TOSHIBA
Leading Innovation

Semiconductor Catalog Mar. 2016

Flash Memory



SEMICONDUCTOR & STORAGE PRODUCTS
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Flash Memory

Toshiba, the inventor of Flash Memory, blazed the trail to a world we can all carry data, music and videos with us, wherever we go. Now, Flash Memory is playing a major role in driving the evolution of automobiles and industrial equipment that is essential for realizing an environmentally friendly society. Behind the scenes, Flash Memory supports the world's continuing transformation to a better tomorrow.



Back in 1984, Toshiba developed a new semiconductor memory, Flash Memory, and by doing led the industry, and its competitors, into the next generation.
Today the international de facto standard, Flash Memories have realized an immense range of applications that include Memory Cards, Solid-State Drives (SSDs), and even industrial equipment. As the total volume of information continues its exponential growth, demand for storage units using Flash Memories will grow with it. In order to meets these market needs, Toshiba has made major investments in plant and equipment at its Yokkaichi memory fab, and is resolutely committed to develop new products. This brochure highlights Toshiba's Flash Memory and other Memory Solutions.

Toshiba's Leading Technology Areas

- Process
- Multi-Level Cell (MLC)
- Controller
- Die stacking
- Packaging

Features of Toshiba's Flash Memory

- Fast storage of large files
- Fast write and erase rates
- Low per-bit cost
- Easily extendable using the NAND Flash Memory interface
- Extensive product portfolio to meet diverse needs
  - Products with the standard HS-MMC interface
  - Offers products with the high-speed UHS-I and UHS-II SD bus interfaces
  - Available as SD Memory Cards with unique features

Toshiba's Flash Memory and controller technologies have found a wide range of applications. By exploiting its outstanding technologies to the full, Toshiba endeavors to respond to market needs and create products and services offering new levels of comfort and convenience to everyday life.



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SLC: Single Level Cell. A memory cell that can store a single bit of information.

* BENAND™ (Built-in-Error Correction Code NAND), EXCERIA™, FlashAir™ and TransMemory™ are trademark of Toshiba Corporation.
* *e*·MMC™ is a trademark of JEDEC/MMCA.
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SLC NAND Flash Memory

To meet diverse customers' application needs, Toshiba offers SLC NAND flash memory products with a wide range of capacity points and multiple packaging options. The high read/write performance and write endurance of the Toshiba SLC NAND make it a superb choice for a broad spectrum of commercial and industrial applications. SLC NAND also provides a significant cost advantage compared with NOR flash memory.

Toshiba, the inventor of flash memory, has led the world in using successive generations of fabrication processes to steadily enhance its performance. Toshiba also offers BENAND™ that incorporates error checking and correction (ECC) and Serial Interface NAND that provides a serial peripheral interface for NAND flash interfacing. Thus, you can select the optimal SLC NAND according to your host ECC and memory interface requirements.

SLC NAND Flash Memory Lineup

The Toshiba SLC NAND lineup includes three categories of products.
You can choose a product that best fits your needs accordingly to the ECC capability and the memory interface of the host chipset.

SLC NAND

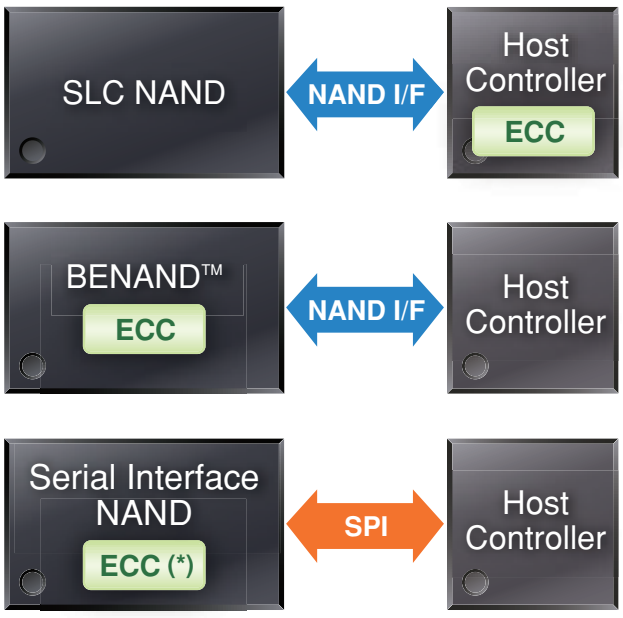
The high read/write performance and write endurance of the Toshiba SLC NAND make it a superb choice for a broad spectrum of commercial and industrial applications.

BENAND™

BENAND™ is a NAND flash memory that incorporates ECC logic. BENAND™ eliminates the need for a host processor to perform ECC, making it possible to utilize the latest 24-nm SLC NAND regardless of whether the host processor has an adequate ECC capability.

Serial Interface NAND

Serial Interface NAND provides a commonly used six-pin Serial Peripheral Interface (SPI) for flash memory interfacing and is offered in small WSON and SOP packages.



* The ECC logic in Serial Interface NAND can be enabled and disabled by the customers.



SLC NAND Flash Memory Line-up

Low Capacity (Small Block Size)

Capacity	Part Number	Page Size (byte)	Block Size (byte)	Power Supply (V)	Operating Temperature (˚C)	Package
512 Mbits	TC58DVM92A5TA00	512	16 K	2.7 to 3.6	0 to 70	48 pin TSOP
	TC58DVM92A5TAI0				–40 to 85	
	TC58DVM92A5BAJ3					63 Ball BGA

SLC NAND Flash Memories in BGA packages are also available with a supply voltage of 1.8 V. For details, contact your Toshiba sales representative.

■ Small to Mid Capacity (Large Block Size)

Capacity	Part Number	Page Size (bytes)	Block Size (bytes)	Power Supply (V)	Operating Temperature (˚C)	Package
1 Gbits	TC58NVG0S3HTA00	2 K	128 K	2.7 to 3.6	0 to 70	48pin TSOP
	TC58NVG0S3HTAI0				–40 to 85	
	TC58NVG0S3HBAI6					67Ball BGA
	TC58NVG0S3HBAI4					63Ball BGA
2 Gbits	TC58NVG1S3HTA00	2 K	128 K	2.7 to 3.6	0 to 70	48pin TSOP
	TC58NVG1S3HTAI0				–40 to 85	
	TC58NVG1S3HBAI6					67Ball BGA
	TC58NVG1S3HBAI4					63Ball BGA
4 Gbits	TC58NVG2S0HTA00	4 K	256 K	2.7 to 3.6	0 to 70	48pin TSOP
	TC58NVG2S0HTAI0				–40 to 85	
	TC58NVG2S0HBAI6					67Ball BGA
	TC58NVG2S0HBAI4					63Ball BGA
8 Gbits	TC58NVG3S0FTA00	4 K	256 K	2.7 to 3.6	0 to 70	48pin TSOP
	TC58NVG3S0FTAI0				–40 to 85	
	TC58NVG3S0FBAID					63Ball BGA
	TH58NVG3S0HTA00	4 K	256 K	2.7 to 3.6	0 to 70	48pin TSOP
	TH58NVG3S0HTAI0				–40 to 85	
	TH58NVG3S0HBAI6					67Ball BGA
	TH58NVG3S0HBAI4					63Ball BGA
16 Gbits	TH58NVG4S0FTA20	4 K	256 K	2.7 to 3.6	0 to 70	48pin TSOP
	TH58NVG4S0FTAK0				–40 to 85	
	TH58NVG4S0FBAID					63Ball BGA
32 Gbits	TH58NVG5S0FTA20	4 K	256 K	2.7 to 3.6	0 to 70	48pin TSOP
	TH58NVG5S0FTAK0				–40 to 85	

SLC NAND Flash Memories in BGA packages are also available with a supply voltage of 1.8 V. For details, contact your Toshiba sales representative.

