Fujitsu 3.2 TB Flash Accelerator Card User's Guide

For Product Models 7119601 and 7119603

C120-0067-01EN

Preface

This document describes the Fujitsu 3.2 TB Flash Accelerator Card for product models 7119601 and 7119603, which may be mounted on the Oracle or Fujitsu SPARC M12/M10 system.
Before you read this document, we recommend reading the *Fujitsu SPARC M12 Quick Guide* or *Fujitsu M10/SPARC M10 Systems Quick Guide*.
Fujitsu SPARC M12 is sold as SPARC M12 by Fujitsu in Japan.
Fujitsu SPARC M12 and SPARC M12 are identical products.
Fujitsu M10 is sold as SPARC M10 by Fujitsu in Japan.
Fujitsu M10 and SPARC M10 are identical products.
The preface includes the following sections:

Using the Product Safely

Handling of This Manual

This manual contains important information necessary for using this product safely. Read this manual and the manuals described in "Related Manuals" thoroughly before using the product. In particular, before attempting to use the product, carefully read and understand the safety precautions described in these various manuals.
Keep this manual in a safe and convenient location for quick reference.
Fujitsu makes every effort to prevent injury to users and bystanders as well as property damage. Be sure to use the product in accordance with the instructions in this manual.

Product Notice

This product is designed and manufactured for use in standard applications such as office work, personal devices, and general industrial use. This product is not intended for special uses (nuclear-reactor control in atomic energy facilities, aeronautic and space systems, air traffic control, operation control in mass transit systems, life support, or missile launch controls) where particularly high reliability requirements exist, where the pertinent levels of safety are not guaranteed, or where a failure, an operational error, or some other factor could be life-threatening or cause a physical injury (referred to below as "high-risk" use). Customers considering the use of this product for high-risk applications must have safety-assurance measures in place beforehand. Moreover, they are requested to consult our sales representative before embarking on such specialized use.

Security Export Control

Exportation/release of this document may require necessary procedures in accordance with the regulations of the Foreign Exchange and Foreign Trade Control Law of Japan and/or US export control laws.

FCC Class B Notice

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.
2. This device must accept any interference received, including interference that may cause undesired operation.

Note - This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

FCC WARNING - Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

ICES-003 Class B Notice - Avis NMB-003, Classe B

CAN ICES-3 (B) / NMB-3 (B)

Korean Class B Notice

This equipment is home use electromagnetic wave suitability equipment and to be used mainly at home and it can be used in all areas.
이기기는가정용전자파적합기기로서주로가정에서사용하는것을목적으로하며, 모든지역에서사용할수있습니다.

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- Trademark indications (TM, (R)) are omitted for some system and product names in this document.

Organization and Contents of This Manual

This document consists of the following chapters and appendixes.

This chapter provides information on installing the Fujitsu 3.2 TB Flash Accelerator Card.

Chapter 3 Fujitsu 3.2 TB Flash Accelerator Card Settings

This chapter describes how to configure the Fujitsu 3.2 TB Flash Accelerator Card.

Appendix A Precautions and Restrictions

This appendix describes precautions and restrictions on the Fujitsu 3.2 TB Flash Accelerator Card.

Appendix B Specifications

This appendix shows the specifications of the Fujitsu 3.2 TB Flash Accelerator Card.

Appendix C Environmental Information

This appendix provides environmental information on the Fujitsu 3.2 TB Flash Accelerator Card.

Related Manuals

All documents for your server are available online at the following locations.

- Sun Oracle software-related documents (Oracle Solaris, etc.)

  http://docs.oracle.com/en/

- Fujitsu documents

  Global site
  http://www.fujitsu.com/global/products/computing/servers/unix/sparc/downloads/manuals/
  Japanese site
  http://www.fujitsu.com/jp/products/computing/servers/unix/sparc/downloads/manual/

Text Conventions

- Abbreviation for Oracle Solaris

  Oracle Solaris may be abbreviated as "OS" in this document.

- Prompts in command examples

  In command examples, the environment or privilege for the operation is distinguished by the displayed prompt. The following table shows the relationship between prompts and environments/privileges for operations.

