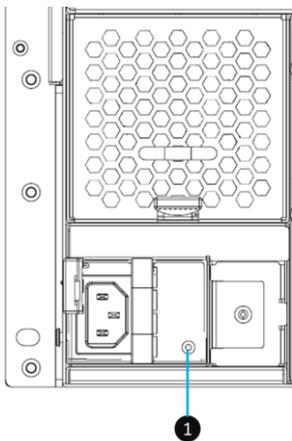


Figure 5-4 The Power Supply Unit LED

Table 5-4 Descriptions of the Power Supply Unit LED

Number	Description	Definition
1	PSU LED	<ul style="list-style-type: none"> <li>Solid <b>Green</b>: The PSU is on and normal.</li> <li>Blinking <b>Green</b>: The PSU is off, +5VSB (Standby) is on.</li> <li>Solid <b>Amber</b>: There is critical event caused shutdown.</li> <li>Blinking <b>Amber</b>: There are PSU warning events including high temperature, high power, high current, slow fan, or under input voltage.</li> </ul>

### 5.2.3. Host Card LEDs

Please refer to the following content for definitions of the LED behaviors.

#### 4-port 16Gb Fibre Channel Host Card (SFP+) LEDs

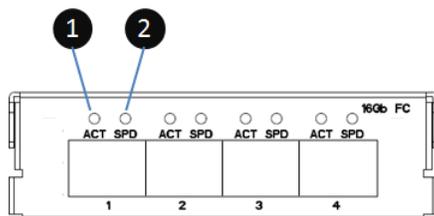


Figure 5-5 4-port 16Gb Fibre Channel Host Card (SFP+) LEDs

Table 5-5 Descriptions of 4-port 16Gb Fibre Channel Host Card (SFP+) LEDs

Number	Description	Definition
1	Activity LED	<ul style="list-style-type: none"> <li>• Solid <b>Green</b>: Asserted when the link is establish (Link OK without I/O).</li> <li>• Blinking <b>Green</b>: Asserted when the link is established and packets are being transmitted along with any receive activity (Access).</li> <li>• Off: No link is detected or link fails.</li> </ul>
2	Speed LED	<ul style="list-style-type: none"> <li>• Solid <b>Blue</b>: Asserted when a 16G link is established and maintained.</li> <li>• Solid <b>Amber</b>: Asserted when an 8G link is established and maintained.</li> <li>• Solid <b>White</b>: Asserted when a 4G and below link is established and maintained</li> <li>• Off: No link is detected or link fails.</li> </ul>

## 2-port 16Gb Fibre Channel Host Card (SFP+) LEDs

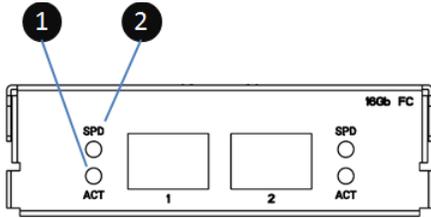


Figure 5-6 2-port 16Gb Fibre Channel Host Card (SFP+) LEDs

Table 5-6 Descriptions of 2-port 16Gb Fibre Channel Host Card (SFP+) LEDs

Number	Description	Definition
1	Activity LED	<ul style="list-style-type: none"> <li>• Solid <b>Green</b>: Asserted when the link is establish (Link OK without I/O).</li> <li>• Blinking <b>Green</b>: Asserted when the link is established and packets are being transmitted along with any receive activity (Access).</li> <li>• Off: No link is detected or link fails.</li> </ul>
2	Speed LED	<ul style="list-style-type: none"> <li>• Solid <b>Blue</b>: Asserted when a 16G link is established and maintained.</li> <li>• Solid <b>Amber</b>: Asserted when an 8G link is established and maintained.</li> <li>• Solid <b>White</b>: Asserted when a 4G and below link is established and maintained</li> <li>• Off: No link is detected or link fails.</li> </ul>

## 4-port 10GbE iSCSI Host Card (SFP+) LEDs

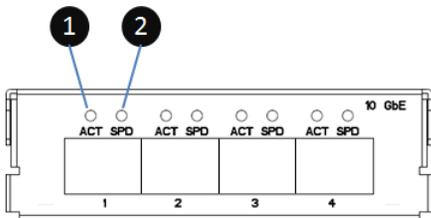


Figure 5-7 4-port 10GbE iSCSI Host Card (SFP+) LEDs

Table 5-7 Descriptions of 4-port 10GbE iSCSI Host Card (SFP+)LEDs

Number	Description	Definition
1	Activity LED	<ul style="list-style-type: none"> <li>Blinking <b>Green</b>: Asserted when the link is established and packets are being transmitted along with any receive activity (Access).</li> <li>Off: No link is detected or link fails.</li> </ul>
2	Speed LED	<ul style="list-style-type: none"> <li>Solid <b>Blue</b>: Asserted when a 10G link is established and maintained.</li> <li>Solid <b>Amber</b>: Asserted when a 1G link is established and maintained.</li> <li>Off: No link is detected or link fails.</li> </ul>

### 2-port 10GBASE-T iSCSI Host Card (RJ45) LEDs

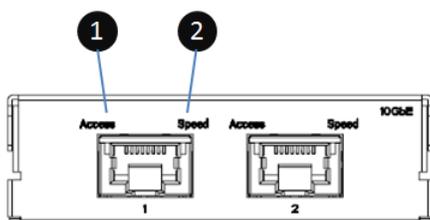


Figure 5-8 2-port 10GBASE-T iSCSI Host Card (RJ45) LEDs

Table 5-8 Descriptions of 2-port 10GBASE-T iSCSI Host Card (RJ45) LEDs

Number	Description	Definition
1	Access LED	<ul style="list-style-type: none"> <li>Blinking <b>Green</b>: Asserted when the link is established and packets are being transmitted along with any receive activity (Access).</li> <li>Off: No link is detected or link fails.</li> </ul>
2	Speed LED	<ul style="list-style-type: none"> <li>Solid <b>Green</b>: Asserted when a 10G link is established and maintained.</li> <li>Solid <b>Amber</b>: Asserted when a 1G link is established and maintained.</li> <li>Off: No link is detected or link fails.</li> </ul>

## 4-port 1GBASE-T iSCSI Host Card (RJ45) LEDs

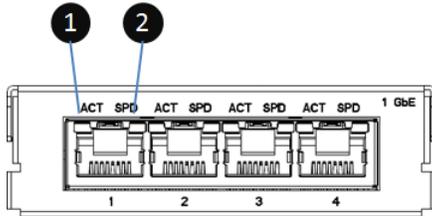


Figure 5-9 4-port 1GBASE-T iSCSI Host Card (RJ45) LEDs

Table 5-9 Descriptions of 4-port 1GBASE-T iSCSI Host Card (RJ45) LEDs

Number	Description	Definition
1	Activity LED	<ul style="list-style-type: none"> <li>Blinking Green: Asserted when the link is established and packets are being transmitted along with any receive activity (Access).</li> <li>Off: No link is detected or link fails.</li> </ul>
2	Speed LED	<ul style="list-style-type: none"> <li>Solid Amber: Asserted when a 1G link is established and maintained.</li> <li>Solid Green: Asserted when a 100M link is established and maintained.</li> <li>Off: No link is detected or link fails.</li> </ul>

### 5.2.4. Cache-to-Flash Module LEDs and Button

Please refer to the following content for definitions of the LED and button behaviors.

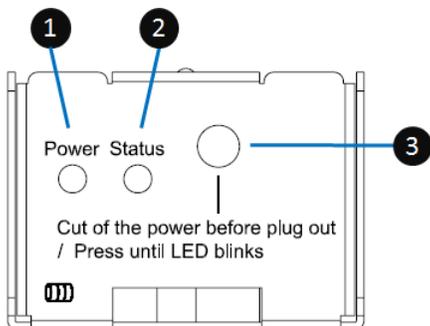


Figure 5-10 Flash Module LEDs and Button

Table 5-10 Descriptions of Flash Module LEDs and Button

Number	Description	Definition
1	Power LED	<ul style="list-style-type: none"> <li>• Solid <b>Green</b>: Power is good at flash module.</li> <li>• Off: There is no power at flash module.</li> </ul>
2	Status LED	<ul style="list-style-type: none"> <li>• Solid <b>Blue</b>: The status of flash module is good.</li> <li>• Blinking <b>Blue</b> and <b>Amber</b> Interlaced: Installing or removing the flash module.</li> <li>• Solid <b>Amber</b>: The flash module is failed or wrong PCIe connection speed.</li> </ul>
3	Attention Button	Used to prompt system that the flash module can be removed later.