■ High Capacity (Large Block Size)

Legacy Interface

Capacity	Part Number	Page Size (bytes)	Block Size (bytes)	Power Supply (V)	Operating Temperature (˚C)	Package
32 Gbits	TC58NVG5H2HTA00	8 K	1 M	2.7 to 3.6	0 to 70	48pin TSOP
	TC58NVG5H2HTAI0				–40 to 85	
64 Gbits	TH58NVG6H2HTA20	8 K	1 M	2.7 to 3.6	0 to 70	48pin TSOP
	TH58NVG6H2HTAK0				–40 to 85	
128 Gbits	TH58NVG7H2HTA20	8 K	1 M	2.7 to 3.6	0 to 70	48pin TSOP
	TH58NVG7H2HTAK0				–40 to 85	

Toggle Interface

Capacity	Part Number	Page Size (bytes)	Block Size (bytes)	Power Supply		Operating Temperature (˚C)	Package
				Vcc(V)	VccQ (V)		
64 Gbits	TH58TEG6H2HBA4C	8 K	1 M	2.7 to 3.6	2.7 to 3.6	0 to 70	132Ball BGA
	TH58TEG6H2HBAMC				1.70 to 1.95	–40 to 85	
128 Gbits	TH58TEG7H2HBA8C	8 K	1 M	2.7 to 3.6	2.7 to 3.6	0 to 70	132Ball BGA
	TH58TEG7H2HBASC				1.70 to 1.95	–40 to 85	
256 Gbits	TH58TEG8H2HBA89	8 K	1 M	2.7 to 3.6	2.7 to 3.6	0 to 70	132Ball BGA
	TH58TEG8H2HBAS9				1.70 to 1.95	–40 to 85	



BENAND™



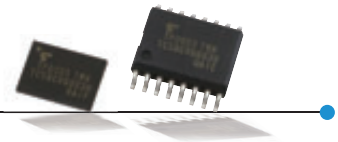
BENAND™ is an SLC NAND Flash Memory Solution with embedded ECC(Error Correction Code), ending the burden of ECC on the host processor. Use of a common NAND Flash Memory interface ensures BENAND™ maintains compatibility with general SLC NAND Flash Memory in terms of the command set, device operation, packaging, pin configuration, etc., allowing the latest BENAND™ to easily replace a general SLC NAND Flash Memory, free of concerns about ECC.

BENAND™ Lineup

Capacity	Part Number	Page Size (bytes)	Block Size (bytes)	Power Supply (V)	Operating Temperature (˚C)	Package
1 Gbits	TC58BVG0S3HTA00	2 K	128 K	2.7 to 3.6	0 to 70	48pin TSOP
	TC58BVG0S3HTAI0				–40 to 85	
	TC58BVG0S3HBAI6					67Ball BGA
	TC58BVG0S3HBAI4					63Ball BGA
2 Gbits	TC58BVG1S3HTA00	2 K	128 K	2.7 to 3.6	0 to 70	48pin TSOP
	TC58BVG1S3HTAI0				–40 to 85	
	TC58BVG1S3HBAI6					67Ball BGA
	TC58BVG1S3HBAI4					63Ball BGA
4 Gbits	TC58BVG2S0HTA00	4 K	256 K	2.7 to 3.6	0 to 70	48pin TSOP
	TC58BVG2S0HTAI0				–40 to 85	
	TC58BVG2S0HBAI6					67Ball BGA
	TC58BVG2S0HBAI4					63Ball BGA
8 Gbits	TH58BVG3S0HTA00	4 K	256 K	2.7 to 3.6	0 to 70	48pin TSOP
	TH58BVG3S0HTAI0				–40 to 85	
	TH58BVG3S0HBAI6					67Ball BGA
	TH58BVG3S0HBAI4					63Ball BGA

Toshiba also offers SLC NAND Flash Memories in BGA packages that operate at a 1.8-V supply voltage. For details, contact your Toshiba sales representative.

Serial Interface NAND



Serial Interface NAND is a NAND Flash Memory with an interface compatible with a commonly used six-pin Serial Peripheral Interface (SPI). Toshiba offers high-capacity, low-pin-count Serial Interface NAND in small packages.

Serial Interface NAND Lineup

Capacity	Part Number	Access Time Serial cycle(min)(ns)	Page Size (bytes)	Block Size (bytes)	Power Supply (V)	Operating Temperature(˚C)	Package
1 Gbits	TC58CVG0S3HQAIE *	9.6	2 K	128 K	2.7 to 3.6	–40 to 85	16pin SOP
	TC58CVG0S3HRAIF *	9.6					8pin WSON
	TC58CYG0S3HQAIE *	9.6			1.70 to 1.95		16pin SOP
	TC58CYG0S3HRAIF *	9.6					8pin WSON
2 Gbits	TC58CVG1S3HQAIE *	9.6	2 K	128 K	2.7 to 3.6	–40 to 85	16pin SOP
	TC58CVG1S3HRAIF *	9.6					8pin WSON
	TC58CYG1S3HQAIE *	9.6			1.70 to 1.95		16pin SOP
	TC58CYG1S3HRAIF *	9.6					8pin WSON
4 Gbits	TC58CVG2S0HQAIE *	9.6	4 K	256 K	2.7 to 3.6	–40 to 85	16pin SOP
	TC58CVG2S0HRAIF *	9.6					8pin WSON
	TC58CYG2S0HQAIE *	9.6			1.70 to 1.95		16pin SOP
	TC58CYG2S0HRAIF *	9.6					8pin WSON

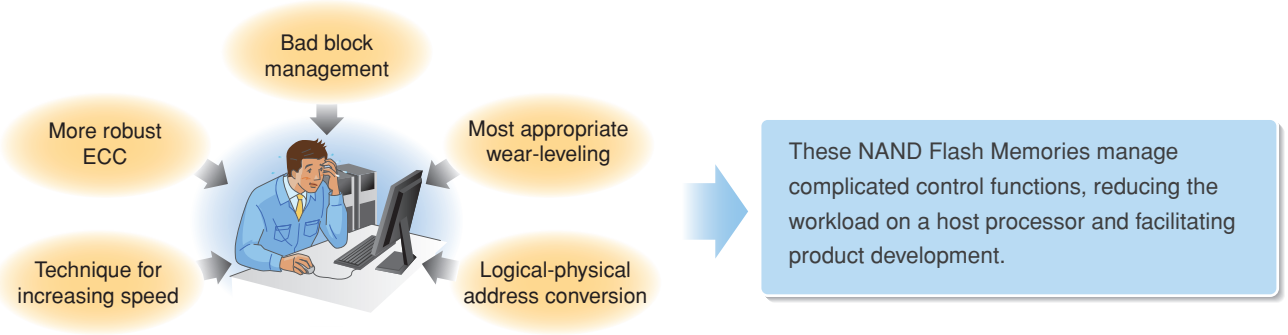
*: New Product

Packages

Serial Interface NAND is available in WSON and SOP packages. These packages and their pin assignments are compatible with those of usual serial flash memories.