Prompt	Environment/Privilege for Operation
{0} ok	OpenBoot PROM
XSCF>	XSCF shell
$	General user shell for OS
#	Superuser shell for OS

Warning/Importance Indications

This manual uses the following indications to provide warnings and indicate useful information to the user to prevent personal injury and property damage.

WARNING

Warning – Indicates a hazardous situation that could result in death or injury if the product is not used properly (a potentially dangerous situation).

CAUTION

Caution – Indicates a hazardous situation that could result in minor or moderate personal injury and/or property damage, such as to the product itself or the user's property, if the product is not used properly.

Warning Indications in the Text

Warning markings are followed by warning messages. A warning message is indented on the left and right sides to distinguish it from regular text. Furthermore, the lines immediately before and after a warning indication are left blank.

WARNING

Ask a certified service engineer or our sales representative to perform the following tasks for this product and the optional products provided by Fujitsu. The work must not be done by the customer under any circumstances. Otherwise, electric shock, injury, or fire may result.

- New installation/relocation of the device
- Device inspection/repair

Document Feedback

Please inform us of any comments or requests you may have about this document by contacting us at the following URL with the manual number, manual title, page numbers, and specific details:

- Global site

  http://www.fujitsu.com/global/contact/

- Japanese site

  http://www.fujitsu.com/jp/products/computing/servers/unix/sparc/contact/

Revision History

Edition	Date	Changed Location (Change Classification) (*1)	Description of Change
01	April 10, 2018	-	First edition

*1 The number/title of a changed chapter/section is the one in the latest version. However, the number/title of a chapter/section with an asterisk is the one in the old version.

Product Handling Precautions

Maintenance

⚠WARNING

Ask a certified service engineer or our sales representative to perform the following tasks for this product and the optional products provided by Fujitsu. The work must not be done by the customer under any circumstances. Otherwise, electric shock, injury, or fire may result.

- New installation/relocation of the device
- Device inspection/repair

Modifying or Recycling the Product

⚠CAUTION

Modifying this product or recycling and using a secondhand product may result in personal injury to users and/or bystanders or damage to the product and/or other property.

Disposal or Recycling of Products at the End of Their Life Cycles

Waste must be disposed of in a professional and responsible manner in accordance with environmental regulations. For details, please contact your nearest environmental authority or our sales representative.

Replacement Work Personnel

⚠WARNING

Only certified service engineers should perform replacement work. The work must not be done by the customer under any circumstances.
Otherwise, electric shock, injury, or fire may result.

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Chapter 1 Overview

This chapter provides an overview of the Fujitsu 3.2 TB Flash Accelerator Card.

1.1 Product and Model Names

Table 1-1 lists the product and model names of the Fujitsu 3.2 TB Flash Accelerator Card.

Table 1-1 Product and Model Names

Item	Description
Product name	Fujitsu 3.2 TB Flash Accelerator Card
Model name	7119601 (ATO), 7119603 (X-option)

1.2 Components

Table 1-2 lists the components of the Fujitsu 3.2 TB Flash Accelerator Card.

Table 1-2 Components

Name	Quantity	Details
Fujitsu 3.2 TB Flash Accelerator Card	1	Mounted on a low-profile bracket.
Access to manuals for peripherals （CA92001-4965）	1	Written as a leaflet containing the URL for manuals.
Antistatic wrist strap	1	

1.3 Appearance

Figure 1-1 shows the appearance of the Fujitsu 3.2 TB Flash Accelerator Card.

Figure 1-1 Appearance of the Fujitsu 3.2 TB Flash Accelerator Card

1.4 Functions

The Fujitsu 3.2 TB Flash Accelerator Card provides the following functionality.