**CAUTION:**

The flash module of Cache-to-Flash is hot swappable because it is a PCIe device. Before removing the flash module from the system chassis, you must press the attention button until the flash module status LED finished blinking. Otherwise, the flash module maybe damage. For more information about Cache-to-Flash modules, please refer to the chapter 3.5, [Installing the Optional Cache-to-Flash Modules](#) section and the chapter 6.5, [Removing the Cache-to-Flash Modules](#) section.

## 6. Quick Maintenance

---

This chapter provides quick maintenance and instruction of removing / installing FRU (Field Replaceable Unit) or optional components of all the XCubeSAN series models. All of the XCubeSAN models feature the HA design, any of the FRU components can be hot swapped and replaced with zero downtime in the rare event of a component failure. If you encounter any issues caused by FRU components while operating the XCubeSAN, please refer to related section and follow the quick troubleshooting procedures step by step.



**CAUTION:**

We recommend that all maintenance is carried out by a certified technician. Do not attempt to carry out any maintenance outside of those outlined in the following section of this guide. System damage due to incorrect maintenance or FRU replacement can affect your product warranty. If you are unsure of the problem related to your XCubeSAN series system, we strongly recommend you to contact or get help from QSAN support team:

- Via the Web: <https://qsan.com/support>
  - Via Telephone: +886-2-7720-2118 extension 136  
(Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
  - Via Skype Chat, Skype ID: qsan.support  
(Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
  - Via Email: [support@qsan.com](mailto:support@qsan.com)
- 

### 6.1. Removing / Installing the Controller Module

This section outlines how to check the status of your controller module and the procedure of removing / installing the controller module when encountering problems.

## Removing the Controller Module



### CAUTION:

- The controller module is heavy and fragile; please use both hands while installing, removing, or carrying the controller module. Recommended place for removing the controller module: the system is in a well secured rack or on a stable surface.
- For single controller model, the controller must be installed into slot 1 (the top slot of the system in rear view) and you must install the dummy controller cage provided for the empty slot to ensure the proper system cooling.

If you see the system health becomes **Controller Degraded** in the SANOS UI **Dashboard** -> **System Information** or the controller status LED shows solid **red** color, which means your controller module is encountering an issue or a hardware configuration mismatch (different memory size or different types of host cards are installed in the same slot number of different controllers) and need to be replaced immediately. You need to follow the procedures below to remove problematic controller module and install a healthy one.

System Information



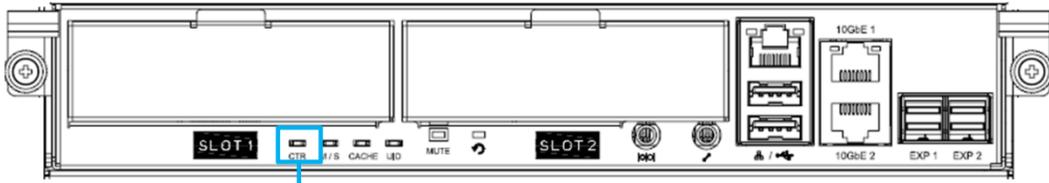
Item	Information
System Name	XS5216-D40000
Model Name	XS5216
Backplane ID	QW316
System Serial Number	QW3160160I0021001
Firmware Version	1.2.0
System Controller Status	Dual Controller, Active-Active
System Health	Controller Degraded



XS5216

[More...](#)

Figure 6-1 Warning Message of Failed Controller Module in the SANOS UI



If controller status LED shows solid red, it means the controller module encounters some sort of issues or hardware configuration mismatch.

Figure 6-2 Warning Message of Controller Module by the Status LED

- The following images illustrate mechanical components of the controller module.

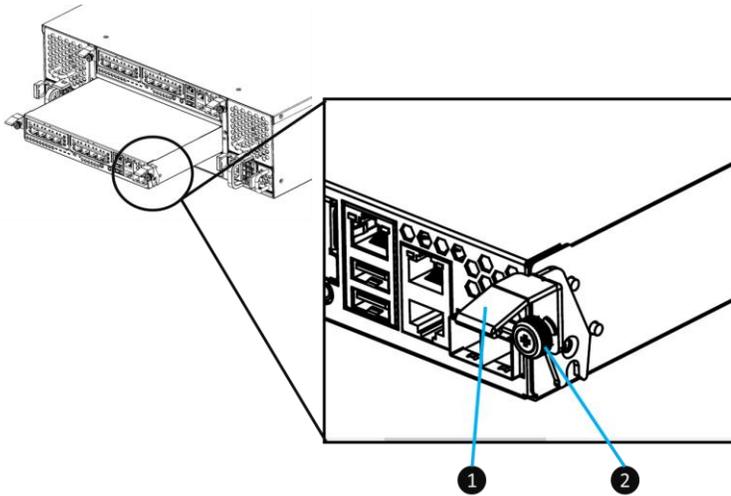


Figure 6-3 Mechanical Components of the Controller Module

Table 6-1 Mechanical Components of the Controller Module

Number	Description
1	Release Lever
2	Thumb Screw

The following are detailed steps for removing the controller module from the system chassis.

- Use a Phillips screwdriver to loosen the thumb screws on each release levers.
- Pull down both release levers at the same time and then pull out about half length of the controller module by holding two release levers.

- Use one hand to hold one end of the controller module (the side with release levers) and the other hand hold the bottom of the controller; pull out the controller module until it is free from the system chassis.

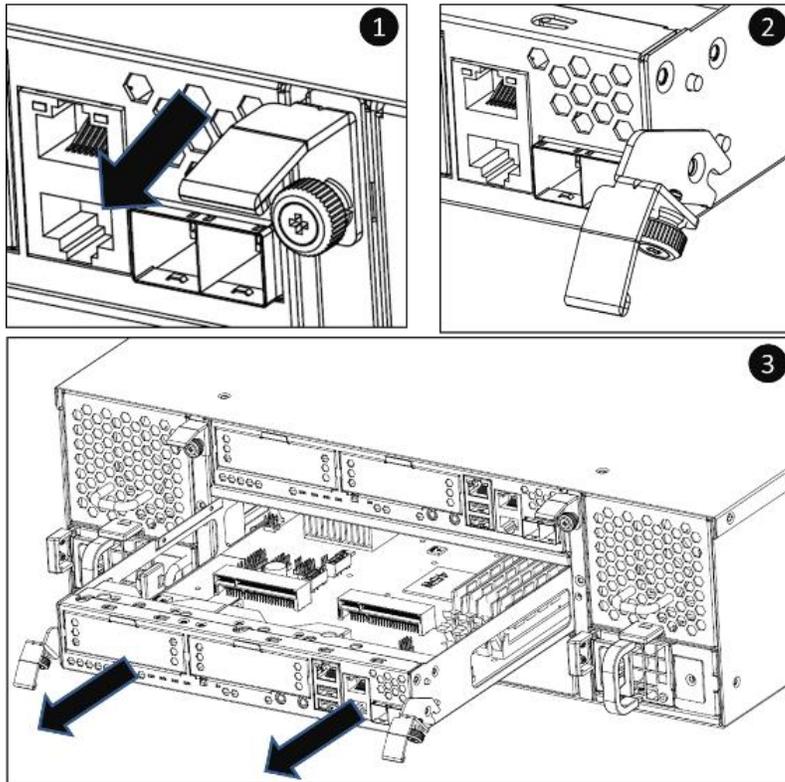


Figure 6-4 Procedures of Removing the Controller Module

### Installing the Controller Module

The following content and images are the detail steps of installing the controller module into the system chassis.

- Make sure the position of both release levers of the controller is at downward.
- Align and place the controller to the empty controller slot.
- Push the controller module all the way into the controller slot until the position of two release levers move upward automatically.
- Pull up both release levers at the same time until they totally parallel with the controller cage and then use a Phillips screw driver to tighten both screws.

