

# Cactus<sup>®</sup>

## Technologies

Cactus Technologies designs and manufactures Industrial, OEM and Commercial Grade Flash Storage Devices with the highest endurance, performance and reliability. We offer memory solutions and support to meet the needs of OEM and Industrial customers worldwide.



### Product Lines

## Industrial Grade Embedded Flash Storage Devices

- ➔ Long Life Cycles - Fixed BOM Control
- ➔ Rugged, Reliable, Based on select SLC NAND components
- ➔ Industrial Strength Wear Leveling, Defect Management
- ➔ Available in a Wide Variety of Industry Standard Form Factors
- ➔ Industry Leading:
  - Handling of Unexpected Power Interruption
  - Data integrity, Quality & Reliability
  - Endurance
  - Temperature Options (-45C to 90C)
- ➔ SMART - Self Monitoring Analysis and Reporting Technology for useable life prediction
- ➔ Optional ATA Security, CTPurge™, CTLock™ and Write Protect Features, Physical Write Protect Switch

## OEM Grade

- ➔ Over 6 Times the Endurance of Commercial Grade
- ➔ Based on pSLC NAND with Fixed BOM Control
- ➔ Several Form Factors to Choose From

## Commercial Grade

- ➔ Most Reliable MLC NAND products with Fixed BOM Control
- ➔ Qualified and Tested to Industry Leading MLC specs
- ➔ Available in a Wide Variety of Industry Standard Form Factors

# Industrial Grade Embedded Flash Storage Devices

Highest specifications for Ruggedness, Temperature, Altitude, Endurance and Reliability. Ideal for most demanding Industrial and OEM applications. Uses only SLC (Single Level Cell) NAND memory.



## ATA/IDE Interface Devices:

The ATA/IDE interface, also known as PATA (Parallel ATA) interface, was developed in the early 1990s. While one of the older flash storage interfaces, the IDE interface is still widely used in OEM and Industrial designs today.

Form Factor	Series	Capacities		Sustained Transfers	
		Min	Max	Read	Write
CompactFlash	203	32MB	2GB	8MB/s	6MB/s
CompactFlash	303	128MB	32GB	35MB/s	20MB/s
CompactFlash	503	1GB	64GB	50MB/s	30MB/s
PC Card	203	32MB	2GB	8MB/s	6MB/s
PC Card	303	128MB	32GB	35MB/s	20MB/s
IDE Disk-On-Module	203	128MB	2GB	8MB/s	6MB/s
IDE Disk-On-Module	303	128MB	8GB	35MB/s	20MB/s
1.8" IDE SSD	303	128MB	32GB	35MB/s	20MB/s
2.5" IDE SSD	203	128MB	4GB	8MB/s	6MB/s
2.5" IDE SSD	303	128MB	32GB	35MB/s	20MB/s
2.5" IDE SSD	503	1GB	64GB	50MB/s	25MB/s



## SATA Interface SSDs:

The SATA interface, developed in 2003, is becoming a key interface in the embedded OEM flash storage market. With sustained read and write performance >500MB/sec on the SATA III interface products, it will meet almost every OEM's performance needs.

Form Factor	Series	Capacities		Sustained Transfers	
		Min	Max	Read	Write
CFast	900S	4GB	64GB	110MB/s	90MB/s
mSATA	900S	4GB	64GB	110MB/s	90MB/s
Slim SATA	900S	4GB	64GB	110MB/s	90MB/s
2.5" SATA II SSD	900S	4GB	128GB	110MB/s	90MB/s
2.5" SATA III SSD	910S	64GB	640GB	430MB/s	440MB/s



## SD Interface Devices:

The SD interface, developed in the late 1990s, has a low pin count serial bus which makes it ideal for small form factor designs. Many embedded processors come standard with the SD interface built-in for ease of implementation.

Form Factor	Series	Capacities		Sustained Transfers	
		Min	Max	Read	Write
SD Card	806	128MB	8GB	20MB/s	16MB/s
SD Card	808	512MB	16GB	28MB/s	23MB/s
SDChip	806	128MB	8GB	20MB/s	16MB/s
microSD	803M	1GB	4GB	20MB/s	17MB/s



## USB Interface Devices:

The USB interface, developed in the mid-1990s, is typically used for removable devices such as USB Flash Drives. With USB support on many processors, many designers have chosen to use an embedded USB module as well.