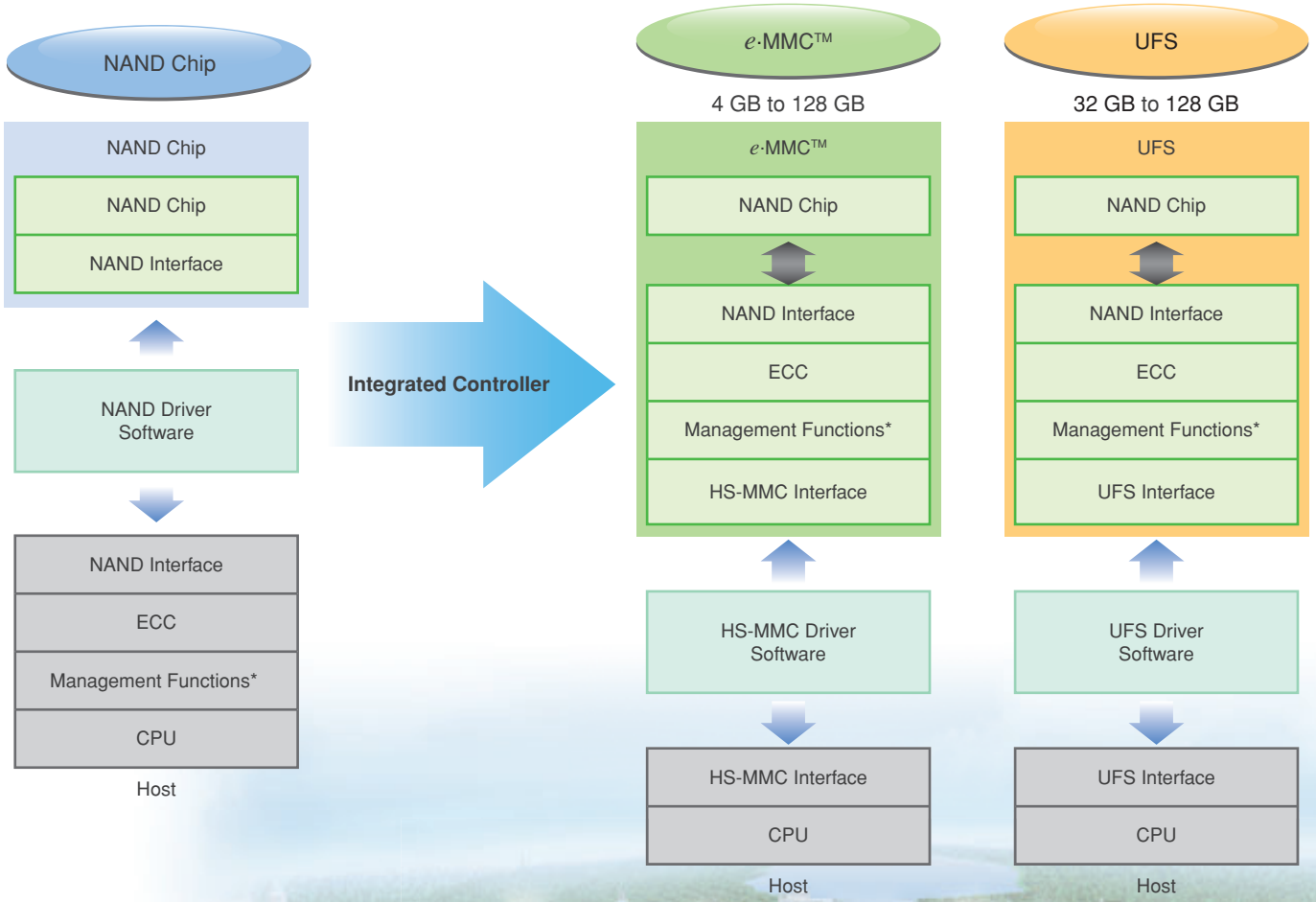
Package	Package Specifications			Power Supply (V)	Capacity		
	Appearance	Size (mm)	Pin Count (Pins)		1 Gbits	2 Gbits	3 Gbits
WSON		6 x 8	8	1.70 to 1.95	●	●	●
				2.7 to 3.6			
SOP		10.3 x 7.5	16	1.70 to 1.95	●	●	●
				2.7 to 3.6			

If you opt for raw NAND(NAND Flash Memory) chips, ECC(Error Correction Code), bad-block management, logical-to-physical address conversion, wear leveling (a technique for distributing re-writes evenly across a memory array) and other control functions must be implemented on the host side. With evolving NAND manufacturing processes, ECC is becoming notably more sophisticated, imposing heavier burdens on the host processor, especially for large-capacity NAND.
In response to customer needs, Toshiba offers NAND Flash Memories that integrate a controller in the same package. These are Toshiba's recommendation for high-capacity NAND Flash Memories.



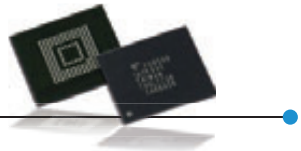
Features of NAND Flash Memories with an Integrated Controller

Toshiba offers *e*·MMC™ and UFS, a family of high-capacity NAND Flash Memories that integrates a controller in one package. These NAND solutions provide ECC and other control functions, optimized by Toshiba for each NAND technology generation.
e·MMC™ and UFS reduce the workload on the host processor, simplify product development, shorten time-to-market and increase ease of use of memory products.



*Management functions: wear leveling, bad-block management, garbage collection, etc.

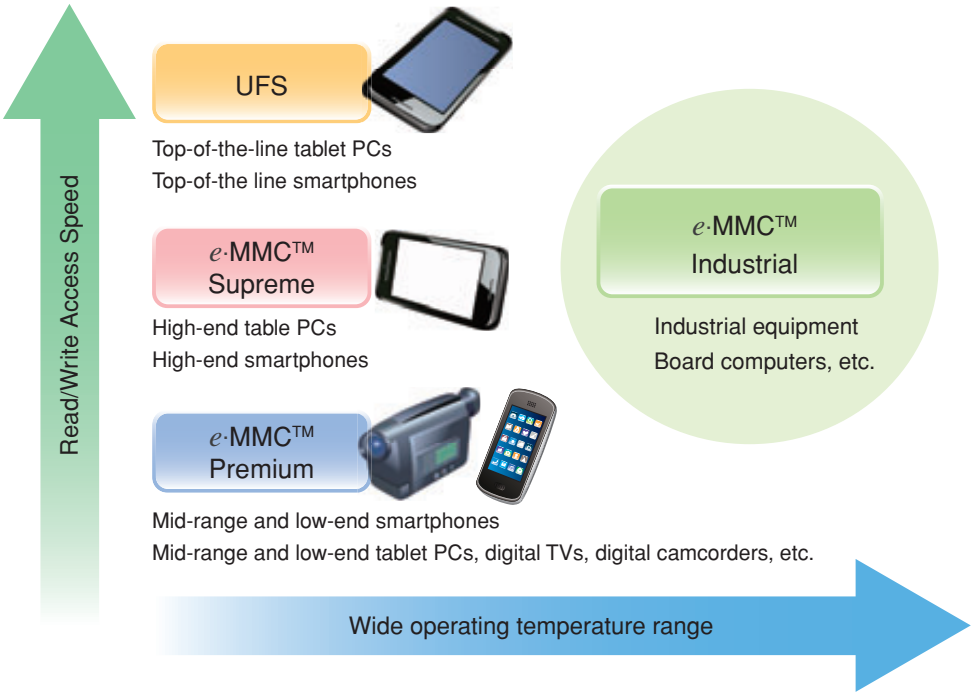
e·MMC™



e·MMC™ is a family of NAND Flash Memories with controller functionality covering ECC(Error Correction Code), wear leveling and bad-block management. e·MMC™ also provides a high-speed memory card interface compliant with JEDEC/MMCA Version 5.0/5.1, eliminating concerns about directly controlling NAND Flash Memories. e·MMC™ can easily be used as an embedded storage device.

