TDK

TDK

TDK FLASH STORAGE CATALOGUE

№
03

TDK Corporation
Flash Memory Applied Device Business Div.
https://product.tdk.com/en/













SMART INFRA : STORAGE

TDK-powered SSD solutions. Excelling anytime, anyplace, at any jobsite.

Manufacturing, transport, IT, financial, medical…
TDK flash storage devices help get the job right, in all domains.
On the land, across the seas, in the skies—24/7. SSD solutions from TDK,
securing your jobsite again, today.

SMART STORAGE, SMART FUTURE

TDK has developed the NAND-type flash memory controllers “GBDriver” series realizing high speed access while securing data reliability. TDK has also developed Solid State Drives (SSDs) combining GBDriver series inside, ideal solution for embedded systems.

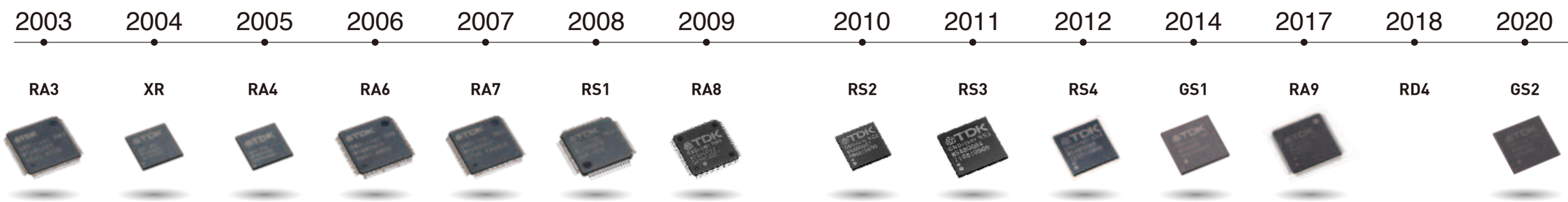
CONTENTS

03 GBDriver

07 Product Features

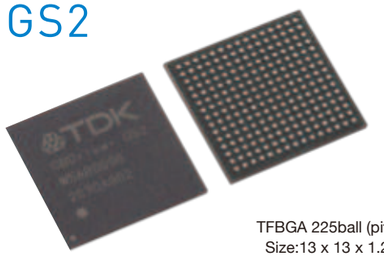
13 Product Lineup

GBDriver



Flash Memory Controller IC
GBDriver series

For 3D NAND

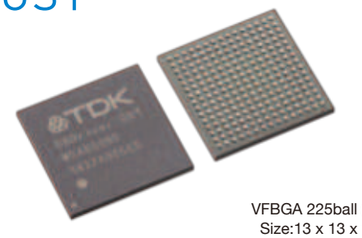
Product NAME	HOST INTERFACE	Operating Temperature
GS2  TFBGA 225ball (pitch 0.8mm) Size:13 x 13 x 1.2mm	SATA 1.5Gbps/3.0Gbps/6.0Gbps	-40 to +85℃

SSD controller for 3D NAND : GBDriver GS2

GBDriver GS2 is a highly reliable 3D flash memory controller IC with both hardware and firmware designed in-house(TDK) specifically for industrial use. As 3D flash memory technology advances, high-capacity flash storage solutions are more widely used and data reliability requirements are becoming increasingly sophisticated. Even in the industrial equipment sector, there is a growing need to improve performance while maintaining high data reliability. GBDriver GS2 not only adds new functions for 3D-NAND Flash memory but also uses TDK's proprietary technology to achieve high-speed access while enhancing power interruption tolerance and preventing data corruption.

powered by GBDriver

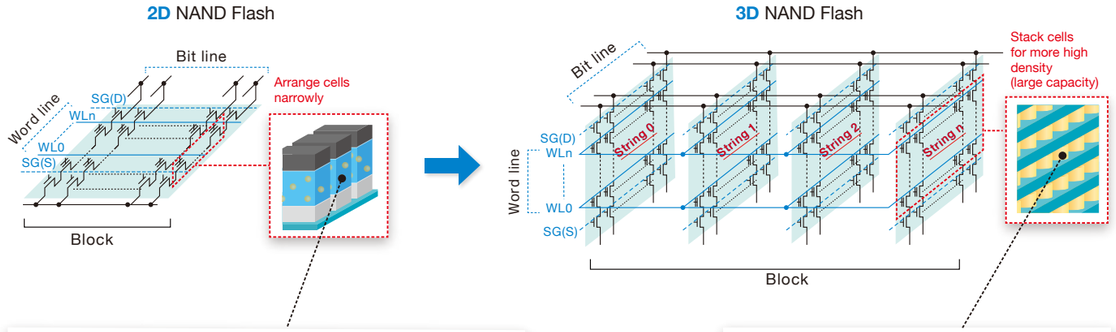
For 2D NAND

Product NAME	HOST INTERFACE	Operating Temperature
GS1  VFBGA 225ball (pitch 0.9mm) Size:13 x 13 x 1.2mm	SATA 1.5Gbps/3.0Gbps/6.0Gbps	-40 to +85℃
RS3  VFBGA 144ball (pitch 0.8mm) Size:12 x 12 x 1.4mm	SATA 1.5Gbps/3.0Gbps	-40 to +85℃

Product NAME	HOST INTERFACE					Operating Temperature
	PCMCIA ATA	Compact Flash	IDE	Direct Bus Connect	Inter -face	
RA9  TQFP 128pin (pitch 0.40mm) Size:16 x 16 x 1.2mm VFBGA 121ball (pitch 0.65mm) Size:8 x 8 x 0.99mm	○	4.1	PIO6 —— MDMA4 —— UDMA6	○	133 MByte/sec	-40 to +85℃

2D NAND vs 3D NAND

NAND flash memory has changed from the 2D plane array cell structure to the 3D stacked cell structure.
In 3D-NAND flash memory, the flash type can be selected from SLC mode and TLC.



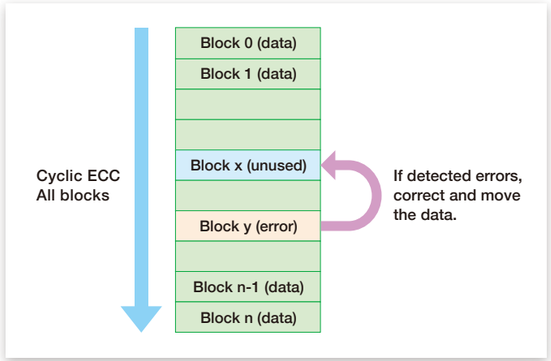
	SLC	SLC mode	MLC
Endurance [P/E per Block]	100K/50K	20K	3K
Data retention	10 years @ life begin – 10% 1year @ life end		
	0	0	01
			00
			10
	1	1	11
	1bit/cell(2state)	1bit/cell(2state)	2bit/cell(4state)

	SLC mode	TLC
Endurance [P/E per Block]	30K	3K
Data retention	10 years @ life begin 1year @ life end	
	0	011
		010
		000
		001
		101
		100
		110
	1	111
	1bit/cell(2state)	3bit/cell(8state)

Cyclic auto refresh function secures data retention.

TDK SSDs are equipped with a cyclic auto refresh function which automatically checks data and recovers errors by ECC. “Refresh” are executed at every boot and every 24hours.

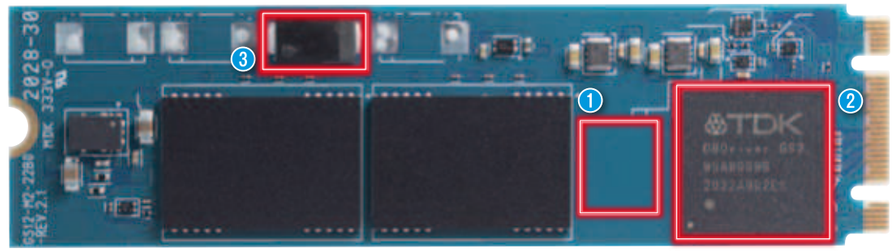
* This function works in background process when there is no access from host system.