Form Factor	Series	Capacities		Sustained Transfers	
		Min	Max	Read	Write
USB Flash Drive	100	128MB	8GB	30MB/s	25MB/s
USB Disk-On-Module	100	128MB	8GB	30MB/s	25MB/s
USB Flash Drive	300	512MB	32GB	30MB/s	25MB/s

## Customization Services

- ➔ Custom Labeling & Preloaded Content
- ➔ Custom Feature Sets
- ➔ Custom Firmware/ID
- ➔ Complete Custom Products

# Pro Series

Available on select ATA and SATA devices

- ➔ ATA Security Feature Set: Set/Disable Password, Security Lock/Unlock, etc.
- ➔ CTPurge™: Generic Erase Options:
  - Erase Only
  - Erase and Overwrite with random data once
  - Erase and overwrite with random data N times
- ➔ CTPurge™: Erase Options according to:
  - USA-AF AFSSI 5020 specification
  - USA Navy NAVSO P-5239-26 specification
  - DoD 5220.22-M specification
  - NSA Manual 130-2 specification
  - USA-Army 380-19 specification
  - NISPOMSUP Chap.8, Sect.8-501 specification
  - IREC (IRIG) 106 specification
  - Others upon customer request
- ➔ CTLock™: Simplified Lock/Unlock Command
- ➔ CTWPROT™ - Write Protect:
  - Software command
  - Hardware selection (CF pin 40, Jumper on SSD)



Form Factor	Series	Capacities		Sustained Transfers	
		Min	Max	Read	Write
CompactFlash	<b>303-Pro</b>	128MB	32GB	35MB/s	20MB/s
PC Card	<b>303-Pro</b>	128MB	32GB	35MB/s	20MB/s
2.5" IDE SSD	<b>303-Pro</b>	128MB	32GB	35MB/s	20MB/s
2.5" SATA III SSD	<b>910S-Pro</b>	64GB	640GB	430MB/s	440MB/s
2.5" SATA III SSD	<b>230S-Pro</b>	128GB	640GB	380MB/s	400MB/s

# OEM Grade

Based on pSLC (Pseudo-SLC) NAND memory with over 6 times the Endurance of Commercial Grade products. Ideal for applications where Commercial Grade MLC does not meet Endurance requirements.



Form Factor	Series	Capacities		Sustained Transfers	
		Min	Max	Read	Write
SD Card	<b>245</b>	4GB	64GB	80MB/s	65MB/s
CFAST	<b>245S</b>	4GB	64GB	350MB/s	310MB/s
mSATA	<b>245S</b>	4GB	128GB	540MB/s	450MB/s
M.2 (2260)	<b>245S</b>	4GB	128GB	540MB/s	450MB/s
2.5" SATA III SSD	<b>245S</b>	8GB	512GB	540MB/s	450MB/s

# Cactus Extras

- ➔ Pre-Sales Engineering Design Assistance
- ➔ Post-Sales Applications Engineering Support
- ➔ Leading Industrial Grade Flash Storage Supplier
- ➔ Development Adapters
- ➔ Bonded Inventory
- ➔ Extended Last-Time-Shipments option

# Commercial Grade

Based on MLC (Multi Level Cell) NAND memory and offering a cost-effective solution for budget limited applications. Ideal for Lower Endurance applications.



Form Factor	Series	Capacities		Sustained Transfers	
		Min	Max	Read	Write
CompactFlash	240	4GB	256GB	110MB/s	80MB/s
SD Card	240	4GB	128GB	80MB/s	40MB/s
microSD	240M	8GB	32GB	85MB/s	50MB/s
CFast	240S	4GB	256GB	530MB/s	330MB/s
mSATA	240S	8GB	256GB	560MB/s	360MB/s
Slim SATA	220S	4GB	128GB	165MB/s	80MB/s
M.2 (2260)	240S	8GB	256GB	560MB/s	360MB/s
2.5" SATA III SSD	230S	128GB	640GB	380MB/s	400MB/s
2.5" SATA III SSD	240S	16GB	1TB	560MB/s	460MB/s

## Product Grade Selector

Product Grade	Industrial	OEM	Commercial	Consumer
NAND Types	SLC Single Level Cell	pSLC Pseudo SLC	MLC Multi Level Cell	TLC Tri Level Cell
Bit/Cell	1	1	2	3
Endurance Cycles	100K / 80K / 50K	20K	3K	300
Reliability	● ● ● ● ●	● ◐	●	◐
Data Retention	● ● ● ● ●	● ◐	●	◐
Life Cycle	● ● ● ● ●	● ●	● ●	
Locked-BOM	✓	✓	✓	
Cost	\$\$\$\$	\$\$\$	\$\$	\$



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