- Through the adoption of the NVMe protocol, the card achieves higher-speed throughput compared with conventional disk-based drive technologies.
- The memory is 3.2 TB Triple Level Cell (TLC) flash. The OS recognizes it as one 3.2 TB disk.
- System performance can improve significantly when the card is used for:
  - a large-capacity read cache for databases, in combination with the Database Smart Flash Cache function of Oracle Database Enterprise Edition
  - a large-capacity read/write cache for ZFS file systems
- The card can be used as the system boot drive.
- Error monitoring and failure sign monitoring are possible with a standard tool of the OS.
- The card is a suitable product for enterprises since a life of 5 DWPD x 5 years is guaranteed.

1.5 Control Driver

The nvme driver is bundled with the Oracle Solaris.

1.6 Operating Environment

Table 1-3 shows the operating environment of the Fujitsu 3.2 TB Flash Accelerator Card.

Table 1-3 Operating Environment

Configuration	Details
Mounting server	- SPARC M12-1, SPARC M12-2, SPARC M12-2S - SPARC M10-1, SPARC M10-4, SPARC M10-4S - PCI expansion unit For the maximum number of mounted cards on each server, see the *Fujitsu SPARC M12 PCI Card Installation Guide* or the *Fujitsu M10/SPARC M10 Systems PCI Card Installation Guide*.
Supported OS version	Oracle Solaris 11.3 SRU 11.3.28.4.0 or later
Supported XCP version	- SPARC M12-1: XCP 3030 or later - SPARC M12-2 and SPARC M12-2S: XCP 3021 or later - SPARC M10: XCP 2320 or later
Card firmware version	GPNA5B3Q or later

1.7 Status Indicators

Figure 1-2 shows the indicators that indicate the status of the Fujitsu 3.2 TB Flash Accelerator Card.

Figure 1-2 Status Indicators

Table 1-4 lists the status of the Fujitsu 3.2 TB Flash Accelerator Card as shown by the indicators.

Table 1-4 Fujitsu 3.2 TB Flash Accelerator Card Status Indicated by the Indicators

Indicator	Icon	Color	State	Meaning
Transfer Rate	X8	Green	On	Linked up at PCIe x8
			Off	The status is either of the following: - Linked up at PCIe x4 - No PCIe link established
Service Action Required		Amber	On	An error occurred.
			Off	The status is either of the following: - Operating normally - Not powered on
Activity Signal	ACT	Green	On	Idle state
			Blinking	IO access in progress
			Off	The status is either of the following: - Inoperable state - Not powered on

Chapter 2 Fujitsu 3.2 TB Flash Accelerator Card Installation

For details on how to install the Fujitsu 3.2 TB Flash Accelerator Card, see the following service manuals for the respective models of the SPARC M12/SPARC M10 or the PCI expansion unit service manual:

- Fujitsu SPARC M12-1 Service Manual
- Fujitsu SPARC M12-2/M12-2S Service Manual
- Fujitsu M10-1/SPARC M10-1 Service Manual
- Fujitsu M10-4/Fujitsu M10-4S/SPARC M10-4/SPARC M10-4S Service Manual
- PCI Expansion Unit for Fujitsu SPARC M12 and Fujitsu M10/SPARC M10 Service Manual

Chapter 3 Fujitsu 3.2 TB Flash Accelerator Card Settings

This chapter describes how to configure the Fujitsu 3.2 TB Flash Accelerator Card.

3.1 Checking the Fujitsu 3.2 TB Flash Accelerator Card

You can check the Fujitsu 3.2 TB Flash Accelerator Card in the same way as detecting a hard disk drive. The command shown below is an example.

```
# /usr/sbin/format
Searching for disks...done
AVAILABLE DISK SELECTIONS:
       :
       2. c9t1d0 <SAMSUNG-MZPLL3T2HMLS-000-GPNA-2.91TB>
          /pci@8300/pci@4/pci@0/pci@1/nvme@0/disk@1
          /dev/chassis/SYS/PCI#2/NVME/disk
Specify disk (enter its number):
```