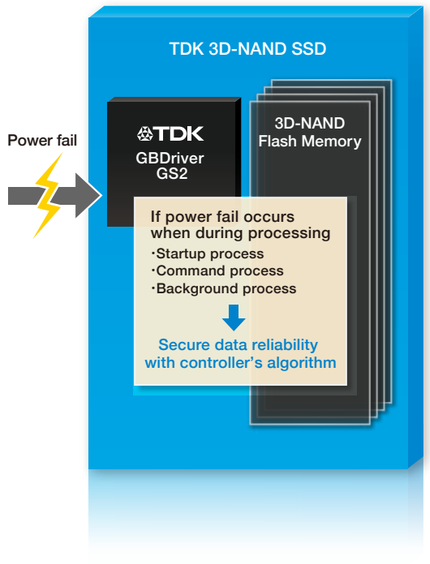
Countermeasures for power interruption

TDK’s SSDs are designed with an emphasis on power interruption tolerance. The combination of the following three measures provides an overwhelming level of tolerance.

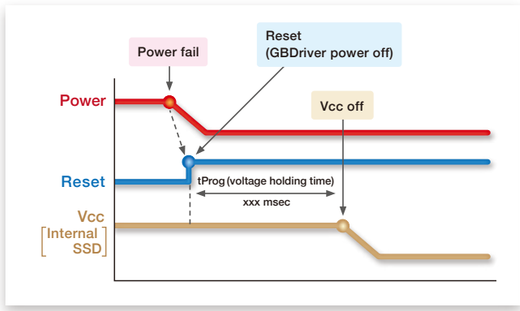
❶DRAM-less design

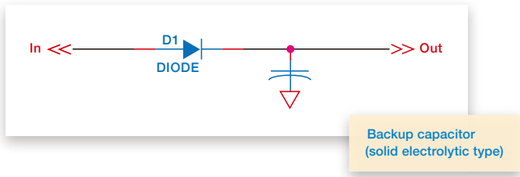


❷GBDriver GS2 algorithm (firmware)



❸Power backup circuit (on PCB)





TDK SSDs secure data reliability in sudden power fail.

① SSDs, Power shutdown test result

	TDK	A	B
Writing data sectors	2837558584	3966531026	2015419396
Power off cycles	677	946	481
Data errors	0 (0.00%)	859 (91%)	68 (14%)

② SD Memory cards, Power shutdown test result

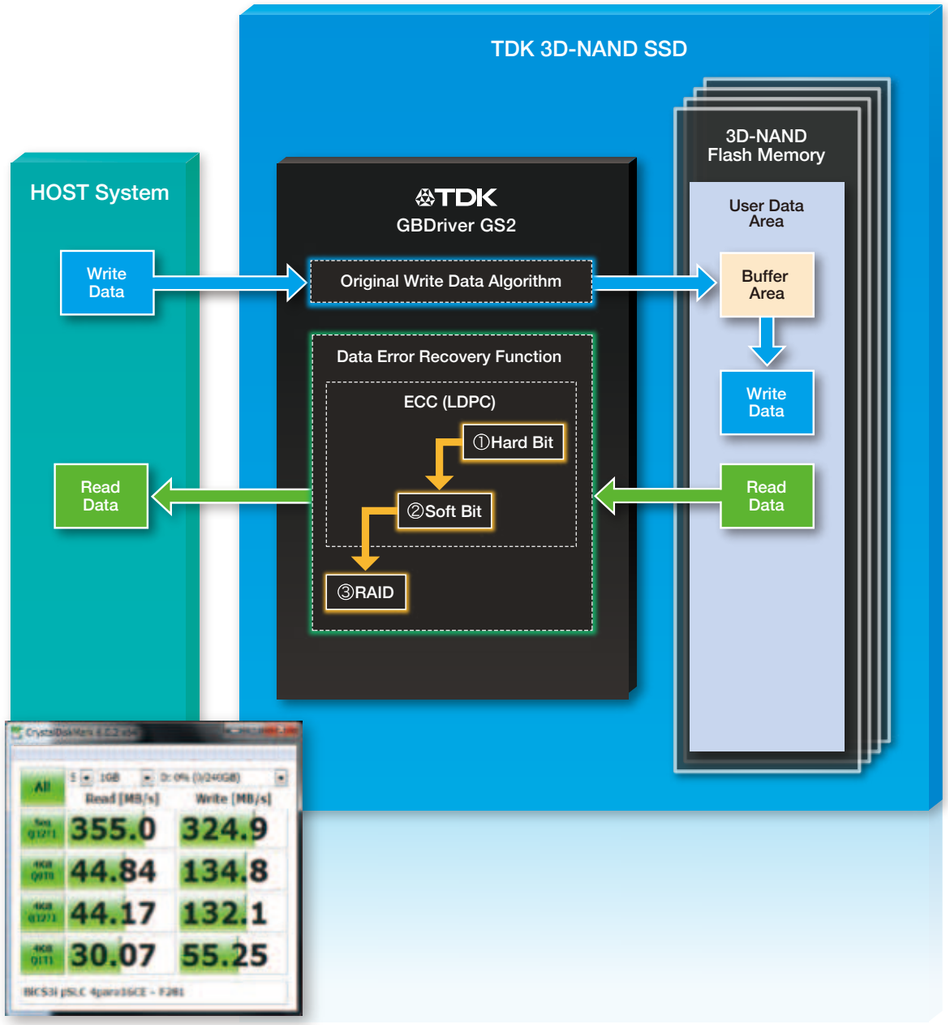
	TDK	A	B
Writing data sectors	166,049,542	27,296,954	5,791,942
Power off cycles	15,989	7,155	753
Data errors	0 (0.00%)	2 (0.03%)	1 (0.13%)

High-speed performance without the use of DRAM

TDK's 3D-SSD achieves high-speed performance despite its DRAM-less design in order to prioritize power failure tolerance (power interruption tolerance)

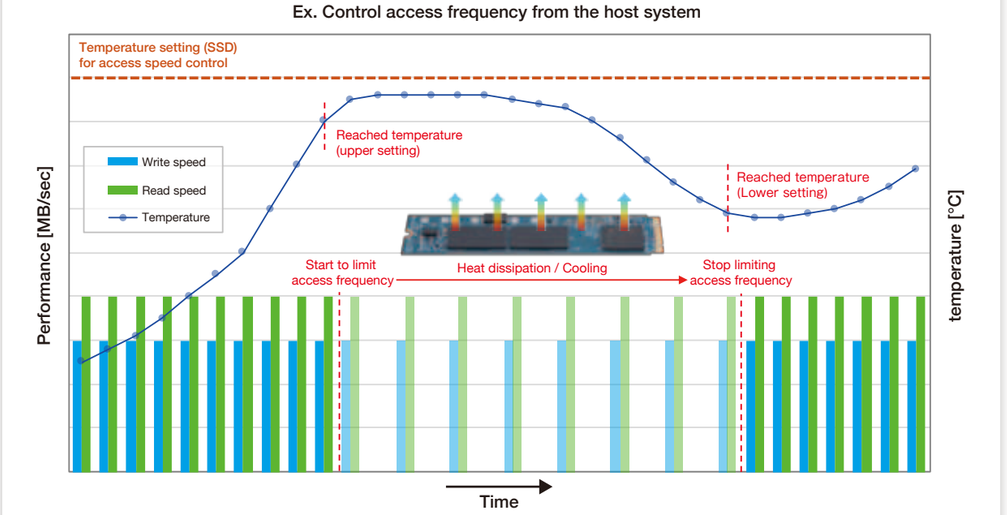
Data error recovery (LDPC/RAID)

TDK GBDriver GS2 has advanced data error recovery. When reading data from SSD, three functions work in stages. Depending on the data error situation, (1) LDPC Hard Bit, (2) LDPC Soft Bit, and (3) RAID are operated in this order as necessary to repair the error.