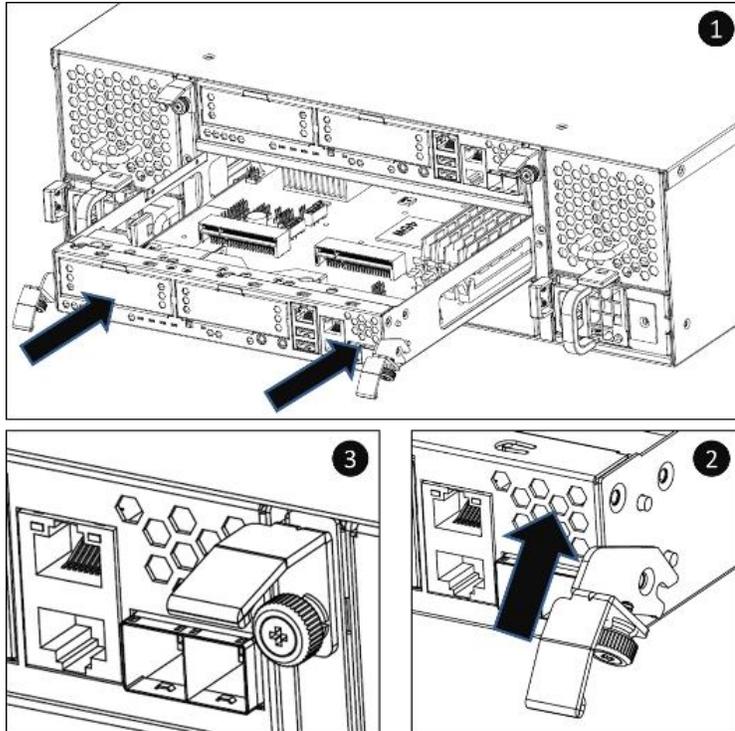


Figure 6-5 Detailed Procedures of the Controller Module installation

- After about 150 seconds from the time you have installed the controller module into the system chassis, the status LED will show solid green color if controller module is successfully installed, then the web UI will show figure 6-6: System Healthy is Good.

**System Information**



Item	Information
System Name	XS5216-D40000
Model Name	XS5216
Backplane ID	QW316
System Serial Number	QW3160160I0021001
Firmware Version	1.2.0
System Controller Status	Dual Controller, Active-Active
System Health	Good

[More...](#)

Figure 6-6 Screenshot of the Controller Module Successfully Installed in SANOS UI

## 6.2. Removing / Installing the Power Supply Unit

The standard XCubeSAN series system comes with two redundant PSUs (Power Supply Units) that allow users to hot swap it when one of the PSUs is not functioning.

All XCubeSAN models are fitted with the same PSU, but the installation direction came differ. Please refer to the following content for the PSU removal / installation guide.



### CAUTION:

The power supply unit is heavy and fragile; please use both hands while installing, removing, or carrying the controller module. Recommended place for removing the controller module: the system is in a well secured rack or on a stable surface.

If you see the “System Health” showing **PSU Fault**, or the PSU LED shows solid or blinking **amber** color which means your PSU has encountered an issue and need to be replaced immediately. You need to follow the procedure of how to remove problematic PSU module and install a healthy one.

System Information



Item	Information
System Name	XS5216-D40000
Model Name	XS5216
Backplane ID	QW316
System Serial Number	QW3160160I0021001
Firmware Version	1.2.0
System Controller Status	Dual Controller, Active-Active
System Health	<b>PSU Fault</b>

XS5216

[More...](#)

Figure 6-7 Warning Message of Failed PSU in SANOS UI

### Removing the Power Supply Unit

The images and the table below provide description of mechanical components of the PSU. Please note that the PSU installed in 4U/3U or 2U system chassis are the same but the installation direction is different (If you pull out the PSU from the system chassis, for 4U/3U

systems, the sticker on the PSU will be facing downwards; for 2U system, the sticker will be on the right hand side). Please be sure to use the correct installation direction of the PSU to prevent any potential damage by improper installation.

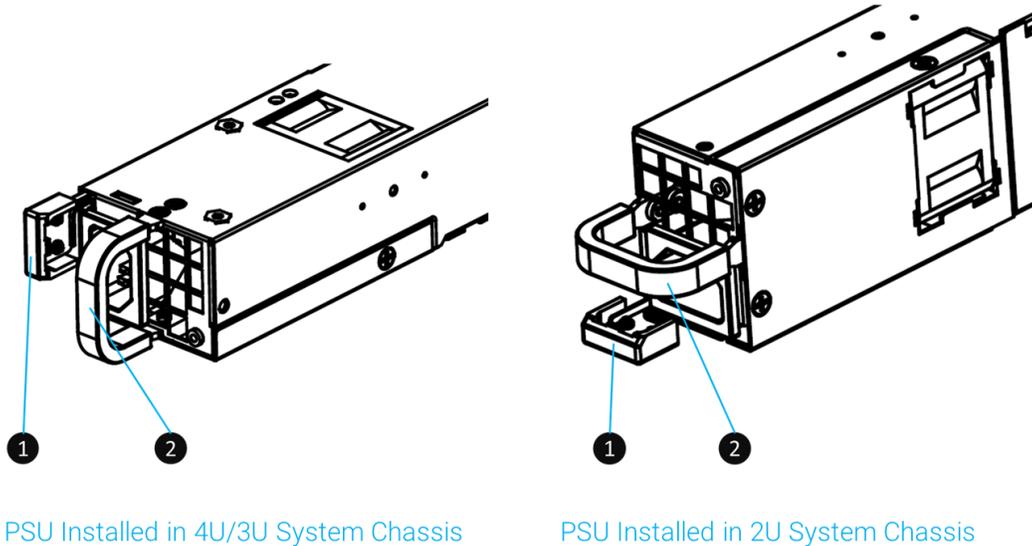


Figure 6-8 Mechanical Components of the PSU

Table 6-2 Mechanical Components of the PSU

Number	Description
1	PSU Release Tab
2	PSU Handle

Before removing the PSU, disconnect the power cord from the wall outlet; then remove the other end that is connected to the PSU.

The following are detailed steps of removing a PSU from the system chassis.

- Hold the PSU handle first, and then press the release tab.
- Pull out the power supply about half of the total PSU length.
- Use one hand to hold one end of the PSU (the side with release tab) and the other hand hold the bottom of the power supply unit; pull out the power supply unit until it is free from the system chassis.

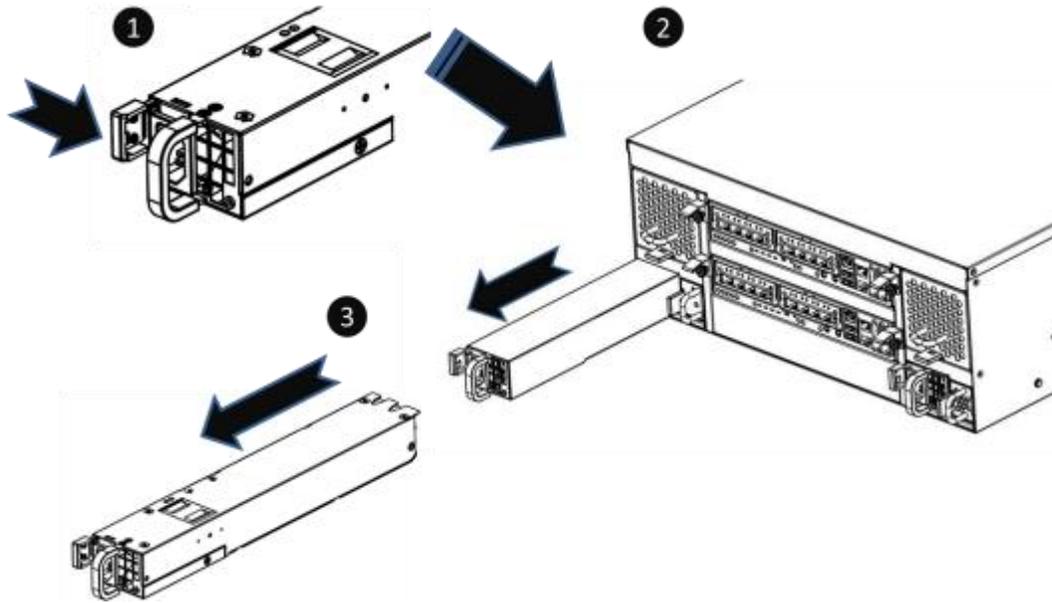


Figure 6-9 Procedures of Removing the Power Supply Unit

### Installing the Power Supply Unit

The following are detailed steps of installing the PSU into the system chassis.