■ e·MMC™ Families

Toshiba offers e·MMC™ in three classes of products: Supreme, Premium and Industrial. The Supreme family features a high data transfer rate, ideal for high-end mobile and other applications requiring high performance. The Premium family is suitable for general low-end and mid-range applications. The Industrial family (shown as "I-Ver" in the following table) provides guaranteed device operation at low temperature, making it highly suited to industrial applications.



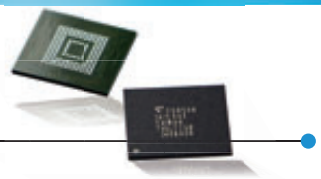
■ e·MMC™ Lineup

Capacity	Part Number	Class	e·MMC Version	Max Data Rate (MB/s)	Power Supply		Operating Temperature (˚C)	Package	
					Vcc (V)	VccQ (V)		Type	Size (mm)
4 Gbytes	THGBMDG5D1LBAIT*	Premium	5.0	400	2.7 to 3.6	1.70 to 1.95 2.7 to 3.6	–25 to 85	P-WFBGA153	11.0 x 10.0 x 0.8
	THGBMDG5D1LBAIL*	Premium	5.0	400			–25 to 85	P-WFBGA153	11.5 x 13.0 x 0.8
8 Gbytes	THGBMHG6C1LBAIL	Premium	5.1*1	400			–25 to 85	P-WFBGA153	11.5 x 13.0 x 0.8
	THGBMHG6C1LBAWL*	I-Ver	5.1*1	400			–40 to 85	P-WFBGA153	11.5 x 13.0 x 0.8
16 Gbytes	THGBMHG7C2LBAIL	Supreme	5.1*1	400			–25 to 85	P-WFBGA153	11.5 x 13.0 x 0.8
	THGBMHG7C1LBAIL	Premium	5.1*1	400			–25 to 85	P-WFBGA153	11.5 x 13.0 x 0.8
	THGBMHG7C2LBAWR*	I-Ver	5.1*1	400			–40 to 85	P-VFBGA169	11.5x 13.0 x 1.0
32 Gbytes	THGBMHG8C4LBAIR	Supreme	5.1*1	400			–25 to 85	P-VFBGA169	11.5 x 13.0 x 1.0
	THGBMHG8C2LBAIL	Premium	5.1*1	400			–25 to 85	P-WFBGA153	11.5 x 13.0 x 0.8
	THGBMHG8C4LBAWR*	I-Ver	5.1*1	400			–40 to 85	P-VFBGA169	11.5 x 13.0 x 1.0
64 Gbytes	THGBMHG9C4LBAIR	Supreme	5.1*1	400			–25 to 85	P-VFBGA153	11.5 x 13.0 x 1.0
	THGBMGG9U4LBAIR	Premium	5.1	400			–25 to 85	P-VFBGA153	11.5 x 13.0 x 1.0
	THGBMHG9C8LBAWG*	I-Ver	5.1*1	400			–40 to 85	P-TFBGA153	11.5 x 13.0 x 1.2
128 Gbytes	THGBMHT0C8LBAIG	Supreme	5.1*1	400			–25 to 85	P-TFBGA153	11.5 x 13.0 x 1.2
	THGBMGT0U8LBAIG	Premium	5.1	400			–25 to 85	P-TFBGA153	11.5 x 13.0 x 1.2

*1 Complaint with the optional command queuing features of JEDEC e·MMC Version 5.1

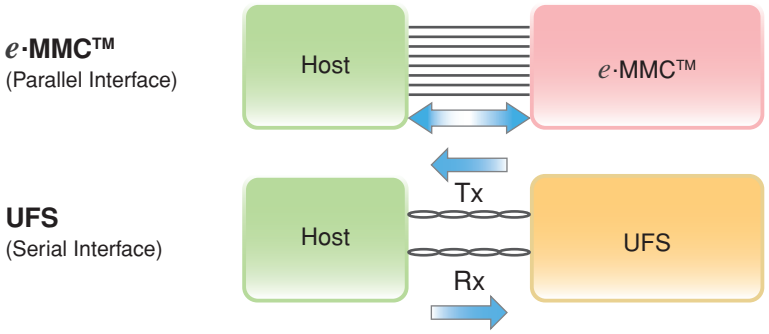
*: New product

UFS



Universal Flash Storage (UFS), the successor to *e*·MMC™, is the latest flash memory to feature an ultra-high-speed data rate compliant with the JEDEC/UFS standard. Like *e*·MMC™, UFS integrates a controller that supports ECC, wear leveling, bad-block management and other control functions. UFS also provides an interface compliant with JEDEC/UFS Version 2.0, eliminating concerns about directly controlling NAND Flash Memories. UFS can easily be used as an embedded storage device.

Because of its high-speed data rate, UFS reduces boot times for smartphone and tablet apps, create embedded cameras with a high-speed consecutive shooting function, and cut the time needed to record large video and music files, and so delivers an enhanced user experience.



While *e*·MMC™ has a parallel interface, UFS has a high-speed serial interface. Free from the restrictions imposed by a parallel interface, UFS makes it possible to further improve data rates.

■ UFS Lineup

Capacity	Part Number	UFS Version	Max Data Rate (MB/s)	Power Supply (V)			Operating Temperature (°C)	Package	
				Vcc	VccQ	VccQ2		Type	Size (mm)
32 Gbytes	THGBF7G8K4LBATR*	2.0	1166	2.7 to 3.6	1.1 to 1.3	1.70 to 1.95	–25 to 85	P-VFBGA153	11.5 x 13.0 x 1.0
64 Gbytes	THGBF7G9L4LBATR*							P-VFBGA153	11.5 x 13.0 x 1.0
128 Gbytes	THGBF7T0L8LBATA*							P-TFBGA153	11.5 x 13.0 x 1.04

*: New product



All Toshiba memory cards are manufactured by Toshiba, a NAND flash vendor, using its own NAND flash memories.
In addition to standard SD and microSD memory cards, Toshiba offers value-added memory cards such as FlashAir™, SeeQVault™, NFC-enabled and TransferJet™ memory cards in order to meet the requirements for increasingly diverse portable media.

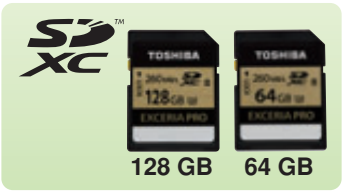
SD Memory Cards

High-Speed Card Series: EXCERIA™

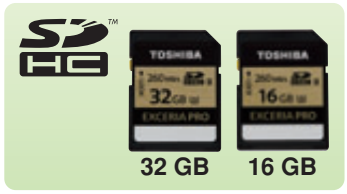
UHS-II cards deliver the maximum data rate*1 when they are used with devices compliant with the UHS-II high-speed bus interface with the HD312 speed mode. UHS-I cards deliver the maximum data rate*1 when they are used with devices compliant with the UHS-I high-speed bus interface with the SDR104 speed mode.