3.2 Optimizing the Fujitsu 3.2 TB Flash Accelerator Card

To obtain optimal performance, arrange all partitions to start on a 4 KB boundary.
In the following command example, the first sector of the partition is not aligned on a 4 KB boundary (1 sector = 512 bytes).

```
partition> print
Current partition table (original):
Total disk sectors available: 6251217517 + 16384 (reserved sectors)
Part      Tag    Flag     First Sector          Size          Last Sector
  0        usr    wm               34         2.91TB           6251217550
  1 unassigned    wm                0            0                0
  2 unassigned    wm                0            0                0
  3 unassigned    wm                0            0                0
  4 unassigned    wm                0            0                0
  5 unassigned    wm                0            0                0
```

```
  6 unassigned    wm                 0           0                0
  8   reserved    wm        6251217551        8.00MB       6251233934
```

To align the first sector of the partition on a 4 KB boundary, use the format –e command to change the first sector to an appropriate value.

Note - "256" is the setting at shipment. There is no need to change it.

By setting the first sector value to 256 or a value for aligning on a 128 KB boundary, you can ensure an alignment for a maximum block size of 128 KB.

3.3 Checking Various Information on the Fujitsu 3.2 TB Flash Accelerator Card

You can check various information on the Fujitsu 3.2 TB Flash Accelerator Card with the nvmeadm command.

- Checking the firmware version

```
# nvmeadm list -v
SUNW-NVME-1
        PCI Vendor ID:                  0x144d
        Serial Number:                  S3GYNA0JA02542
        Model Number:                   SAMSUNG MZPLL3T2HMLS-00003
        Firmware Revision:              GPNA5B3Q
        Number of Namespaces:           32
```

- Checking SMART information

```
# nvmeadm getlog -h
SUNW-NVME-1
SMART/Health Information:
        Critical Warning: 0
        Temperature: 313 Kelvin
        Available Spare: 100 percent
        Available Spare Threshold: 10 percent
        Percentage Used: 0 percent
        Data Unit Read: 0x3d81f38 of 512k bytes.
        Data Unit Written: 0x422bdab of 512k bytes.
        Number of Host Read Commands: 0xf045bca
        Number of Host Write Commands: 0x1027b4eb
        Controller Busy Time in Minutes: 0x354
        Number of Power Cycle: 0x2
        Number of Power On Hours: 0x1c
        Number of Unsafe Shutdown: 0x0
```

```
        Number of Media Errors: 0x0
        Number of Error Info Log Entries: 0x0
```

Appendix A Precautions and Restrictions

A.1 Restrictions on Oracle VM Server for SPARC

Do not use the following functions to assign the Fujitsu 3.2 TB Flash Accelerator Card to a guest domain.

- Dynamic PCIe buses assignment function
- Dynamic reconfiguration function for PCIe endpoint devices
- Direct I/O function (function that assigns direct I/Os, DIOs, or PCIe endpoints to domains)

A.2 Restrictions on PHP/PPAR DR and Active Replacement

Active replacement and active addition/removal with the PCI Hot Plug (PHP) and physical partition dynamic reconfiguration (PPAR DR) functions cannot be used.

A.3 Disk Label Precaution

Only the EFI disk label is supported because the size of the Fujitsu 3.2 TB Flash Accelerator Card is a disk volume exceeding 2 TB.

A.4 LBA Format Precaution

The Fujitsu 3.2 TB Flash Accelerator Card supports only LBA formats with a block size of 512 bytes.

A.5 Precaution on OS Boot From FCode

On the SPARC M10, if you try to boot/reboot a logical domain after a certain amount of time has elapsed(*) since physical partition (PPAR) power-on, the boot/reboot may fail.
This phenomenon does not occur on the SPARC M12.

Note - The phrase "after a certain amount of time has elapsed" has the following meaning:
(1) The 15-minute period after the elapse of "24 days, 20 hours, 16 minutes, and 23.648 seconds" (25th day) from physical partition (PPAR) power-on
(2) The 15-minute period after the elapse of above time (1) and the elapse of a multiple of time of "24 days, 20 hours, 31 minutes, and 23.648 seconds" (50th day, 75th day, and so on)

A.5.1 Workaround

Apply XCP 2330 or later.

A.5.2 Corrective Action After Occurrence

If the system does not stop at the ok prompt, apply break to the target domain to stop at an ok prompt. After 15 minutes have passed, execute the boot command again.