- Use one hand to hold one end of the power supply unit (the side with release tab and handle) and the other hand hold the bottom of the power supply unit; then align the PSU with the empty PSU slot.
- Push the PSU all the way into the empty slot until you hear the “click” sound from the release tab.

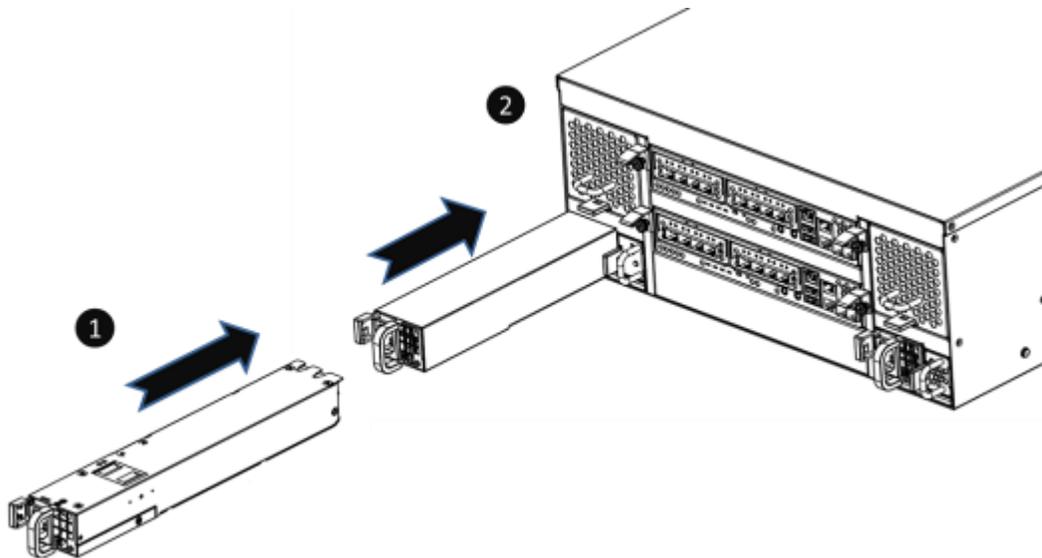


Figure 6-10 Installing the Power Supply Unit in the System Chassis

If the PSU is successfully installed, the status LED will show solid green color (if no other malfunction is encountered), then web UI will show Figure 6-11: System Health is **Good** and no warning message on the upper right side of the SANOS UI.

**System Information**



Item	Information
System Name	XS5216-D40000
Model Name	XS5216
Backplane ID	QW316
System Serial Number	QW3160160I0021001
Firmware Version	1.2.0
System Controller Status	Dual Controller, Active-Active
System Health	<b>Good</b>

XS5216

[More...](#)

Figure 6-11 Screenshot of the PSU Successfully Installed in the SANOS UI

### 6.3. Removing / Installing the Fan Module

The standard XCubeSAN system comes with two redundant fan modules that allow you to hot swap it when one of the fan modules encounters an issue. In the event that the fan module fails, it can be hot-swapped. The XCubeSAN series utilizes two types of fan module

for 4U/3U and 2U system chassis. Please refer to the following information for the fan module removing / installing procedures.



**CAUTION:**

The fan module is heavy; please use both hands while removing, holding, or carrying the fan module. The fan module is hot swappable, but power off the system to do the fan module installing or removing is highly recommended. Recommended place for installing / removing a fan module: the system is on the well secured rack or onto stable surface.

If you see the System Health showing **Fan Fault**, that means your fan module has encountered an issue and needs to be immediately replaced. You need to follow the procedures below to remove problematic fan module and install a healthy one.

System Information



Item	Information
System Name	XS5216-D40000
Model Name	XS5216
Backplane ID	QW316
System Serial Number	QW3160160I0021001
Firmware Version	1.2.0
System Controller Status	Dual Controller, Active-Active
System Health	<b>Fan Fault</b>

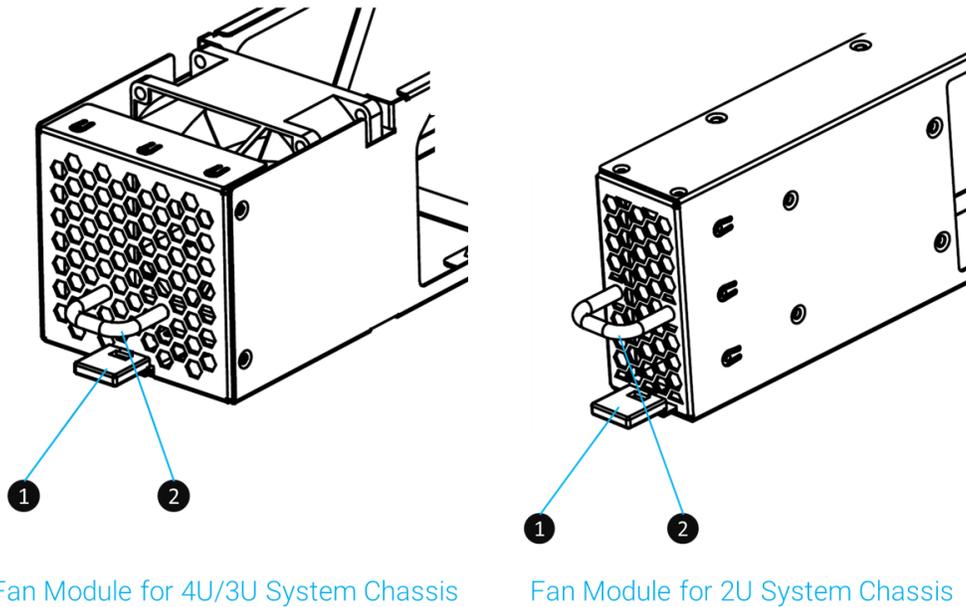
XS5216

[More...](#)

Figure 6-12 Warning Message of Failed Fan Module in the SANOS UI

### Removing the Fan Module

Figures below are fan modules for 4U/3U or 2U system chassis.



Fan Module for 4U/3U System Chassis

Fan Module for 2U System Chassis

Figure 6-13 Mechanical Components of the Fan Module

Table 6-3 Mechanical Components of the Fan Module

Number	Description
1	The Fan Module Release Tab
2	The Fan Module Handle

The following details the steps of removing the fan module from the system chassis.

- Hold the fan module handle first, and then press the release tab.
- Pull out the fan module around half of the total fan module length.
- Use one hand to hold one end of the fan module (the side with release tab and handle) and the other hand hold the bottom of the module; pull out the module until it is free from the system chassis.

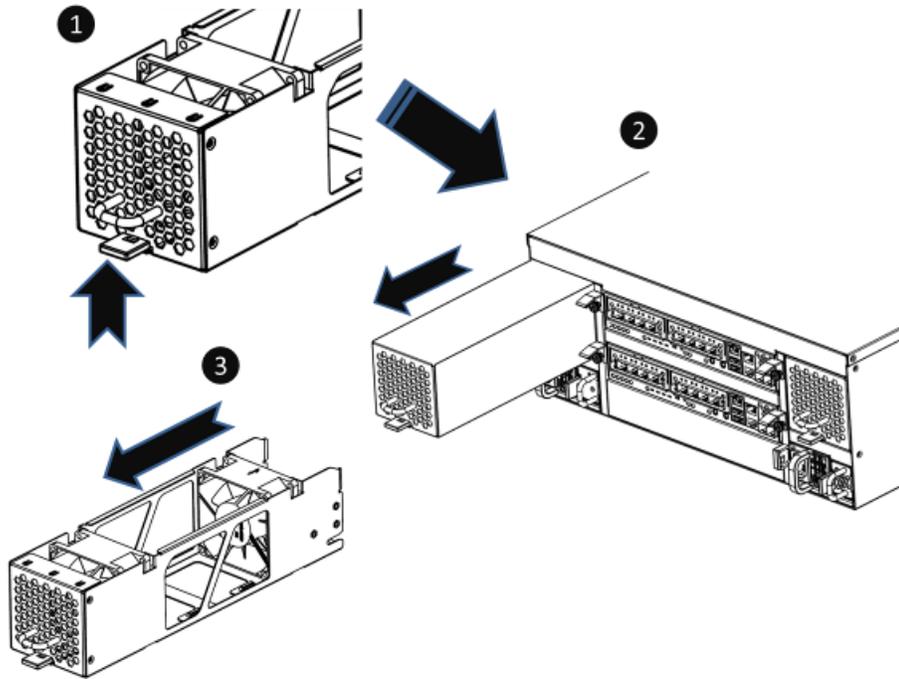


Figure 6-14 Procedures of Removing the Fan Module

### Installing the Fan Module

The following details the steps of installing the fan module into the system chassis.