SDXC/SDHC Memory Cards

EXCERIA PRO™ (Read 260 MB/s, Write 240 MB/s)



SDHC UHS-II
UHS Speed Class3 U3



SDHC UHS-II
UHS Speed Class3 U3

EXCERIA™ (Read 95 MB/s, Write 60 MB/s)



SDXC(*2) UHS-I
UHS Speed Class3 U3



SDHC UHS-I
UHS Speed Class3 U3

microSDXC/microSDHC Memory Cards

EXCERIA™ (Read 95 MB/s, Write 60 MB/s)



microSDHC UHS-I
UHS Speed Class3 U3



microSDHC UHS-I
UHS Speed Class3 U3

Compatibility Considerations
*1: Maximum data transfer speeds can be achieved on devices supporting the high-speed SD bus interface UHS-II (312 MB/s) or UHS-I (104 MB/s).
*2: SDXC memory cards exceeding 32 GB in capacity employ a new file system called exFAT and cannot be used on devices that support SD and SDHC memory cards. These memory cards can only be used on devices compliant with the SDXC specifications.

Standard Series

The support for the high-speed UHS-I (with SDR50 bus speed mode and a maximum read speed of 48 MB/s) and/or 25-MB/s bus interfaces makes the Standard series suitable for various applications.

SDXC(*2)/SDHC Memory Cards, microSDXC(*2)/microSDHC Memory Cards









UHS-I, UHS Speed Class1 U1, SD Speed Class C10

SDHC Memory Cards, microSDHC Memory Cards





SD Speed Class C4

▶ SD and microSD Memory Cards for Automotive Infotainment Applications

- ▶ Extended operating temperature range
- ▶ New features, including power interruption tolerance, data refreshing and reliability test commands

Capacity	Part Number	SD Physical Layer version	Maximum Data Rate [MB/s]	Power Supply Vcc[V]	Operating Temperature Range (˚C)	Card Type
32 GB	THNSR032GBA5KC	3.01	45	2.7 to 3.6	–30 to 85	SD
	THNSR032GBB5KG					microSD
16 GB	THNSR016GBA5KB					SD
	THNSR016GBB5KF					microSD
8 GB	THNSR008GBA5KA					SD
	THNSR008GBB5KE					microSD

▶ Industrial SD memory card

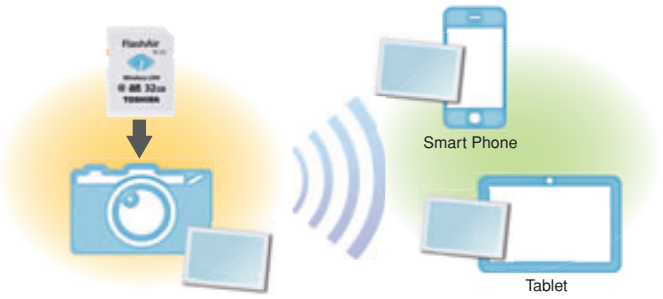
- ▶ Extended operating temperature range
- ▶ These memory cards allow users to check the remaining life, making them suitable for applications with frequent writes such as event data recorders and surveillance cameras.
- ▶ Power interruption tolerance

Capacity	Part Number	SD Physical Layer version	Maximum Data Rate [MB/s]	Power Supply Vcc[V]	Operating Temperature Range (˚C)	Card Type
32 GB	THNSQ032GBB5KG	3.01	45	2.7 to 3.6	–30 to 85	microSD
16 GB	THNSQ016GBB5KF					microSD
8 GB	THNSQ008GBB5KE					microSD

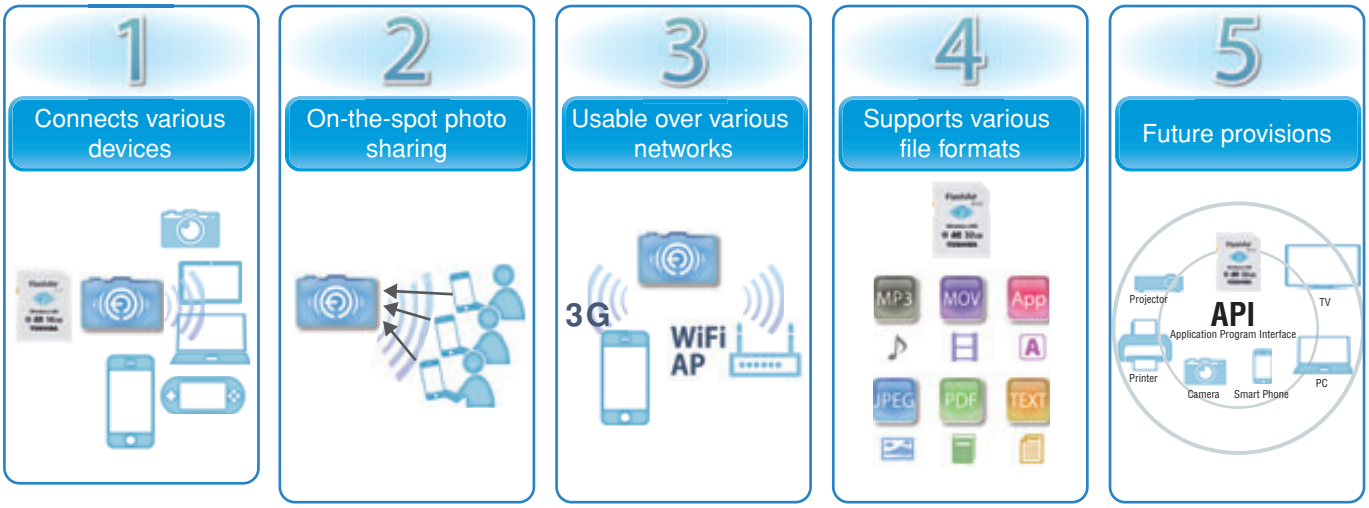


Wireless LAN Memory Cards FlashAir™

FlashAir™ is an SDHC memory card with wireless LAN functionality that allows it to function as a wireless LAN access point. This makes it possible for tablet PCs, smartphones and other external wireless LAN devices to access photos and other files stored in the card.
FlashAir™ expands the possibilities for communication through photos.



Five Features of FlashAir™



Product Outline

- Compliant with the SD memory card standard.
- SDHC Speed Class 10
- Capacity: 8 GB, 16GB, 32 GB
- Compliant with IEEE802.11b/g/n.
- Supports HTTP/HTTPS protocols to enable interactions with web applications from a standard browser.
- Allows access from PCs and smartphones using server functions.
- Offers application software for smartphones and tablets.

FlashAir™



32 GB 16 GB 8 GB



Wireless LAN Specifications

Compliant standard	IEEE802.11b/g/n (2.4 GHz SISO, 20 MHz)
Modulation	DSSS/CCK (1, 2, 5.5, 11 Mbps), OFDM(6 to 72.2 Mbps)
Wireless LAN security	WEP, TKIP, AES (WPA/WPA2)
Wireless QoS	EDCA (WMM)
Others	Infrastructure-STA, Infrastructure-AP, WPS-enrollee

Networking Specifications

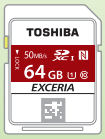
Supported protocol	TCP/IP (IPv4)
Server functionality	HTTP Server, DHCP Server
Client functionality	HTTP, DHCP, DNS, NETBIOS

Toshiba has a website designed to support developers of applications and devices for FlashAir.
https://flashair-developers.com/ja/

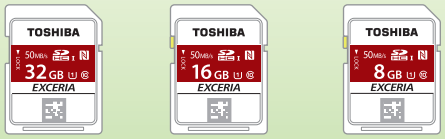
NFC-Enabled SDHC and SDXC Memory Cards

NFC-enabled SDHC and SDXC memory cards provide Near Field Communication (NFC) functionality. These memory cards consist of a Flash Memory used as a typical SD memory card and a read/write user area for NFC tags. Thumbnails of several photos stored in the Flash Memory and card usage information are written to the user's NFC tag area. This makes it possible to check the contents of the memory card just by touching it with an NFC-enabled device such as an Android™ smartphone.