A.6 Precaution on Installing an OS on the Fujitsu 3.2 TB Flash Accelerator Card

Installation of an OS on the Fujitsu 3.2 TB Flash Accelerator Card may cause the following message to be output, and the card may not appear as an OS possible installation destination.

```
WARNING: Fail to attach: 8192 page size is not supported by the controller.
```

A.6.1 Workaround

To install an OS on the Fujitsu 3.2 TB Flash Accelerator Card, use an OS installation image with Oracle Solaris 11.3 SRU 28.4 or later already applied.
You can create the OS installation image by using distro_const.
For details on creating a custom Oracle Solaris 11 installation image for Oracle Solaris 11.3, see the *Creating a Custom Oracle Solaris 11.3 Installation Image*.

A.6.2 Corrective Action After Occurrence

None

A.7 Precaution on the nvmeadm namespace -v Command

Not "1" but rather "32" appears as the namespace ID.

```
# nvmeadm namespace -v
SUNW-NVME-1-NAMESPACE-1
        Namespace: 32
                Block Size: 512
                Capacity: 3200631791616
                Metadata Size: 0
                Block Device Name: /dev/rdsk/c11t1d0s2
                Status: online
                Nac Name: /dev/chassis/SYS/PCI#2/NVME/disk
#
```

A.8 Restriction on the -n Option of the nvmeadm Command

When specifying each namespace individually with the nvmeadm namespace, online, or other command, specify and execute the -a option + namespace, not the -n option + namespace ID.
The following example shows execution of nvmeadm online.

```
# nvmeadm online -a SUNW-NVME-1-NAMESPACE-1
```

A.9 Restriction on probe-nvme-all

The probe-nvme-all command cannot be used.
To confirm that the Fujitsu 3.2 TB Flash Accelerator Card is recognized on OBP, use the show-devs command.

A.10 fwupdate Command Precaution

The fwupdate list controller command does not display "NVMe" but rather "SAS" for Type. The command shown below is an example.

```
# fwupdate list controller
================================================
CONTROLLER
================================================
ID    Type   Manufacturer   Model     Product Name               FW Version
BIOS Version   EFI Version    FCODE Version  Package Version  NVDATA Version
XML Support
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
--------
:
c1    SAS    Samsung        0xa822    SAMSUNG MZPLL3T2HMLS-00003GPNA5B3Q       -
            -              -             -                -                N/A
```

Appendix B Specifications

B.1 Product Specifications

Table B-1 Product Specifications

Item	Specifications
Capacity	3.2 TB, LBA: 6,251,233,967
Form factor	Half-height half-length standard connector
Interface	PCI Express Gen3 x8
NAND type	SAMSUNG TLC V-NAND (V3)
Safety/Radio wave standards	cUL, CE, KCC, VCCI, TUV-GS, CB, FCC, RCM, ICES
Environmental standard	RoHS
Compliance	PCI Express Base Specification Rev. 3.0 NVM Express Specification Rev. 1.2 Enterprise SSD Form Factor Ver. 1.0a
Thermal throttling	80ºC or higher: Throttling begins (warning) 87ºC or higher: Full throttling 95ºC or higher: Shutdown
Encryption function	Not supported

B.2 Physical Specifications

Table B-2 Physical Specifications

Item	Specifications
Width	69.9 mm
Length	167.65 mm
Height	18.71 mm
Weight	310 g

B.3 Environmental Specifications

Table B-3 Environmental Specifications

Item	Specifications
Temperature	Operating: 0 to 55ºC Non-operating: -40 to 85ºC
Relative humidity	Operating: 8 to 80% (no condensation) Non-operating: 5 to 95% (no condensation)
Impact	1,500 G/0.5 msec
Vibration	20 G RMS (10 to 2,000 Hz)
Airflow	300 LFM@55ºC

B.4 Electrical Specifications

Table B-4 Electrical Specifications

Item	Specifications
Operating voltage range	12 V (±10%)
Maximum power consumption	Read: 23 W Write: 22 W Idle: 8 W