- Use one hand to hold one end of the fan module (the side with release tab and handle) and the other hand hold the bottom of the module; then align it with the empty slot. Installation direction of LFF and SFF systems is the same.
- Push the fan module all the way into the empty slot until hear the “click” sound from the release tab.

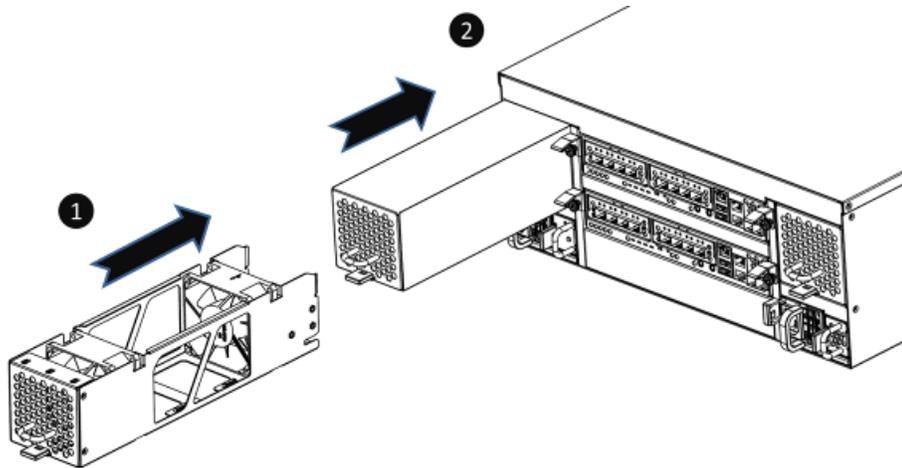


Figure 6-15 Procedures of Installing the Fan Module

If the fan module is successfully installed, the SANOS UI -> **DASHBOARD** -> **System Information** will show as figure 6-16: System Health is **Good** and no warning message on the upper right side of the SANOS UI.

**System Information**



Item	Information
System Name	XS5216-D40000
Model Name	XS5216
Backplane ID	QW316
System Serial Number	QW3160160I0021001
Firmware Version	1.2.0
System Controller Status	Dual Controller, Active-Active
System Health	<b>Good</b>

XS5216

More...

Figure 6-16 Screenshot of the Fan Module Successfully Installed in the SANOS UI

## 6.4. Removing the Host Card

If you encounter data connection problems from the host's side but you don't know which port or which host card is with problem, please go to SANOS UI -> **HOST CONNECTIVITY** -> **Overview**, it will show all host cards you have installed. If the host card has fault, all of the ports will have a fault and will show as **Down**.

The following figure is the example of one port failed of the 10GbE iSCSI host card.

Controller 1			
Location	Name	Status	MAC Address/WWPN
Onboard	LAN1 (10Gb)	10 Gb/s	00:13:78:d3:02:72
Onboard	LAN2 (10Gb)	10 Gb/s	00:13:78:d3:02:73
Slot1	LAN1 (10Gb)	10 Gb/s	00:13:78:d3:02:74
Slot1	LAN2 (10Gb)	10 Gb/s	00:13:78:d3:02:75
Slot1	LAN3 (10Gb)	10 Gb/s	00:13:78:d3:02:76
Slot1	LAN4 (10Gb)	Down	00:13:78:d3:02:77
Slot2	LAN1 (1Gb)	1 Gb/s	00:13:78:d3:02:78
Slot2	LAN2 (1Gb)	1 Gb/s	00:13:78:d3:02:79
Slot2	LAN3 (1Gb)	1 Gb/s	00:13:78:d3:02:7a
Slot2	LAN4 (1Gb)	1 Gb/s	00:13:78:d3:02:7b

Figure 6-17 Example of a Failed Port on the 10GbE iSCSI Host Card

The following content and images are detailed steps of removing a host card from the system.

- Remove the controller module first. For detailed steps of removing a controller module; please refer to the chapter 6.1, [Removing / Installing the Controller Module](#) section.
- Press the host card release button and disconnect the host card with the connector in the controller cage.
- Pull the host card out until it is free from the controller cage.
- Install the substitute host card. The detailed steps of installing a host card; please refer to the chapter 3.3, [Installing the Optional Host Cards](#) section.
- Install the dummy host card cage in the empty host card slot and tighten two screws.
- Repeat the procedures above if there are other host cards need to be removed.
- To ensure the system cooling, please install all dummy host adapter card cages if host cards are removed.

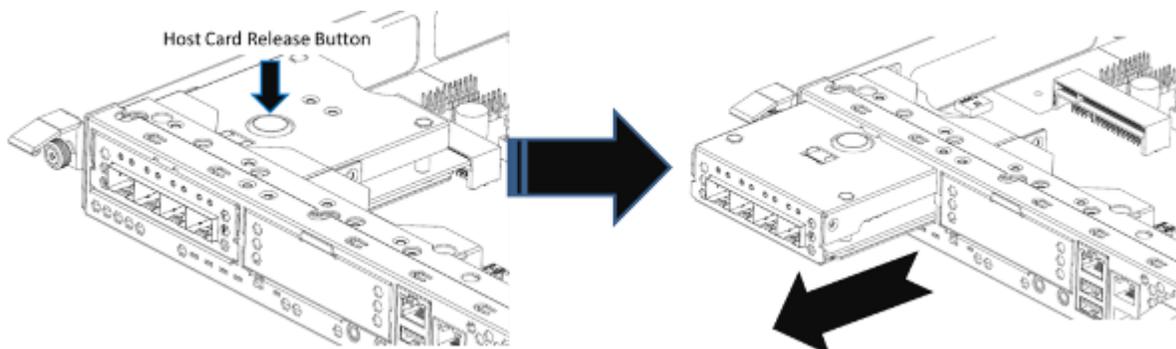


Figure 6-18 Procedures of Removing the Host Card from the Controller Cage

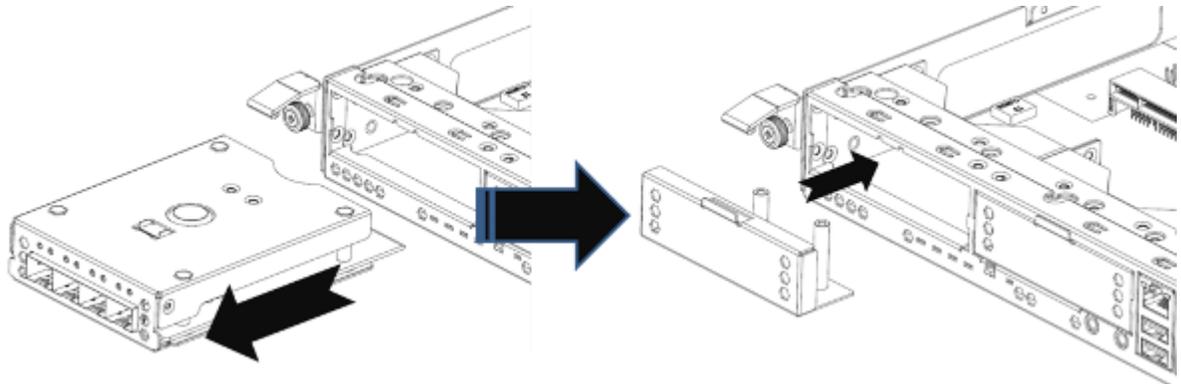


Figure 6-19 Procedures of Pull out the Host Card and Install Dummy Host Card Cage

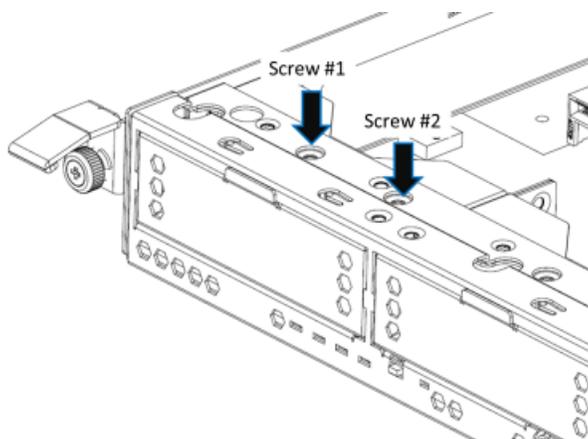


Figure 6-20 The Finished Installed Dummy Host Card Cage

## 6.5. Removing the Cache-to-Flash Modules

Navigate to the SANOS UI -> **SYSTEM SETTINGS** -> **Power** -> **Cache to Flash** and view the status of the power module or flash module. If it shows **Failed**, that means your power module or flash is not functioning correctly and can't provide real time data protection anymore. You may need to replace the power module or flash to ensure continued protection. The following figure is the example of a failed flash module.