NFC-Enabled SDHC/SDXC Memory Cards: EXCERIA™ (Reed 50 MB/s)



SDXC UHS-I, UHS Speed Class 1
SD Speed Class 10



SDHC UHS-I, UHS Speed Class 1
SD Speed Class 10

Preview function for displaying the contents of a memory card

Just by touching an NFC-enabled memory card with a smartphone, you can display the free space of the card and up to 16 thumbnails of the photos stored in the card.



Augmented reality (AR) function that allows you to quickly find a card you are looking for

NFC-enabled SDHCV/SDXC cards bear a two-dimensional (2D) barcode. By having a smartphone camera recognize 2D barcodes, you can quickly find cards that are registered with an app.



Specifications

Product name	NFC-enabled SDHC/SDXC memory card
Interfacing	SD interface standard UHS-I
Speed class	UHS Speed Class: 1 SD Speed Class: CLASS 10
Card standard compliance	SD memory card standards
NFC standard compliance	NFC Forum Type 3 Tag
Frequency	13.56 MHz
Supply voltage	2.7 to 3.6 V

Developers Website

Toshiba has a website designed to support developers of applications and devices for NFC-enabled SD memory cards.

https://flashair-developers.com/ja/nfc/

Android is a trademark of Google Inc.

TransferJet™ Memory Card

TransferJet

Toshiba offers SDHC memory card with embedded TransferJet™ functionality, a close proximity wireless technology.
TransferJet™ allows you to transfer videos and photos shot with a camera to a peer device such as a Windows® PC, a tablet or a smartphone without removing a memory card from the camera. All you need to do is to just bring the camera close to the coupler (or an external adapter) of the peer device.
TransferJet™ makes your photo-sharing experience more convenient.



DGP 2016 デジタルカメラグランプリ 金賞
DGP 2016 デジタルカメラグランプリ 技術賞



Use Cases

TransferJet™ SDHC memory cards allow you to share and back up videos and photos easily.

You can easily copy your backup files to a Windows® PC.



You can check out your photos with a tablet immediately after shooting them.



You can share your photos immediately after shooting them.



Product Overview

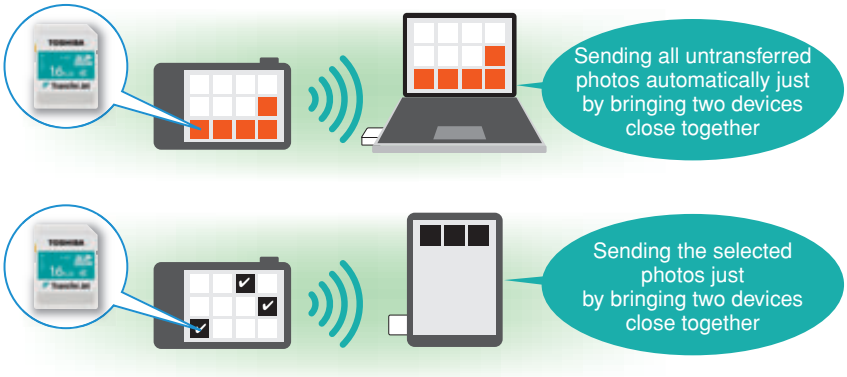
- Compliant with the SD memory card standard
- Compliant with SDHC Class 10
- Capacity: 16 GB
- TransferJet™ transmit mode

Incremental Data Transfer mode

In this mode, all the videos and photos that have yet to be transferred are automatically transferred in batch only once.
This mode is useful when you want to back up videos and photos.

Selected Data Transfer mode

In this mode, you can selectively transfer photos (in JPEG format) using the DPOF* function of a digital camera.
Since this mode allows you to send the same photos any number of times, it is useful when you want to share photos with your friends.



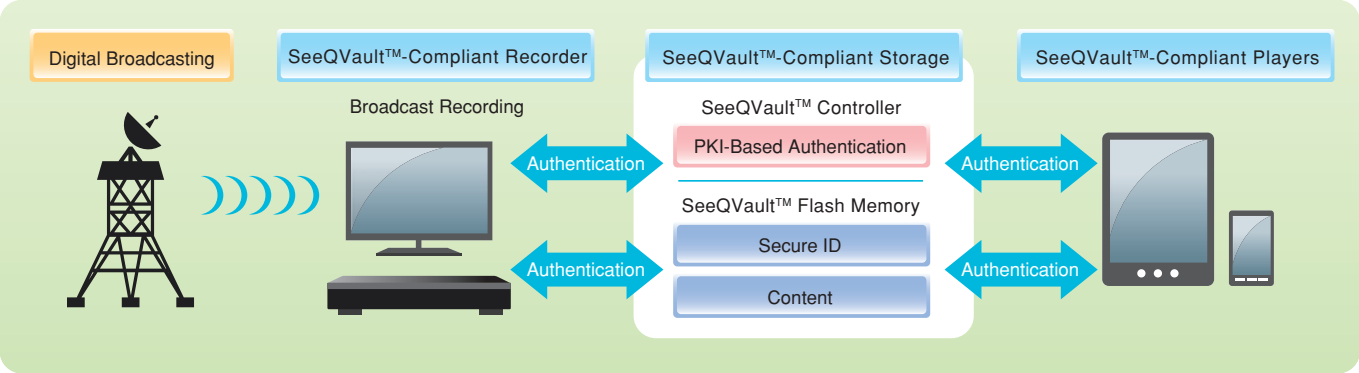
(*)DPOF(Digital Print Order Format)
DPOF is a format that allows the user of a digital camera to specify which captured images on a memory card are to be printed, together with other information such as the number of copies and date imprinting. A DPOF file is often called a print ordering file. For details, see the owner's manual that accompanies your digital camera.

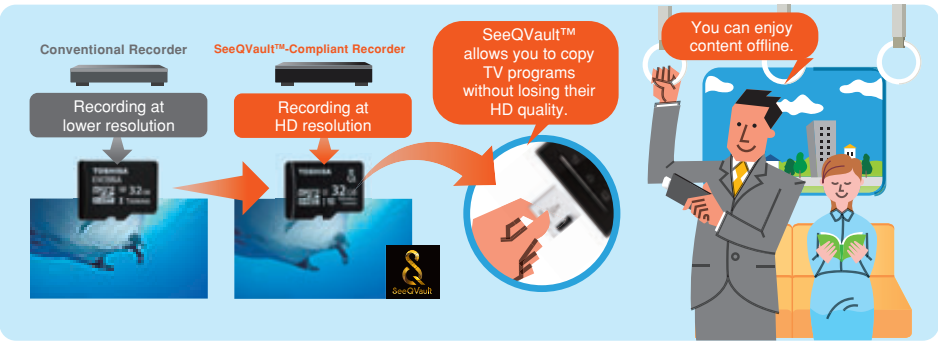
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・DPOF denotes compliance with Digital Print Order Format. DPOF is a trademark of Canon Inc., Eastman Kodak Company, Fujifilm Corporation and Matsushita Electric Industrial Co., Ltd.
・Other company and product names mentioned herein may be trademarks or registered trademarks of respective companies or organizations.

Content Protection Technology SeeQVault™

SeeQVault™ is a content protection technology that provides robust security and protected content playback on any compliant devices. SeeQVault™ has independent double security layers for the controller and flash memory to realize device authentication and anti-cloning (protection against unauthorized reproduction of content on an SD memory card). These features allow enjoyment digital content on the desired device in a highly secure environment via a SeeQVault™- compliant SD memory card or external hard disk. From now on, SeeQVault™ will support the content industry in developing a broad array of business models, including online purchases, rentals, members-only subscriptions, machine vending and over-the-counter sales of premium videos, games, electronic textbooks and more.