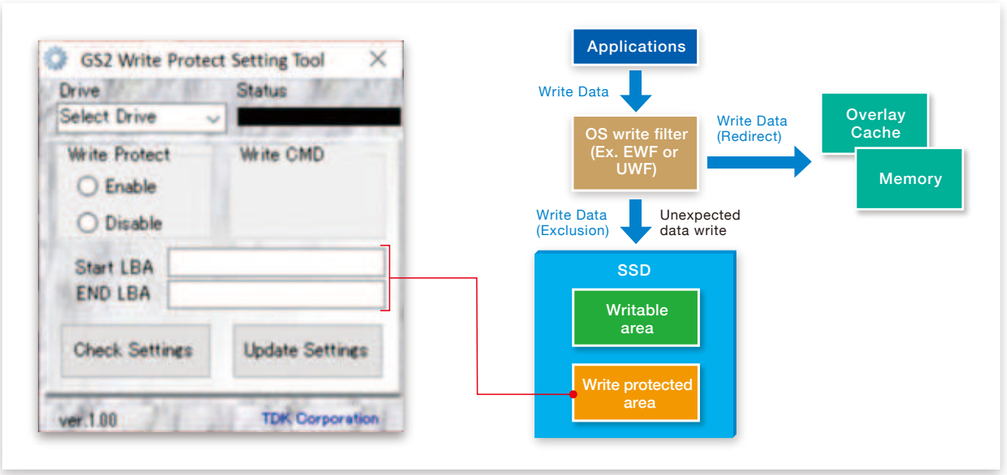
Temperature sensor and access speed limit

The on-board temperature sensor allows user to monitor the temperature of the SSD and limit access to the SSD from the host. The SSD also has a function to limit the access speed when the temperature setting value is exceeded.



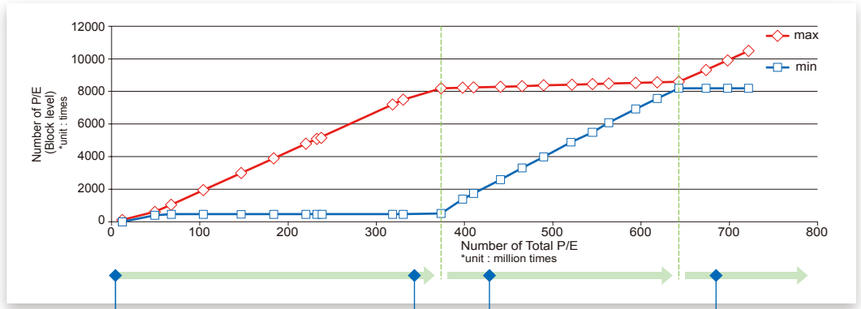
Write protected area setting function

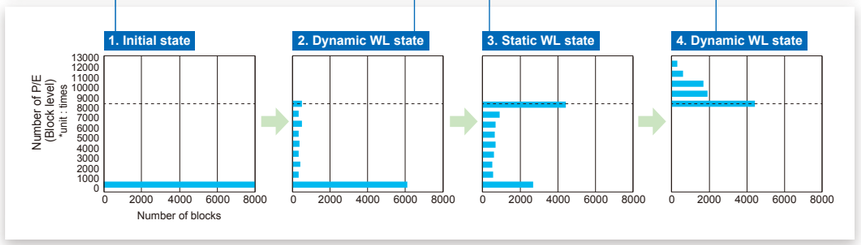
TDK SSDs can be configured with a write-protected area, making it possible to reduce the need for power interruption (power failure) countermeasures on the host side.
(For example, to prevent writes that occur when using the Windows UWF function)
Our original software to configure this function is available upon request.



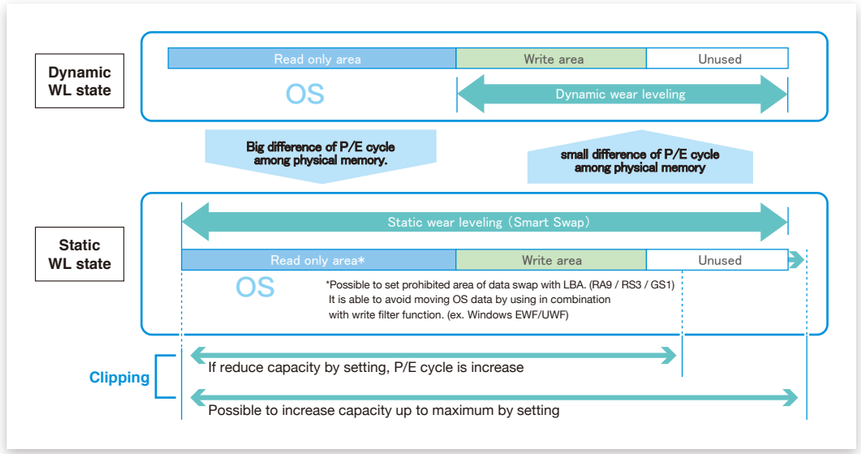
Longevity and ECO Friendly

In order to extend the longevity, our products execute “TDK global static wear leveling (TDK SMART SWAP)” and level P/E count of NAND flash cells(blocks) efficiently.
Storages replacement is Low frequency and it is Lower TCO (Total Cost of Ownership).





TDK global static wear leveling (TDK SMART SWAP)



Clipping (Number of sector setting)

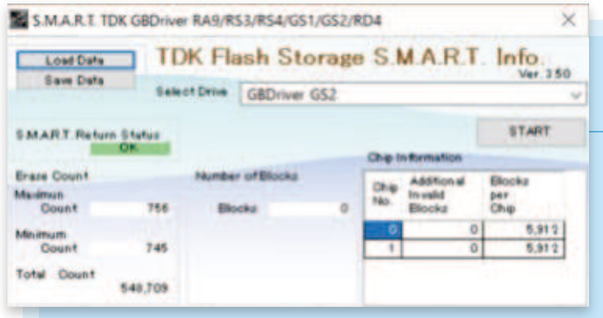
Possible to adjust number of sector for user data area in unit of a sector.

TDK SMART (Flash storage life monitor – Endurance analysis program)

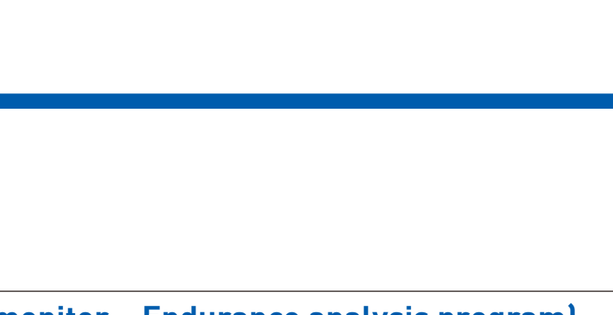
TDK SMART provides various information(following) and could predict storages life.