Power Module	
Item	Information
Status	Failed
Type	BBM
Power Level	100%
Temperature	+32.0(C)

Flash Module	
Item	Information
Status	Good

Figure 6-21 Example of a Failed Power Module

Power Module	
Item	Information
Status	Good
Type	BBM
Power Level	100%
Temperature	+32.0(C)

Flash Module	
Item	Information
Status	Failed

Figure 6-22 Example of a Failed Flash Module



**CAUTION:**

The flash module of Cache-to-Flash is hot swappable because it is a PCIe device. Before removing the flash module from the system chassis, you must press the attention button until the flash module status LED finished blinking. Otherwise, the flash module maybe damage. For more information about Cache-to-Flash modules, please refer to the chapter 3.5, [Installing the Optional Cache-to-Flash Modules](#) section and the chapter 5.2.4, [Cache-to-Flash Module LEDs and Button](#) section.

The following content and image are detail steps of removing the flash module.

- Press the attention button of flash module until the flash module status LED is blinking. After blinking for a while, the LED will light off. At this point, you can safely remove the flash module.

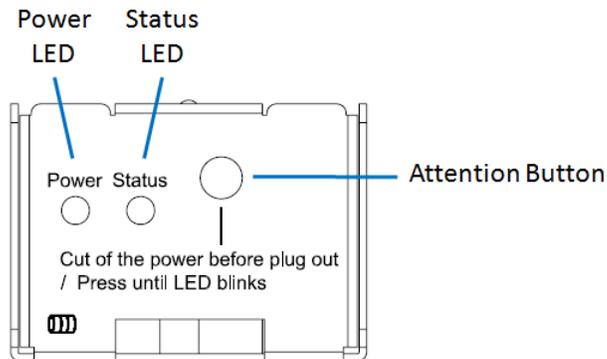


Figure 6-23 Pressing Attention Button of the Flash Module

- Press the release button of flash module and pull it out until it is free from system chassis.
- Install the substitute flash module. The detailed steps of installing the flash module, please refer to the chapter 3.5, [Installing the Optional Cache-to-Flash Modules](#) section.
- Install the dummy cache-to-flash cage and then use a Phillips screw driver to tighten it.

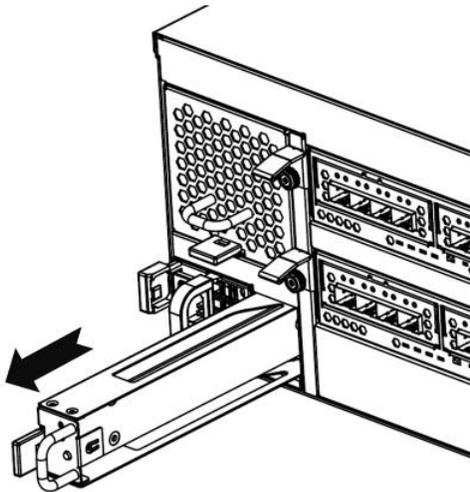


Figure 6-24 The Procedure of Removing the Flash Module from the System Chassis

The following content and image are detail steps of removing the power module.

- Press the release button of power module and pull it out until it is free from system chassis.
- Install the dummy cache-to-flash cage and then use a Phillips screw driver to tighten it.
- To ensure proper cooling of the system, please install all dummy cache-to-flash module cages if the flash or power module is removed.

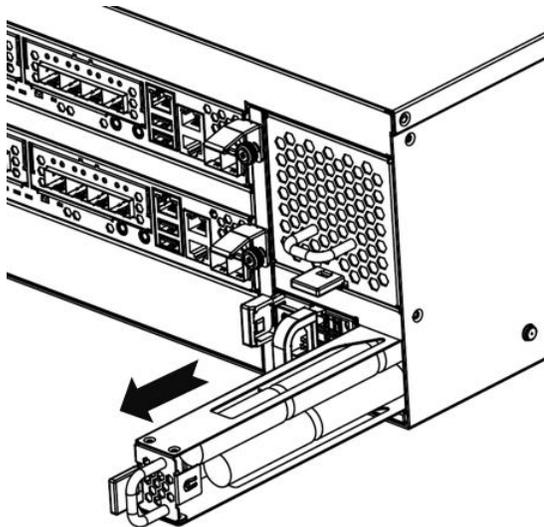


Figure 6-25 The Procedure of Removing the Power Module from the System Chassis

## 7. Support and Other Resources

---

### 7.1. Getting Technical Support

After installing your device, locate the serial number on the sticker located on the side of the chassis or from the SANOS UI -> **MAINTINANCE** > **System Information** and use it to register your product at [https://www.qsan.com/business\\_partnership](https://www.qsan.com/business_partnership). We recommend registering your product in QSAN partner website for firmware updates, document download, and latest news in eDM. To contact QSAN Support, please use the following information.

- Via the Web: [https://www.qsan.com/technical\\_support](https://www.qsan.com/technical_support)
- Via Telephone: +886-2-7720-2118 extension 136  
(Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
- Via Skype Chat, Skype ID: qsan.support  
(Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
- Via Email: [support@qsan.com](mailto:support@qsan.com)

#### Information to Collect

- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages or capture screenshots
- Product-specific reports and logs
- Add-on products or components installed
- Third-party products or components installed

#### Information for Technical Support

The following system information is necessary for technical support, please refer to following for what and where to get the information of your XCubeSAN series model.

If the technical support requests you to download the Service Package, please navigate in the SANOS UI -> **SYSTEM SETTING** -> **Maintenance** -> **System Information**, and then click the **Download Service Package** button to download. Then the system will automatically generate a zip file the default download location of your web browser.

System	
Item	Information
System Name	XS5216-D40000
Model Name	XS5216
System Serial Number	QW3160160I0021001
System Controller Status	Dual Controller, Active-Active
Master Controller	Controller 1

Controller 1	
Item	Information
Controller Serial Number	50013780080A0440
CPU	Intel(R) Xeon(R) Processor D-1500 4 Cores
Memory	8 GB
Host Card Slot 1	Empty
Host Card Slot 2	Empty
Firmware Version	1.2.0
SAS IOC Firmware Version	07.00.01.00
SAS Expander Firmware Version	1000

Controller 2	
Item	Information
Controller Serial Number	50013780080A0380
CPU	Intel(R) Xeon(R) Processor D-1500 4 Cores
Memory	8 GB
Host Card Slot 1	Empty
Host Card Slot 2	Empty
Firmware Version	1.2.0
SAS IOC Firmware Version	07.00.01.00
SAS Expander Firmware Version	1000

Backplane	
Item	Information
Backplane Serial Number	001378D40000
Backplane ID	QW316
MCU Version	1.2.0

Licenses	
Item	Information
SSD Cache	Enabled
Auto Tiering	Enabled

[Download Service Package](#)

Figure 7-1 Download Service Package in the SANOS UI

## 7.2. Online Customer Support

For better customer support, every XCubeSAN series models include the console cable (two for dual controller models), one for single controller models) for online support. Please follow the procedures below to setup the online help environment for QSAN support team.

The following procedure will help you to setup the serial console via the console cable that is enclosed in the shipping carton. The following image is the appearance of the console cable.