Recording protected digital data to a storage device to prevent unauthorized copying





SeeQVault-Compliant microSDHC Memory Cards

MSV-RW Limited production **/MU-SV** Series

* TV programs cannot be recorded directly to an SD card.

32GB MSV-RW32GA/MU-SV032G

16GB MSV-RW16GA/MU-SV016G



MSV-RW Series

MU-SV Series

Accessible anytime

Once you have transferred the recorded programs to a memory card, you can enjoy them on a mobile device with a SeeQVault™ app at your leisure. You can watch your backlog programs in a spare time.

Viewing anywhere

You can comfortably watch video content anywhere offline. SeeQVault™ is stress-free because you do not need to connect to network in locations where your mobile device is out of service or has a weak signal such as on trains and airplanes.

HD picture quality

SeeQVault™ allows HD content to be transferred to a mobile device without any loss of picture quality. Enjoy powerful videos with no concerns about illegible subtitles.

	MSV-RW Series	MU-SV Series
Maximum data rate*	Read 40 MB/s	
Interface	UHS-I Interface, SD Interface	
Speed Class	UHS Speed Class: U1 SD Speed Class: CLASS 10	UHS Speed Class: U1
SeeQVault-compliant microSD card reader	Included	–
Accessory	microSD to SD adapter	

Video Recording Capacities of microSD Memory Cards

* TV programs cannot be recorded directly to an SD card.

	Terrestrial Digital Broadcasting (17 Mbps)	BS & 110-Degree CS (24 Mbps)	AVC AF (× 2 Mode)	AVC AS (× 4 Mode)	AVC AE (× 12 Mode)
32 GB	Approx. 4 hr. 6 min.	Approx. 2 hr. 54 min.	Approx. 5 hr. 24 min.	Approx. 11 hr. 34 min.	Approx. 34 hr. 18 min.
16 GB	Approx. 2 hr. 2 min.	Approx. 1 hr. 26 min.	Approx. 2 hr. 41 min.	Approx. 5 hr. 46 min.	Approx. 17 hr. 3 min.

* Based on Toshiba's test results. Actual read and write speeds depend upon the device in use and the size of the file. * MB per second is calculated as 1,000,000 bytes per second. * The recording capacities shown above are provided only as estimates and are not guaranteed to be accurate. * SeeQVault and the SeeQVault logo are trademarks of NSM Initiatives LLC. * Android is a trademark of Google Inc. Other company and product names mentioned herein may be trademarks or registered trademarks of respective companies or organizations.

See the website of Toshiba Semiconductor & Storage Products Company for a list of compatible devices.

http://www.toshiba-personalstorage.net/compati/microsd/sqv_microsd_list.htm

SeeQVault-Compliant Content Player App

Android™ app: SeeQVault player (PIXELA CORPORATION)

The SeeQVault player allows you to view the HD-quality TV programs stored in a SeeQVault microSD memory card on your Android™ device.

Read the terms of use before downloading the app.

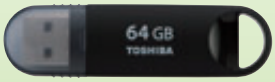
View PIXELA's website for a description of the SeeQVault player and the supported devices.

http://www.pixela.co.jp/products/mobile/seeqvault_player/

USB flash drives are compact memory devices designed to meet the user needs for portability. They provide a convenient means of transferring data at offices and for sharing photos among friends. A USB flash drive is recognized automatically when you plug it into a USB port on a PC, etc.

USB 3.0 TransMemory-MX™

Offers a sequential read speed of 70 MB/s due to the use of a USB 3.0 port, allowing users to transfer large amounts of data quickly.



	64 GB	32 GB	16 GB	8 GB
Black	○	○	○	○
White		○	○	

USB 3.0 TransMemory™

Easy data management by Body color and Tacking Label.



	128 GB	64 GB	32 GB	16 GB	8 GB
Black	○	○	○	○	○
Blue		○	○	○	
Red		○	○	○	

USB 3.0 TransMemory™

Rigid and Durable. Standard USB 3.0 drive with a cap.
Variations in capacity from 16 GB to 64 GB.



	64 GB	32 GB	16 GB
Capacity	○	○	○

USB 3.0 TransMemory™

Small, cute USB 3.0 Drive.



	64 GB	32 GB	16 GB
Capacity	○	○	○

USB 2.0 TransMemory™

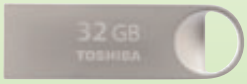
Rigid and Durable. Standard USB 2.0 drive with a cap.
Variations in capacity from 8 GB to 128 GB.



	128 GB	64 GB	32 GB	16 GB	8 GB
White	○	○	○	○	○
Blue				○	○

USB 2.0 TransMemory™

USB memory in a stylish metal body.



	32 GB	16 GB	8 GB
Capacity	○	○	○

USB 3.1 Type-C TransMemory-EX™

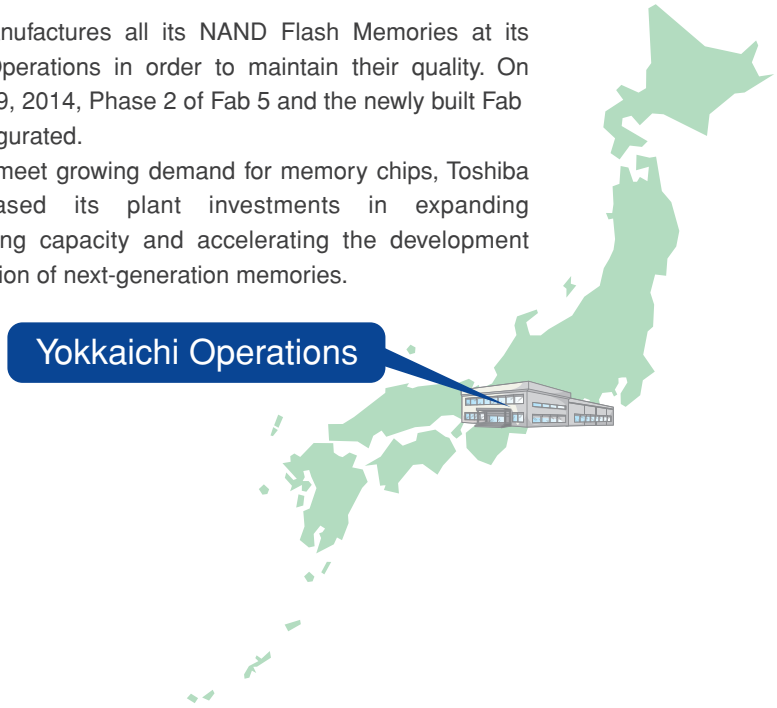
USB Type-A and Type-C Dual Port.
Suitable for Type-C ports on Smartphone and Tablets.



	32 GB
Capacity	○

Yokkaichi Operations, the manufacturing site for Flash Memories

Toshiba manufactures all its NAND Flash Memories at its Yokkaichi Operations in order to maintain their quality. On September 9, 2014, Phase 2 of Fab 5 and the newly built Fab 2 were inaugurated.
In order to meet growing demand for memory chips, Toshiba has increased its plant investments in expanding manufacturing capacity and accelerating the development and production of next-generation memories.