- Number of flash memory chips, number of blocks
- Number of total P/E cycles,Number of highest/lowest P/E cycles among blocks
- Total P/E cycles for all blocks(in a 10-level histogram)
- Memory usage[%], Life indicator[%]

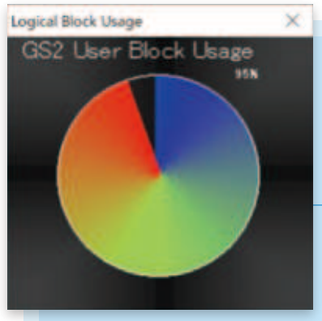
Tools for Windows OS are Available for download on TDK web site. https://product.tdk.com/info/en/products/flash-storage/flash-storage/tdksmart.html
*Please contact us if you need to receive detailed information. (addresses of various parameters, command operation, etc…)



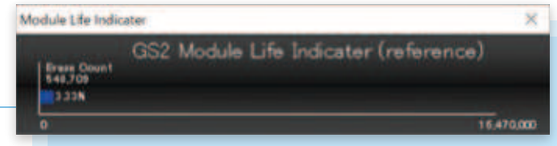
Main Window



Erase Count Histogram



Memory Usage



Life Indicator [%]

[3D NAND Storage]

CFast™

CAT2A



GENERAL INFORMATION

TYPE	CFast™			
INTERFACE DATA TRANSFER MODE	Serial ATA Revision 3.2 SATA 1.5Gbps, 3.0Gbps, 6.0Gpps			
CONNECTOR	CFast™ Type I			
OUTLINE DIMENSIONS	36.4 x 42.8 x 3.6 mm			
SERIES	CAT2A			
CONTROLLER TYPE	TDK GBDriver GS2			
FLASH TYPE	3D - SLC mode		3D - TLC mode	
	3D - Gen3	3D - Gen4	3D - Gen3	3D - Gen4
DENSITY RANGE	16 GB - 128 GB	32 GB - 256 GB	50 GB - 400 GB	100 GB - 800 GB
DATA RETENTION	10 years @ life begin 1 year @ life end			
ENDURANCE ENTERPRISE WL	30,000 P/E Cycles *Flash Block Level		3,000 P/E Cycles *Flash Block Level	

TEMPERATURE

OPERATING TEMPERATURE	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
STORAGE TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C

PERFORMANCE

Read (max.)	345 MByte/sec
Write (max.)	295 MByte/sec

ROBUSTNESS

MTBF	≥ 2,000,000 hours
SHOCK	1500G,0.5ms
VIBRATION	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)

ELECTRICAL DATA

VOLTAGE	3.3 V ± 5 %
POWER CONSUMPTION (*RT)	- Read: 1040 mW max. - Write: 1270 mW max. - Slumber: less than 60mA

FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller (HW/FW) - SLC Cache, LDPC-ECC, RAID - Temperature monitoring function - Write-protected area setting tool (on request) - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART (life monitor) - NCQ, TRIM - AES 256 bit encryption (on request)			
PART NUMBER	CAT2AxxxxKHxxA00EAA0	CAT2AxxxxKKxxA00EAA0	CAT2AxxxxKGxxA00EAA0	CAT2AxxxxKJxxA00EAA0

[2D NAND Storage]

CFast™

CAE3B



CAE1B



GENERAL INFORMATION

TYPE	CFast™			
INTERFACE DATA TRANSFER MODE	Serial ATA Revision 2.6 SATA 1.5Gbps, 3.0Gbps	Serial ATA Revision 3.1 SATA 1.5Gbps, 3.0Gbps, 6.0Gpps		
CONNECTOR	CFast™ Type I			
OUTLINE DIMENSIONS	36.4 x 42.8 x 3.6 mm			
SERIES	CAE3B	CAE1B		
CONTROLLER TYPE	TDK GBDriver RS3	TDK GBDriver GS1		
FLASH TYPE	SLC	SLC	pSLC	MLC
DENSITY RANGE	512 MB - 8 GB	16 GB - 64 GB	16 GB - 128 GB	32 GB - 256 GB
DATA RETENTION	10 years @ life begin-10% 1 year @ life end			
ENDURANCE ENTERPRISE WL	50,000 P/E Cycles *Flash Block Level	100,000 P/E Cycles *Flash Block Level	20,000 P/E Cycles *Flash Block Level	3,000 P/E Cycles *Flash Block Level

TEMPERATURE

OPERATING TEMPERATURE	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
STORAGE TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C

PERFORMANCE

Read (max.)	105 MByte/sec	340 MByte/sec	345 MByte/sec	295 MByte/sec
Write (max.)	60 MByte/sec	105 MByte/sec	145 MByte/sec	75 MByte/sec

ROBUSTNESS

MTBF	≥ 2,000,000 hours
SHOCK	1500G,0.5ms
VIBRATION	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)

ELECTRICAL DATA

VOLTAGE	3.3 V ± 5 %	
POWER CONSUMPTION (*RT)	- Read Write: 125 / 215 / 365mA max. (Single / 2ch / 4ch) - Slumber: less than 50mA	- Read: 385mA max. - Write: 370mA max. - Slumber: less than 100mA

FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller - DRAM-less Design - Power Fail Data Safety - Global static wear leveling - SMART - NCQ, TRIM - AES 128bit encryption (on request)	- In-House Designed Controller - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART - NCQ, TRIM - AES 128/256bit encryption (on request)		
PART NUMBER	CAE3BxxxxTxxxB00EAA0	CAE1BxxxxTXDxB00EAA0	CAE1BxxxxTKDxB00EAA0	CAE1BxxxxTFDxB00EAA0

[3D NAND Storage]

2.5" SATA SSD

SDT2A



GENERAL INFORMATION

TYPE	2.5 inch SATA SSD (7mm / 9mm)			
INTERFACE DATA TRANSFER MODE	Serial ATA Revision 3.2 SATA 1.5Gbps, 3.0Gbps, 6.0Gpps			
CONNECTOR	15 + 7 pin Serial ATA			
OUTLINE DIMENSIONS	100.2 x 69.85 x 7 mm / 9.5 mm			
SERIES	SDT2A			
CONTROLLER TYPE	TDK GBDriver GS2			
FLASH TYPE	3D - SLC mode		3D - TLC mode	
	3D - Gen3	3D - Gen4	3D - Gen3	3D - Gen4
DENSITY RANGE	16 GB - 256GB	32 GB - 512 GB	50 GB - 800 GB	100 GB - 1600 GB
DATA RETENTION	10 years @ life begin 1 year @ life end			
ENDURANCE ENTERPRISE WL	30,000 P/E Cycles *Flash Block Level		3,000 P/E Cycles *Flash Block Level	

TEMPERATURE

OPERATING TEMPERATURE	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
STORAGE TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C

PERFORMANCE

Read (max.)	345 MByte/sec
Write (max.)	295 MByte/sec

ROBUSTNESS

MTBF	≥ 2,000,000 hours
SHOCK	1,000G,1.0ms
VIBRATION	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)

ELECTRICAL DATA

VOLTAGE	5 V ± 10 %
POWER CONSUMPTION (*RT)	- Read: 1000 mW max. - Write: 1150 mW max. - Slumber: less than 60mA

FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller (HW/FW) - SLC Cache, LDPC-ECC, RAID - Temperature monitoring function - Write-protected area setting tool (on request) - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART (life monitor) - NCQ, TRIM - AES 256 bit encryption (on request)

PART NUMBER	SDT2AxxxxKHxxAx0ESA0	SDT2AxxxxKKxxAx0ESA0	SDT2AxxxxKGxxAx0ESA0	SDT2AxxxxKJxxAx0ESA0

[2D NAND Storage]