Figure 7-2 Appearance of a Console Cable

### Procedures to Setup the Serial Console

1. Setup the serial cable between the controller and one server/host like in the below image.

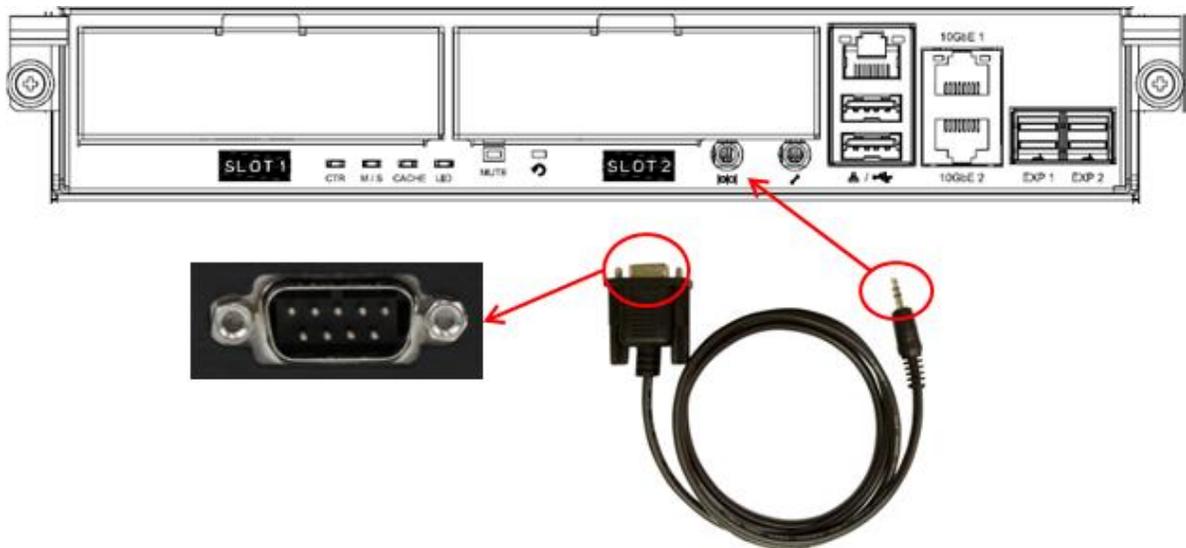


Figure 7-3 Connect the Console Cable

- You must use terminal software such as HyperTerminal or Putty to open the console after the connection is made.



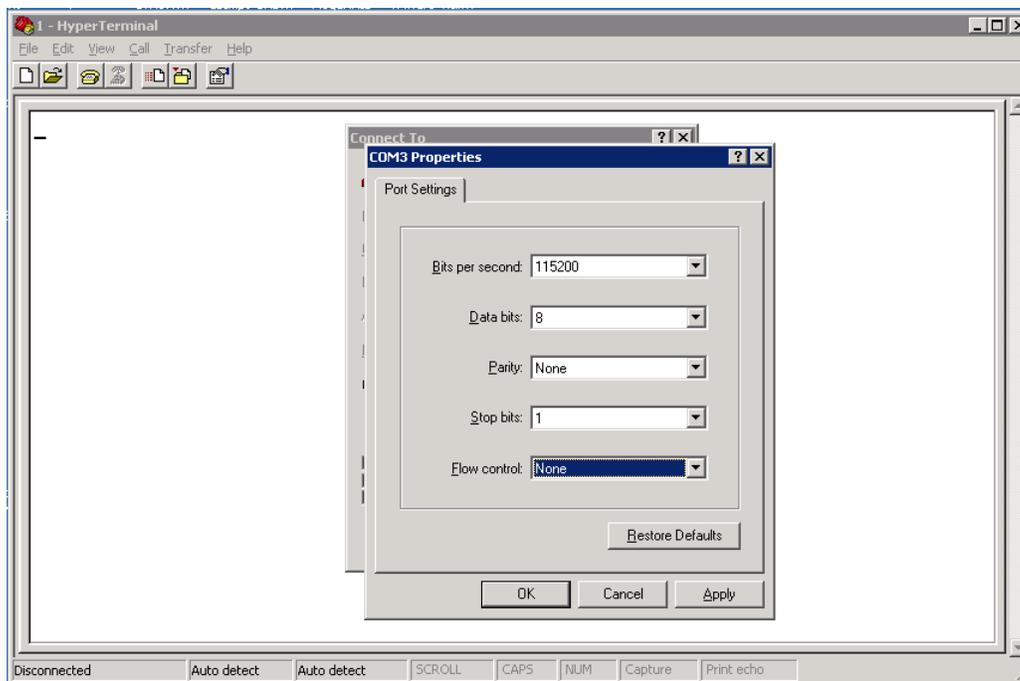
**INFORMATION:**

For more information about terminal software, please refer to

HyperTerminal: <http://www.hilgraeve.com/hyperterminal/>

PuTTY: <http://www.putty.org/>

- Here we first demonstrate HyperTerminal. The console settings are on the following.  
 Baud rate: 115200, 8 data bit, no parity, 1 stop bit, and no flow control  
 Terminal type: vt100



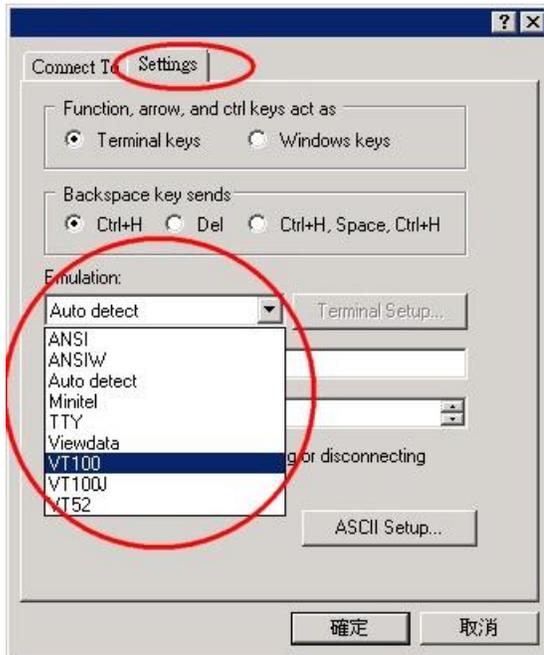
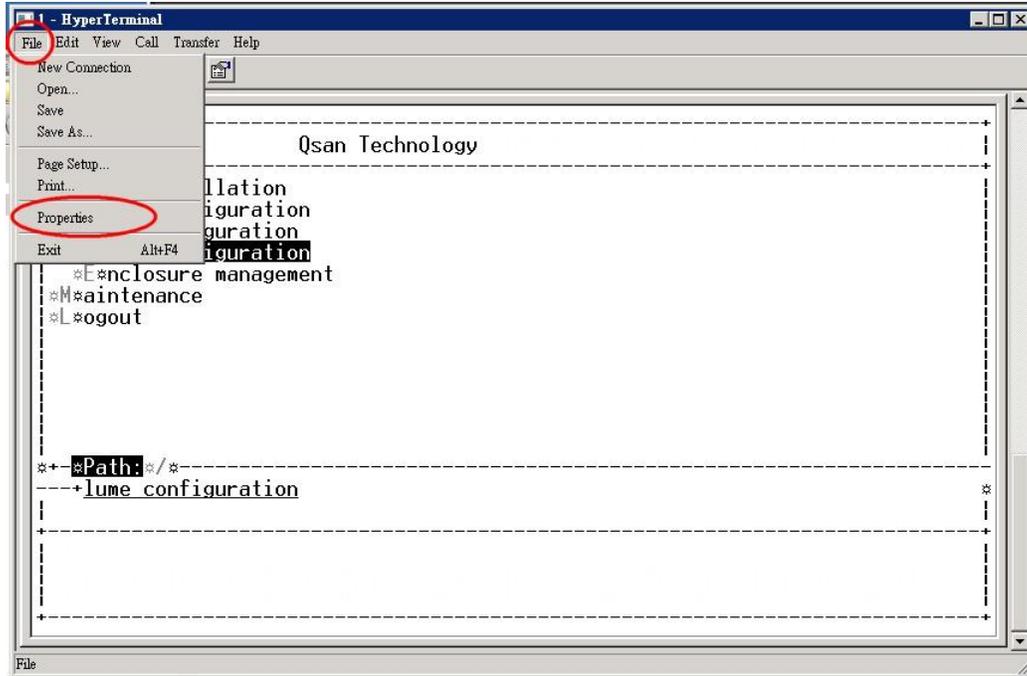
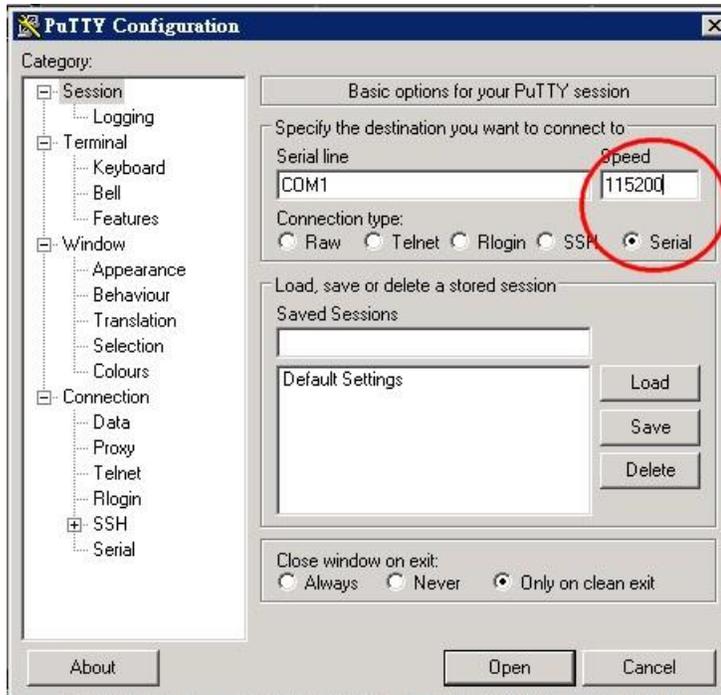