Yokkaichi Operations

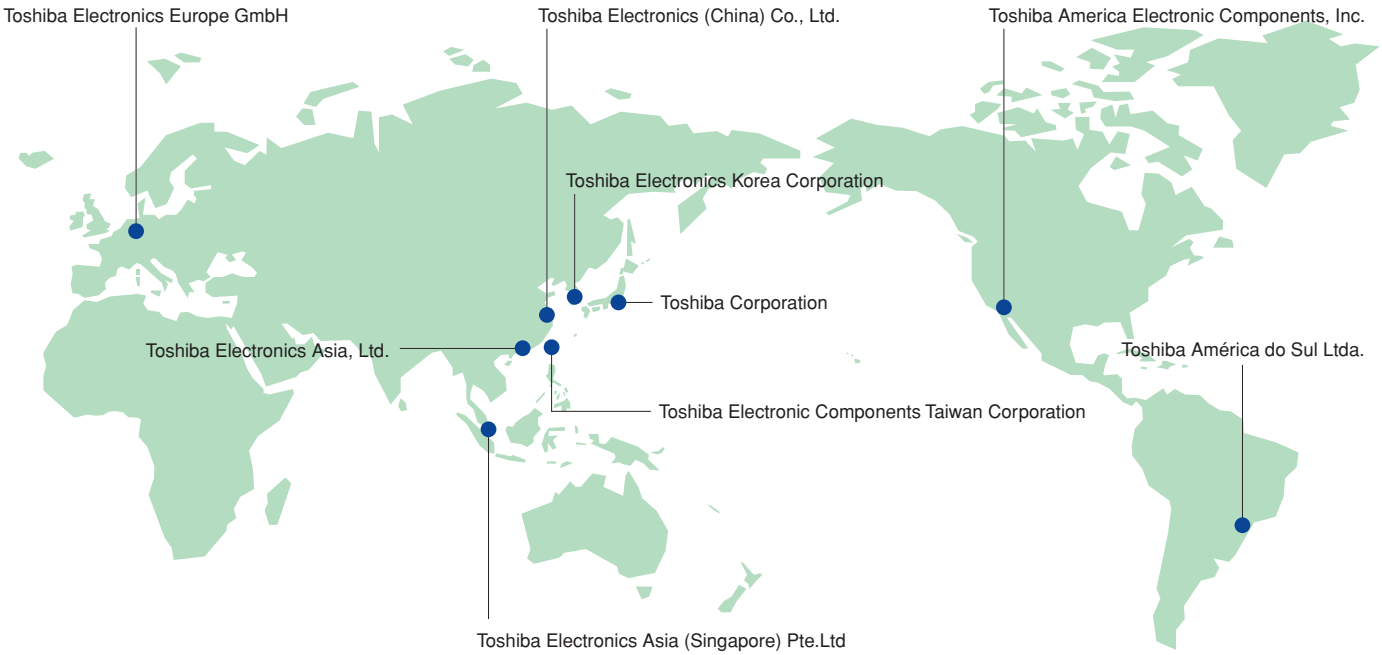


Fab 5



Cleanroom

Overseas Sales Offices



Notes on Memory Capacities
- All memory capacities shown herein represent the actual total capacity of a flash array. Note that not the entire capacity is available as the user area.
- A small amount of the flash array is used as management and other areas. For usable capacities, see the respective product specifications.
  (One gigabyte is 1,073,741,824 bytes.)

Note on Data Rates
- The read and write speeds are calculated based on the decimal number system, i.e., 1 MB/s = 1,000,000 bytes/s.






Flash Memory for your life

Toshiba contributes to its customers and society
as a whole through its Flash Memory and other Memory Solutions.

1984: Invent Flash Memory
1987: Publish a paper on NAND Flash Memory
1991: Disclose the specification for NAND Flash Memory
.
.
2016: Mass-produce Flash Memories with up to 256Gb chip

Web Services for Toshiba Semiconductor & Storage Products

PC Site

On our PC site, it is easy and simple to find the information you are looking for.

http://toshiba.semicon-storage.com/



Mobile Site

It has become easier to run a product search, and view new topics as well as information about individual products with a smartphone.

Your smartphone will automatically take you to the mobile site.



Use a QR reader on your smartphone.

Our official SNS sites provide detailed information about our products and events in real time.

NEW!! Twitter

Our Twitter account dispatches information about new products, trade shows and seminars in a timely manner.



https://twitter.com/ToshibaSemi_EN

Facebook

Our Facebook page delivers information about microcontroller products and seminars.



https://www.facebook.com/ToshibaMicrocontroller/info?tab=page_info

YouTube

Video clips introducing our latest products and technologies are posted on YouTube.



https://www.youtube.com/user/TOSHIBASandSOfficial

SUBSIDIARIES AND AFFILIATES

(As of April 15, 2015)

Toshiba America Electronic Components, Inc.
- Irvine, Headquarters
  Tel: (949)462-7700 Fax: (949)462-2200
- Buffalo Grove (Chicago)
  Tel: (847)484-2400 Fax: (847)541-7287
- Duluth/Atlanta
  Tel: (770)931-3363 Fax: (770)931-7602
- El Paso
  Tel: (915)533-4242
- Marlborough
  Tel: (508)481-0034 Fax: (508)481-8828
- Parsippany
  Tel: (973)541-4715 Fax: (973)541-4716
- San Jose
  Tel: (408)526-2400 Fax: (408)526-2410
- Wixom (Detroit)
  Tel: (248)347-2607 Fax: (248)347-2602

TOSHIBA América do Sul Ltda.
Tel: (011)4083-7978

Toshiba India Private Ltd.
- New Delhi Office
  Tel: (0124)499-6600 Fax: (0124)499-6611
- Bangalore Office
  Tel: (080)251-90800 Fax: (080)490-91945

Toshiba Electronics Europe GmbH
- Düsseldorf Head Office
  Tel: (0211)5296-0 Fax: (0211)5296-400
- France Branch
  Tel: (1)47282181
- Italy Branch
  Tel: (039)68701 Fax: (039)6870205
- Munich Office
  Tel: (089)20302030 Fax: (089)203020310
- Spain Branch
  Tel: (91)660-6798 Fax: (91)660-6799
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  Tel: (08)704-0900 Fax: (08)80-8459
- U.K. Branch
  Tel: (1932)841600

Toshiba Vietnam Consumer Products Co.,Ltd.
Tel: (043)776-5950 Fax: (043)776-5956

Toshiba Electronics Asia (Singapore) Pte. Ltd.
Tel: (6278)5252 Fax: (6271)5155

Toshiba Electronics Service (Thailand) Co., Ltd.
Tel: (02)835-3491 Fax: (02)835-3490

Toshiba Electronics Trading (Malaysia)Sdn. Bhd.
- Kuala Lumpur Head Office
  Tel: (03)5631-6311 Fax: (03)5631-6307
- Penang Office
  Tel: (04)226-8523 Fax: (04)226-8515

Toshiba Electronics (China) Co., Ltd.
- Shanghai Head Office
  Tel: (021)6139-3888 Fax: (021)6190-8288
- Beijing Branch
  Tel: (010)6590-8796 Fax: (010)6590-8791
- Chengdu Branch
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- Qingdao Branch
  Tel: (532)8579-3328 Fax: (532)8579-3329
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  Tel: (0755)3686-0880 Fax: (0755)3686-0816
- Dalian Branch
  Tel: (0411)8368-6882 Fax: (0411)8369-0822
- Xiamen Branch
  Tel: (0592)226-1398 Fax: (0592)226-1399
- Dongguan Branch
  Tel: (0769)8155-6858 Fax: (0769)8155-6368

Toshiba Electronics Asia, Ltd.
Tel: 2375-6111 Fax: 2375-0969

Toshiba Electronics Korea Corporation
Tel: (02)3484-4334 Fax: (02)3484-4302

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