2.5" SATA SSD

SDE1B



GENERAL INFORMATION

TYPE	2.5 inch SATA SSD (7mm / 9mm)		
INTERFACE DATA TRANSFER MODE	Serial ATA Revision 3.1 SATA 1.5Gbps, 3.0Gbps, 6.0Gpps		
CONNECTOR	15 + 7 pin Serial ATA		
OUTLINE DIMENSIONS	100.2 x 69.85 x 7 mm / 9.5 mm		
SERIES	SDE1B		
CONTROLLER TYPE	TDK GBDriver GS1		
FLASH TYPE	SLC	pSLC	MLC
DENSITY RANGE	16 GB - 128 GB	16 GB - 256 GB	32 GB - 512 GB
DATA RETENTION	10 years @ life begin-10% 1 year @ life end		
ENDURANCE ENTERPRISE WL	100,000 P/E Cycles *Flash Block Level	20,000 P/E Cycles *Flash Block Level	3,000 P/E Cycles *Flash Block Level

TEMPERATURE

OPERATING TEMPERATURE	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
STORAGE TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C

PERFORMANCE

Read (max.)	420 MByte/sec	430 MByte/sec	365 MByte/sec
Write (max.)	305 MByte/sec	325 MByte/sec	235 MByte/sec

ROBUSTNESS

MTBF	≥ 2,000,000 hours
SHOCK	1,000G,1.0ms
VIBRATION	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)

ELECTRICAL DATA

VOLTAGE	5 V ± 10 %
POWER CONSUMPTION (*RT)	- Read: 320mA max. - Write: 600mA max. - Slumber: less than 100mA

FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART - NCQ, TRIM - AES 128/256bit encryption (on request)

PART NUMBER	SDE1BxxxxTXxxBx0ESA0	SDE1BxxxxTKxxBx0ESA0	SDE1BxxxxTFxxBx0ESA0

[3D NAND Storage]

Half Slim

SHT2A



GENERAL INFORMATION

TYPE	Half Slim			
INTERFACE DATA TRANSFER MODE	Serial ATA Revision 3.2 SATA 1.5Gbps, 3.0Gbps, 6.0Gpps			
CONNECTOR	15 + 7 pin Serial ATA			
OUTLINE DIMENSIONS	54 x 39 mm			
SERIES	SHT2A			
CONTROLLER TYPE	TDK GBDriver GS2			
FLASH TYPE	3D - SLC mode		3D - TLC mode	
	3D - Gen3	3D - Gen4	3D - Gen3	3D - Gen4
DENSITY RANGE	8 GB - 256GB	32 GB - 512 GB	25 GB - 800 GB	100 GB - 1600 GB
DATA RETENTION	10 years @ life begin 1 year @ life end			
ENDURANCE ENTERPRISE WL	30,000 P/E Cycles *Flash Block Level		3,000 P/E Cycles *Flash Block Level	

TEMPERATURE

OPERATING TEMPERATURE	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
STORAGE TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C

PERFORMANCE

Read (max.)	345 MByte/sec
Write (max.)	295 MByte/sec

ROBUSTNESS

MTBF	≥ 2,000,000 hours
SHOCK	1500G,0.5ms
VIBRATION	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)

ELECTRICAL DATA

VOLTAGE	5 V ± 10 %
POWER CONSUMPTION (*RT)	- Read: 1000 mW max. - Write: 1150 mW max. - Slumber: less than 60mA

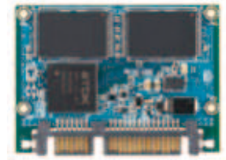
FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller (HW/FW) - SLC Cache, LDPC-ECC, RAID - Temperature monitoring function - Write-protected area setting tool (on request) - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART (life monitor) - NCQ, TRIM - AES 256 bit encryption (on request)			
PART NUMBER	SHT2AxxxxKxxxA00ESA0	SHT2AxxxxKKxxA00ESA0	SHT2AxxxxKxxxA00ESA0	SHT2AxxxxKJxxA00ESA0

[2D NAND Storage]

Half Slim

SHE1B



GENERAL INFORMATION

TYPE	Half Slim		
INTERFACE DATA TRANSFER MODE	Serial ATA Revision 3.1 SATA 1.5Gbps, 3.0Gbps, 6.0Gpps		
CONNECTOR	15 + 7 pin Serial ATA		
OUTLINE DIMENSIONS	54 x 39 mm		
SERIES	SHE1B		
CONTROLLER TYPE	TDK GBDriver GS1		
FLASH TYPE	SLC	pSLC	MLC
DENSITY RANGE	16 GB - 128 GB	16 GB - 256 GB	32 GB - 512 GB
DATA RETENTION	10 years @ life begin-10% 1 year @ life end		
ENDURANCE ENTERPRISE WL	100,000 P/E Cycles *Flash Block Level	20,000 P/E Cycles *Flash Block Level	3,000 P/E Cycles *Flash Block Level

TEMPERATURE

OPERATING TEMPERATURE	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
STORAGE TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C

PERFORMANCE

Read (max.)	340 MByte/sec	400 MByte/sec	320 MByte/sec
Write (max.)	115 MByte/sec	165 MByte/sec	75 MByte/sec

ROBUSTNESS

MTBF	≥ 2,000,000 hours
SHOCK	1500G,0.5ms
VIBRATION	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)

ELECTRICAL DATA

VOLTAGE	5 V ± 10 %
POWER CONSUMPTION (*RT)	- Read: 250mA max. - Write: 270mA max. - Slumber: less than 100mA

FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART - NCQ, TRIM - AES 128/256bit encryption (on request)		
PART NUMBER	SHE1BxxxxTXDxB00SSA0	SHE1BxxxxTKDxB00SSA0	SHE1BxxxxTFDxB00SSA0

[3D NAND Storage]
mSATA

SMT2A



GENERAL INFORMATION

TYPE	mSATA			
INTERFACE DATA TRANSFER MODE	Serial ATA Revision 3.2 SATA 1.5Gbps, 3.0Gbps, 6.0Gpps			
CONNECTOR	52 pin. Edge			
OUTLINE DIMENSIONS	50.8 x 29.85 mm			
SERIES	SMT2A			
CONTROLLER TYPE	TDK GBDriver GS2			
FLASH TYPE	3D - SLC mode		3D - TLC mode	
	3D - Gen3	3D - Gen4	3D - Gen3	3D - Gen4
DENSITY RANGE	16 GB - 128 GB	32 GB - 256 GB	50 GB - 400 GB	100 GB - 800 GB
DATA RETENTION	10 years @ life begin 1 year @ life end			
ENDURANCE ENTERPRISE WL	30,000 P/E Cycles *Flash Block Level		3,000 P/E Cycles *Flash Block Level	

TEMPERATURE

OPERATING TEMPERATURE	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
STORAGE TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C

PERFORMANCE

Read (max.)	345 MByte/sec			
Write (max.)	295 MByte/sec			

ROBUSTNESS

MTBF	≥ 2,000,000 hours
SHOCK	1500G,0.5ms
VIBRATION	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)

ELECTRICAL DATA

VOLTAGE	3.3 V ± 5 %
POWER CONSUMPTION (*RT)	- Read: 1040 mW max. - Write: 1270 mW max. - Slumber: less than 60mA

FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller (HW/FW) - SLC Cache, LDPC-ECC, RAID - Temperature monitoring function - Write-protected area setting tool (on request) - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART (life monitor) - NCQ, TRIM - AES 256 bit encryption (on request)			
PART NUMBER	SMT2AxxxxKHxxA00ESA0	SMT2AxxxxKKxxA00ESA0	SMT2AxxxxKGxxA00ESA0	SMT2AxxxxKJxxA00ESA0