Figure 7-4 The Procedures of Setup Serial Console by HyperTerminal

4. If you are using PuTTY instead, please refer to below



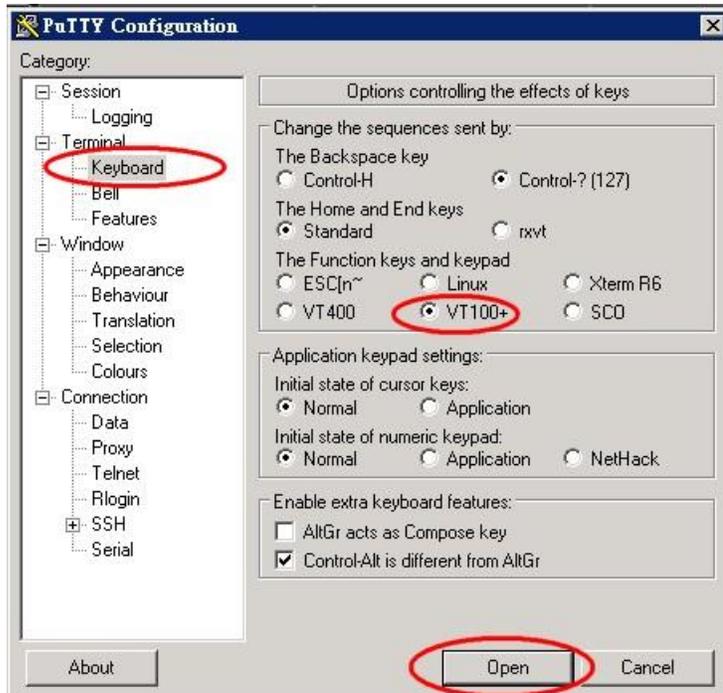


Figure 7-5 The Procedures of Setup Serial Console by PuTTY

5. Users should be able to login the controller system via console cable by following the procedures above.

### Setup the Connection for Online Support

Following is the procedure to setup the connection for online support via TeamViewer:

1. Please download the TeamViewer from following hyper link:  
<https://www.teamviewer.com/en/download/>
2. Install TeamViewer.
3. Please provide the ID/password showed on the application to QSAN support team member to join the online support session.

## 7.3. Accessing Product Updates

To download product updates, please visit QSAN website:

[https://www.qsan.com/download\\_center](https://www.qsan.com/download_center)

## 7.4. Documentation Feedback

QSAN is committed to providing documentation that meets and exceeds your expectations. To help us improve the documentation, email any errors, suggestions, or comments to [docsfeedback@qsan.com](mailto:docsfeedback@qsan.com).

When submitting your feedback, include the document title, part number, revision, and publication date located on the front cover of the document.

## Appendix

---

### End-User License Agreement (EULA)

Please read this document carefully before you use our product or open the package containing our product.

YOU AGREE TO ACCEPT TERMS OF THIS EULA BY USING OUR PRODUCT, OPENING THE PACKAGE CONTAINING OUR PRODUCT OR INSTALLING THE SOFTWARE INTO OUR PRODUCT. IF YOU DO NOT AGREE TO TERMS OF THIS EULA, YOU MAY RETURN THE PRODUCT TO THE RESELLER WHERE YOU PURCHASED IT FOR A REFUND IN ACCORDANCE WITH THE RESELLER'S APPLICABLE RETURN POLICY.

#### **General**

QSAN Technology, Inc. ("QSAN") is willing to grant you ("User") a license of software, firmware and/or other product sold, manufactured or offered by QSAN ("the Product") pursuant to this EULA.

#### **License Grant**

QSAN grants to User a personal, non-exclusive, non-transferable, non-distributable, non-assignable, non-sub-licensable license to install and use the Product pursuant to the terms of this EULA. Any right beyond this EULA will not be granted.

#### **Intellectual Property Right**

Intellectual property rights relative to the Product are the property of QSAN or its licensor(s). User will not acquire any intellectual property by this EULA.

#### **License Limitations**

User may not, and may not authorize or permit any third party to: (a) use the Product for any purpose other than in connection with the Product or in a manner inconsistent with the design or documentations of the Product; (b) license, distribute, lease, rent, lend, transfer, assign or otherwise dispose of the Product or use the Product in any commercial hosted or service bureau environment; (c) reverse engineer, decompile, disassemble or attempt to discover the source code for or any trade secrets related to the Product, except and only to

the extent that such activity is expressly permitted by applicable law notwithstanding this limitation; (d) adapt, modify, alter, translate or create any derivative works of the Licensed Software; (e) remove, alter or obscure any copyright notice or other proprietary rights notice on the Product; or (f) circumvent or attempt to circumvent any methods employed by QSAN to control access to the components, features or functions of the Product.

### **Disclaimer**

QSAN DISCLAIMS ALL WARRANTIES OF PRODUCT, INCLUDING BUT NOT LIMITED TO ANY MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, WORKMANLIKE EFFORT, TITLE, AND NON-INFRINGEMENT. ALL PRODUCTS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND. QSAN MAKES NO WARRANTY THAT THE PRODUCT WILL BE FREE OF BUGS, ERRORS, VIRUSES OR OTHER DEFECTS.

IN NO EVENT WILL QSAN BE LIABLE FOR THE COST OF COVER OR FOR ANY DIRECT, INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, CONSEQUENTIAL OR SIMILAR DAMAGES OR LIABILITIES WHATSOEVER (INCLUDING, BUT NOT LIMITED TO LOSS OF DATA, INFORMATION, REVENUE, PROFIT OR BUSINESS) ARISING OUT OF OR RELATING TO THE USE OR INABILITY TO USE THE PRODUCT OR OTHERWISE UNDER OR IN CONNECTION WITH THIS EULA OR THE PRODUCT, WHETHER BASED ON CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHER THEORY EVEN IF QSAN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

### **Limitation of Liability**

IN ANY CASE, QSAN'S LIABILITY ARISING OUT OF OR IN CONNECTION WITH THIS EULA OR THE PRODUCT WILL BE LIMITED TO THE TOTAL AMOUNT ACTUALLY AND ORIGINALLY PAID BY CUSTOMER FOR THE PRODUCT. The foregoing Disclaimer and Limitation of Liability will apply to the maximum extent permitted by applicable law. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the exclusions and limitations set forth above may not apply.

### **Termination**

If User breaches any of its obligations under this EULA, QSAN may terminate this EULA and take remedies available to QSAN immediately.

### **Miscellaneous**

- QSAN reserves the right to modify this EULA.
- QSAN reserves the right to renew the software or firmware anytime.

- QSAN may assign its rights and obligations under this EULA to any third party without condition.
- This EULA will be binding upon and will inure to User's successors and permitted assigns.
- This EULA shall be governed by and constructed according to the laws of R.O.C. Any disputes arising from or in connection with this EULA, User agree to submit to the jurisdiction of Taiwan Shilin district court as first instance trial.