B.5 Performance Specifications

Table B-5 Performance Specifications

Item	Specifications
Throughput performance	Sequential Read (128 KB): 6,200 MB/s Sequential Write (128 KB): 2,600 MB/s
IO access performance	Random Read (4 KB): 1,000 KIOPS Random Write (4 KB): 170 KIOPS Random Read (8 KB): 750 KIOPS Random Write (8 KB): 105 KIOPS
Latency	Random Read/Write: 120/20 µs Sequential Read/Write: 110/30 µs Drive ready time: 2 sec

Table B-5 Performance Specifications *(continued)*

Item	Specifications
Quality of service	Read/Write (99%): 160/100 µs
Performance consistency	Read/Write (99.9%): 98/84%

B.6 Reliability Specifications

Table B-6 Reliability Specifications

Item	Specifications
Uncorrectable bit error rate	1 sector per 10^{17} bits read
MTBF	2,000,000 hours
Life	5 years
Endurance	5 DWPD
Data retention period	3 months
Data protection at power outage	Available

Appendix C Environmental Information

C.1 Taiwan RoHS Declarations

Table C-1 Taiwan RoHS Declarations

設備名稱：固態硬碟, Equipment name				型號（型式）：3.2TB Flash Accelerator Card Type designation (Type)		
	限用物質及其化學符號 Restricted substances and its chemical symbols					
單元 Unit	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr+6)	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
電子零組件 Component	○	○	○	○	○	○
電路板 PCB	○	○	○	○	○	○
錫膏 Solder Paste	○	○	○	○	○	○
主動及被動零組件 Passive & Active Device	—	○	○	○	○	○
次要零組件 Subsidiary parts	○	○	○	○	○	○

備考1. 〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。
Note 1: "Exceeding 0.1 wt %" and "exceeding 0.01 wt %" indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.
備考2. 〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。
Note 2: "○" indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.
備考3. 〝—〞係指該項限用物質為排除項目。
Note 3: The "-" indicated that the restricted substance corresponds to the exemption.

C.2 China RoHS Declarations

	该标志是不是按照国际惯例2016年报1月报21日报公布于的确[电器电子产品有害无益物质财富限制性使用不当管理办法办法]以及SJ/T11364[电子电气产品有害物质限制使用标识要求]在案中国销售的电器电子产品环保使用期限的标识。常遵守关于该产品的安全及使用上的注意事项,在该期限内(从生产日期起算不了)该产品不会因产品中的有害物质泄露或突然发生的异变,而引起环境污染以及对岸人体或财产产生重大影响。

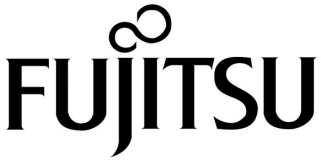
Table C-2 China RoHS Declarations

	有毒有害物质或元素					
部件名称	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent chromium (Cr6+)	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
元器件 Component	○	○	○	○	○	○
印刷电路板 PCB	○	○	○	○	○	○
锡膏 Solder Paste	○	○	○	○	○	○
主被动元器件 Passive & Active Device	×	○	○	○	○	○
附属品 Subsidiary parts	○	○	○	○	○	○

○: 表示该有毒有害物质在该部件所有均质在该部件所有均质材料中的含量均在GB/26572规定的限量要求以下。
Indicates that the concentration of the hazardous substance in all homogeneous materials in the parts is below the relevant threshold of the GB/T26572.
×: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出GB/26572规定的限量要求。
Indicates that the concentration of the hazardous substance of at least one of all homogeneous materials in the parts is above the relevant threshold of the GB/T26572.

C.3 For Indian e-waste Rules

- This product does not contain 6 hazardous substances in accordance with article 16(1) in "The e-waste (Management) Rules, 2016."
- This symbol means that used electrical and electronic products should not be dropped in garbage bin containing waste destined for disposal. Please dispose of this product appropriately by handling over to authorized collection center or registered dismantler or recycler. Disposing correctly will help to protect human health and the environment.


FUJITSU