[2D NAND Storage]
mSATA

SME3B



SME1B



GENERAL INFORMATION

TYPE	mSATA			
INTERFACE DATA TRANSFER MODE	Serial ATA Revision 2.6 SATA 1.5Gbps, 3.0Gbps	Serial ATA Revision 3.1 SATA 1.5Gbps, 3.0Gbps, 6.0Gpps		
CONNECTOR	52 pin. Edge			
OUTLINE DIMENSIONS	50.8 x 29.85 mm			
SERIES	SME3B	SME1B		
CONTROLLER TYPE	TDK GBDriver RS3	TDK GBDriver GS1		
FLASH TYPE	SLC	SLC	pSLC	MLC
DENSITY RANGE	512 MB - 8 GB	16 GB - 64 GB	16 GB - 128 GB	32 GB - 256 GB
DATA RETENTION	10 years @ life begin-10% 1 year @ life end			
ENDURANCE ENTERPRISE WL	50,000 P/E Cycles *Flash Block Level	100,000 P/E Cycles *Flash Block Level	20,000 P/E Cycles *Flash Block Level	3,000 P/E Cycles *Flash Block Level

TEMPERATURE

OPERATING TEMPERATURE	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
STORAGE TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C

PERFORMANCE

Read (max.)	160 MByte/sec	340 MByte/sec	345 MByte/sec	295 MByte/sec
Write (max.)	80 MByte/sec	105 MByte/sec	145 MByte/sec	75 MByte/sec

ROBUSTNESS

MTBF	≥ 2,000,000 hours
SHOCK	1500G,0.5ms
VIBRATION	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)

ELECTRICAL DATA

VOLTAGE	3.3 V ± 5 %	
POWER CONSUMPTION (*RT)	- Read Write: 160 / 275 / 470mA max. (Single / 2ch / 4ch) - Slumber: less than 50mA	- Read: 385mA max. - Write: 370mA max. - Slumber: less than 100mA

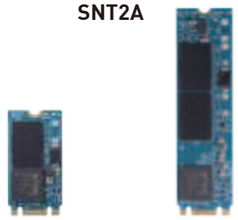
FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller - DRAM-less Design - Power Fail Data Safety - Global static wear leveling - SMART - NCQ, TRIM - AES 128bit encryption (on request)	- In-House Designed Controller - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART - NCQ, TRIM - AES 128/256bit encryption (on request)		
PART NUMBER	SME3BxxxxTxxxB00SSA0	SME1BxxxxTXDxB00SSA0	SME1BxxxxTKDxB00SSA0	SME1BxxxxTFDxB00SSA0

[3D NAND Storage]

M.2

SNT2A



GENERAL INFORMATION

TYPE	M.2 (2242 / 2280)			
INTERFACE DATA TRANSFER MODE	Serial ATA Revision 3.2 SATA 1.5Gbps, 3.0Gbps, 6.0Gpps			
CONNECTOR	75 pin. Edge B & M key			
OUTLINE DIMENSIONS	22 x 42 mm / 80mm			
SERIES	SNT2A			
CONTROLLER TYPE	TDK GBDriver GS2			
FLASH TYPE	3D - SLC mode		3D - TLC mode	
	3D - Gen3	3D - Gen4	3D - Gen3	3D - Gen4
DENSITY RANGE	2242 : 16 GB - 128 GB 2280 : 16 GB - 256 GB	2242 : 32 GB - 256 GB 2280 : 32 GB - 512 GB	2242 : 50 GB - 400 GB 2280 : 50 GB - 800 GB	2242 : 100 GB - 800 GB 2280 : 100 GB - 1600 GB
DATA RETENTION	10 years @ life begin 1 year @ life end			
ENDURANCE ENTERPRISE WL	30,000 P/E Cycles *Flash Block Level		3,000 P/E Cycles *Flash Block Level	

TEMPERATURE

OPERATING TEMPERATURE	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
STORAGE TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C

PERFORMANCE

Read (max.)	345 MByte/sec
Write (max.)	295 MByte/sec

ROBUSTNESS

MTBF	≥ 2,500,000 hours
SHOCK	1500G,0.5ms
VIBRATION	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)

ELECTRICAL DATA

VOLTAGE	3.3 V ± 5 %
POWER CONSUMPTION (*RT)	- Read: 1040 mW max. - Write: 1270 mW max. - Slumber: less than 60mA

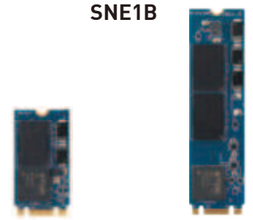
FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller (HW/FW) - SLC Cache, LDPC-ECC, RAID - Temperature monitoring function - Write-protected area setting tool (on request) - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART (life monitor) - NCQ, TRIM - AES 256 bit encryption (on request)			
PART NUMBER	SNT2AxxxxKHxxAx0ESA0	SNT2AxxxxKKxxAx0ESA0	SNT2AxxxxKGxxAx0ESA0	SNT2AxxxxKJxxAx0ESA0

[2D NAND Storage]

M.2

SNE1B



GENERAL INFORMATION

TYPE	M.2 (2242 / 2280)		
INTERFACE DATA TRANSFER MODE	Serial ATA Revision 3.1 SATA 1.5Gbps, 3.0Gbps, 6.0Gpps		
CONNECTOR	75 pin. Edge B & M key		
OUTLINE DIMENSIONS	22 x 42 mm / 80mm		
SERIES	SNE1B		
CONTROLLER TYPE	TDK GBDriver GS1		
FLASH TYPE	SLC	pSLC	MLC
DENSITY RANGE	2242 : 16 GB - 64 GB 2280 : 16GB - 128GB	2242 : 16 GB - 128 GB 2280 : 16 GB - 256 GB	2242 : 32 GB - 256 GB 2280 : 32 GB - 512 GB
DATA RETENTION	10 years @ life begin-10% 1 year @ life end		
ENDURANCE ENTERPRISE WL	100,000 P/E Cycles *Flash Block Level	20,000 P/E Cycles *Flash Block Level	3,000 P/E Cycles *Flash Block Level

TEMPERATURE

OPERATING TEMPERATURE	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
STORAGE TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C

PERFORMANCE

Read (max.)	340 MByte/sec	345 MByte/sec	295 MByte/sec
Write (max.)	105 MByte/sec	145 MByte/sec	75 MByte/sec

ROBUSTNESS

MTBF	≥ 2,500,000 hours
SHOCK	1500G,0.5ms
VIBRATION	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)

ELECTRICAL DATA

VOLTAGE	3.3 V ± 5 %
POWER CONSUMPTION (*RT)	- Read: 385mA max. - Write: 370mA max. - Slumber: less than 100mA

FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART - NCQ, TRIM - AES 128/256bit encryption (on request)		
PART NUMBER	SNE1BxxxxTXDxBx0SSA0	SNE1BxxxxTKDxBx0SSA0	SNE1BxxxxTFDxBx0SSA0

[2D NAND Storage]

Compact Flash™ / 2.5” PATA SSD

CFE9D



SDE9D



GENERAL INFORMATION

TYPE	CompactFlash™	2.5 inch PATA SSD
INTERFACE DATA TRANSFER MODE	PCMCIA/IDE UDMA0-6, MDMA0-4 & PIO0-6	IDE UDMA0-6, MDMA0-4 & PIO0-6
CONNECTOR	CFC Type I	44PIN
OUTLINE DIMENSIONS	36.4 x 42.8 x 3.3 mm	100 x 69.85 x 9.5 mm
SERIES	CFE9D	SDE9D
CONTROLLER TYPE	TDK GBDriver RA9	
FLASH TYPE	SLC	SLC
DENSITY RANGE	128 MB - 32 GB	1 GB - 64 GB
DATA RETENTION	10 years @ life begin-10% 1 year @ life end	
ENDURANCE ENTERPRISE WL	128 MB ~ 4 GB:50,000 P/E Cycles 8 GB ~ 32 GB:100,000 P/E Cycles *Flash Block Level	1 GB ~ 4 GB:50,000 P/E Cycles 8 GB ~ 32 GB:100,000 P/E Cycles *Flash Block Level

TEMPERATURE

OPERATING TEMPERATURE	Commercial:0°C to +70°C Industrial:-40°C to +85°C	
STORAGE TEMPERATURE	Commercial:-25°C to +85°C Industrial:-40°C to +85°C	

PERFORMANCE

Read (max.)	50 MByte/sec	
Write (max.)	35 MByte/sec	

ROBUSTNESS

MTBF	≥ 2,500,000 hours	≥ 2,000,000 hours
SHOCK	1000G,0.5ms	1500G,1.0ms
VIBRATION	15G,10-500Hz	20G,10-2000Hz
HUMIDITY	0 to 90 % RH (No condensation)	

ELECTRICAL DATA

VOLTAGE	3.3 V ± 5 % / 5 V ± 10 %	5 V ± 10 %
POWER CONSUMPTION (*RT)	- Single mode UDMA Read Write: 145mA @ 3.3V / 85mA @ 5.0V - 2ch mode UDMA Read Write: 220mA @ 3.3V / 130mA @ 5.0V - Stand-by:10mA @ 3.3V / 10mA @ 5.0V	- Single mode UDMA Read Write:80mA - 2ch mode UDMA Read Write:135mA - Stand-by:5mA

FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller (HW/FW) - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART - TRIM	- In-House Designed Controller (HW/FW) - DRAM-less Design - Power Fail Data Safety - Power Back-up Circuit - Global static wear leveling - SMART - TRIM
PART NUMBER	CFE9DxxxxTxxxB00EAA0	SDE9DxxxxTxxxB00ESA0

[2D NAND Storage]

SD Card / Micro SD Card

MMRD4



MURD4



GENERAL INFORMATION

TYPE	SD MEMORY CARD (SD / SDHC)		microSD MEMORY CARD (SD / SDHC)	
INTERFACE DATA TRANSFER MODE	SD 3.0, UHS-I/Class 10 (SDHC) , Class 6 (SD)			
CONNECTOR	SD		microSD	
OUTLINE DIMENSIONS	32 x 24 x 2.1 mm		15 x 11 x 0.7 / 1 mm	
SERIES	MMRD4		MURD4	
CONTROLLER TYPE	TDK GBDriver RD4			
FLASH TYPE	SLC	pSLC	SLC	pSLC
DENSITY RANGE	512 MB - 32 GB	4 GB - 32 GB	512 MB - 4 GB	4 GB - 32 GB
DATA RETENTION	10 years @ life begin-10% 1 year @ life end			
ENDURANCE ENTERPRISE WL	512 MB ~ 2 GB: 50,000 P/E Cycles 4 GB ~ 32 GB: 100,000 P/E Cycles *Flash Block Level	20,000 P/E Cycles *Flash Block Level	50,000 P/E Cycles *Flash Block Level	20,000 P/E Cycles *Flash Block Level

TEMPERATURE

OPERATING TEMPERATURE	Commercial: -25°C to +85°C Industrial: -40°C to +85°C			
STORAGE TEMPERATURE	-40°C to +85°C			

PERFORMANCE

Read (max.)	75 MByte/sec	70 MByte/sec	75 MByte/sec	70 MByte/sec
Write (max.)	50 MByte/sec	67 MByte/sec	50 MByte/sec	67 MByte/sec

ROBUSTNESS

MTBF	≥ 3,000,000 hours			
SHOCK	1000G,0.5ms			
VIBRATION	15G,10-2000Hz			
HUMIDITY	0 to 90 % RH (No condensation)			

ELECTRICAL DATA

VOLTAGE	2.7 ~ 3.6 V			
POWER CONSUMPTION (*RT)	- Read: 100mA max. - Write: 100mA max. - Stand-by: 0.4mA			

FEATURE LIST

FEATURES & TOOLS	- In-House Designed Controller - DRAM-less Design - Power Fail Data Safety - Global static wear leveling - SMART			
PART NUMBER	MMRD4xxxxVxxxA00ABA0		MURD4xxxxVxxxA00ABA0	

Part Number

[3D NAND Storage]

Gen3: 3D-NAND 3rd generation (Commercial: 0°C to +70°C / Industrial: -40°C to +85°C)
Gen4: 3D-NAND 4th generation (Commercial: 0°C to +70°C)

CFast





SLC mode Gen3	CAT2A016GKHBCA00EAA0 CAT2A032GKHDCA00EAA0 CAT2A064GKHDCA00EAA0 CAT2A128GKHDCA00EAA0
SLC mode Gen4	CAT2A032GKKBCA00EAA0 CAT2A064GKKDCA00EAA0 CAT2A128GKKDCA00EAA0 CAT2A256GKKDCA00EAA0
TLC mode Gen3	CAT2A050GKGBCA00EAA0 CAT2A100GKGDCA00EAA0 CAT2A200GKGDCA00EAA0 CAT2A400GKGDCA00EAA0
TLC mode Gen4	CAT2A100GKJBCA00EAA0 CAT2A200GKJDCA00EAA0 CAT2A400GKJDCA00EAA0 CAT2A800GKJDCA00EAA0

1) C:0~70°C>>> W:-40~85°C

SATA SSD





SLC mode Gen3	SDT2A016GKHBCAA0ESA0 SDT2A032GKHDCAA0ESA0 SDT2A064GKHDCAA0ESA0 SDT2A128GKHDCAA0ESA0 SDT2A256GKHDCAA0ESA0
SLC mode Gen4	SDT2A032GKKBCAA0ESA0 SDT2A064GKKDCAA0ESA0 SDT2A128GKKDCAA0ESA0 SDT2A256GKKDCAA0ESA0 SDT2A512GKKDCAA0ESA0
TLC mode Gen3	SDT2A050GKGBCAA0ESA0 SDT2A100GKGDCAA0ESA0 SDT2A200GKGDCAA0ESA0 SDT2A400GKGDCAA0ESA0 SDT2A800GKGDCAA0ESA0
TLC mode Gen4	SDT2A100GKJBCAA0ESA0 SDT2A200GKJDCAA0ESA0 SDT2A400GKJDCAA0ESA0 SDT2A800GKJDCAA0ESA0 SDT2A1R6TKJDCAA0ESA0

1) C:0~70°C >>> W:-40~85°C
2) A:Case7mm>>> 0:Case9.5mm

Half Slim



SLC mode Gen3	SHT2A008GKPACA00ESA0 SHT2A016GKHBCA00ESA0 SHT2A032GKHDCA00ESA0 SHT2A064GKHDCA00ESA0 SHT2A128GKHDCA00ESA0 SHT2A256GKHDCA00ESA0
SLC mode Gen4	SHT2A032GKKBCA00ESA0 SHT2A064GKKDCA00ESA0 SHT2A128GKKDCA00ESA0 SHT2A256GKKDCA00ESA0 SHT2A512GKKDCA00ESA0
TLC mode Gen3	SHT2A025GKNACA00ESA0 SHT2A050GKGBCA00ESA0 SHT2A100GKGDCA00ESA0 SHT2A200GKGDCA00ESA0 SHT2A400GKGDCA00ESA0 SHT2A800GKGDCA00ESA0
TLC mode Gen4	SHT2A100GKJBCA00ESA0 SHT2A200GKJDCA00ESA0 SHT2A400GKJDCA00ESA0 SHT2A800GKJDCA00ESA0 SHT2A1R6TKJDCA00ESA0

1) C:0~70°C >>> W:-40~85°C

mSATA



SLC mode Gen3	SMT2A016GKHBCA00ESA0 SMT2A032GKHDCA00ESA0 SMT2A064GKHDCA00ESA0 SMT2A128GKHDCA00ESA0
SLC mode Gen4	SMT2A032GKKBCA00ESA0 SMT2A064GKKDCA00ESA0 SMT2A128GKKDCA00ESA0 SMT2A256GKKDCA00ESA0
TLC mode Gen3	SMT2A050GKGBCA00ESA0 SMT2A100GKGDCA00ESA0 SMT2A200GKGDCA00ESA0 SMT2A400GKGDCA00ESA0
TLC mode Gen4	SMT2A100GKJBCA00ESA0 SMT2A200GKJDCA00ESA0 SMT2A400GKJDCA00ESA0 SMT2A800GKJDCA00ESA0

1) C:0~70°C >>> W:-40~85°C

M.2



SLC mode Gen3	SNT2A016GKHBCA00ESA0 SNT2A032GKHDCA00ESA0 SNT2A064GKHDCA00ESA0 SNT2A128GKHDCA00ESA0 SNT2A256GKHDCAA0ESA0
SLC mode Gen4	SNT2A032GKKBCA00ESA0 SNT2A064GKKDCA00ESA0 SNT2A128GKKDCA00ESA0 SNT2A256GKKDCA00ESA0 SNT2A512GKKDCAA0ESA0
TLC mode Gen3	SNT2A050GKGBCA00ESA0 SNT2A100GKGDCA00ESA0 SNT2A200GKGDCA00ESA0 SNT2A400GKGDCA00ESA0 SNT2A800GKGDCAA0ESA0
TLC mode Gen4	SNT2A100GKJBCA00ESA0 SNT2A200GKJDCA00ESA0 SNT2A400GKJDCA00ESA0 SNT2A800GKJDCA00ESA0 SNT2A1R6TKJDCAA0ESA0

1) C:0~70°C >>> W:-40~85°C
2) 0:Type2242 >>> A:Type2280

[2D NAND Storage]

CFast









SLC	CAE3B512MTNACB00EAA0 CAE3B001GTNACB00EAA0 CAE3B002GTNBCB00EAA0 CAE3B004GTNBCB00EAA0 CAE3B008GTNDCB00EAA0
SLC	CAE1B016GTXDCB00EAA0 CAE1B032GTXDCB00EAA0 CAE1B064GTXDCB00EAA0
pSLC	CAE1B016GTKDCB00EAA0 CAE1B032GTKDCB00EAA0 CAE1B064GTKDCB00EAA0 CAE1B128GTKDCB00EAA0
MLC	CAE1B032GTFDCB00EAA0 CAE1B064GTFDCB00EAA0 CAE1B128GTFDCB00EAA0 CAE1B256GTFDCB00EAA0

1) C:0~70°C >>> W:-40~85°C

SATA SSD





SLC	SDE1B016GTXDCBA0ESA0 SDE1B032GTXECBA0ESA0 SDE1B064GTXFCBA0ESA0 SDE1B128GTXFCBA0ESA0
pSLC	SDE1B016GTKDCBA0ESA0 SDE1B032GTKDCBA0ESA0 SDE1B064GTKECBA0ESA0 SDE1B128GTKFCBA0ESA0 SDE1B256GTKFCBA0ESA0
MLC	SDE1B032GTFDCBA0ESA0 SDE1B064GTFDCBA0ESA0 SDE1B128GTFECBA0ESA0 SDE1B256GTFFCBA0ESA0 SDE1B512GTFFCBA0ESA0

1) C:0~70°C >>> W:-40~85°C
2) A:Case7mm>>> 0:Case9.5mm

Half Slim



SLC	SHE1B016GTXDCB00SSA0 SHE1B032GTXDCB00SSA0 SHE1B064GTXDCB00SSA0 SHE1B128GTXDCB00SSA0
pSLC	SHE1B016GTKDCB00SSA0 SHE1B032GTKDCB00SSA0 SHE1B064GTKDCB00SSA0 SHE1B128GTKDCB00SSA0 SHE1B256GTKDCB00SSA0
MLC	SHE1B032GTFDCB00SSA0 SHE1B064GTFDCB00SSA0 SHE1B128GTFDCB00SSA0 SHE1B256GTFDCB00SSA0 SHE1B512GTFDCB00SSA0

1) C:0~70°C >>> W:-40~85°C

mSATA





SLC	SME3B512MTNACB00SSA0 SME3B001GTNACB00SSA0 SME3B002GTNBCB00SSA0 SME3B004GTNBCB00SSA0 SME3B008GTNDCB00SSA0
SLC	SME1B016GTXDCB00SSA0 SME1B032GTXDCB00SSA0 SME1B064GTXDCB00SSA0
pSLC	SME1B016GTKDCB00SSA0 SME1B032GTKDCB00SSA0 SME1B064GTKDCB00SSA0 SME1B128GTKDCB00SSA0
MLC	SME1B032GTFDCB00SSA0 SME1B064GTFDCB00SSA0 SME1B128GTFDCB00SSA0 SME1B256GTFDCB00SSA0

1) C:0~70°C >>> W:-40~85°C

M.2



SLC	SNE1B016GTXDCB00SSA0 SNE1B032GTXDCB00SSA0 SNE1B064GTXDCB00SSA0 SNE1B128GTXDCBA0SSA0
pSLC	SNE1B016GTKDCB00SSA0 SNE1B032GTKDCB00SSA0 SNE1B064GTKDCB00SSA0 SNE1B128GTKDCB00SSA0 SNE1B256GTKDCBA0SSA0
MLC	SNE1B032GTFDCB00SSA0 SNE1B064GTFDCB00SSA0 SNE1B128GTFDCB00SSA0 SNE1B256GTFDCB00SSA0 SNE1B512GTFDCBA0SSA0

1) C:0~70°C >>> W:-40~85°C
2) 0:Type2242 >>> A:Type2280

CF CARD



SLC	CFE9D128MTPACB00EAA0 CFE9D256MTPACB00EAA0 CFE9D512MTNACB00EAA0 CFE9D001GTNACB00EAA0 CFE9D002GTNACB00EAA0 CFE9D004GTNBCB00EAA0 CFE9D008GTYBCB00EAA0 CFE9D016GTYBCB00EAA0 CFE9D032GTYBCB00EAA0

1) C:0~70°C >>> W:-40~85°C

PATA SSD



SLC	SDE9D001GTNACB00ESA0 SDE9D002GTNBCB00ESA0 SDE9D004GTNBCB00ESA0 SDE9D008GTYBCB00ESA0 SDE9D016GTYBCB00ESA0 SDE9D032GTYBCB00ESA0 SDE9D064GTYBCB00ESA0

1) C:0~70°C >>> W:-40~85°C

SD



SLC	MMRD4512MVNACA00ABA0 MMRD4001GVNBCA00ABA0 MMRD4002GVNBCA00ABA0 MMRD4004GVYACA00ABA0 MMRD4008GVYBCA00ABA0 MMRD4016GVYBCA00ABA0 MMRD4032GVYBCA00ABA0
pSLC	MMRD4004GVHACA00ABA0 MMRD4008GVJACA00ABA0 MMRD4016GVJBCA00ABA0 MMRD4032GVJBCA00ABA0

1) C:-25~85°C >>> W:-40~85°C

micro SD



SLC	MURD4512MVNACA00ABA0 MURD4001GVNBCA00ABA0 MURD4002GVNBCA00ABA0 MURD4004GVNBCA00ABA0
pSLC	MURD4004GVHACA00ABA0 MURD4008GVHBCA00ABA0 MURD4016GVHBCA00ABA0 MURD4032GVHBCA00ABA0

1) C:-25~85°C >>> W:-40~85°C