

# Flash Memory Storage Solutions From the Worldwide Flash Card Leader.



**SanDisk**   
STORE YOUR WORLD IN OURS™

More people rely on SanDisk® memory cards than any other brand in the world, and for good reasons. As a pioneer and leader in the field, SanDisk designs its own non-volatile flash memory and controller technology, and develops the complete card design and manufacturing process. By having this capability, staying very close to the customers and meeting the needs of the markets served, SanDisk is able to continually set the standard for quality, reliability and performance.



	CompactFlash	SanDisk Ultra II CompactFlash	
<b>Interface</b>	PC Card ATA True IDE Mode	PC Card ATA True IDE Mode	
<b>Performance</b> (Notes 1 & 2) Interface Transfer Speed (Max)	16.6 MB/sec	16.6 MB/sec	
<b>Power Requirements</b> (Note 1) DC Input Voltage			
Commercial	3.3V ± 5%, 5V ± 10%	3.3V ± 5%, 5V ± 10%	
Industrial	3.3V ± 5%, 5V ± 10%	3.3V ± 5%, 5V ± 10%	
Typical Power Dissipation (Notes 3 & 4)			
Sleep	300 µA (3.3V)	500 µA (5V)	300 µA (3.3V)
Read (Typical)	<50 mA RMS (3.3V)	<55 mA RMS (5V)	<50 mA RMS (3.3V)
Write (Typical)	<65 mA RMS (3.3V)	<70 mA RMS (5V)	<65 mA RMS (3.3V)
<b>Environmental Specifications</b>			
<b>Temperature</b>			
Operating Commercial	0–60°C	0–60°C	
Non-Operating Commercial	–25–85°C	–25–85°C	
<b>Humidity</b>			
Operating	8–95%, non-condensing	8–95%, non-condensing	
Non-Operating	8–95%, non-condensing	8–95%, non-condensing	
<b>Acoustic Noise (at 1 meter)</b>	0 dB	0 dB	
<b>Vibration</b>			
Operating	15 G peak to peak max.	15 G peak to peak max.	
Non-Operating	15 G peak to peak max.	15 G peak to peak max.	
<b>Shock</b>			
Operating	2,000 G max.	2,000 G max.	
Non-Operating	2,000 G max.	2,000 G max.	
<b>Altitude (relative to sea level)</b>			
Operating/Non-Operating	80,000 feet max.	80,000 feet max.	
<b>Reliability and Maintenance</b>			
MTBF (Mean Time Between Failures)	>1,000,000 hours	>1,000,000 hours	
Preventive Maintenance	None	None	
Data Reliability	<1 non-recoverable error in 10 <sup>14</sup> bits read	<1 non-recoverable error in 10 <sup>14</sup> bits read	
<b>Physical Specifications</b>	CompactFlash	Ultra II CompactFlash	
Length	1.433 in (36.4 mm)	1.433 in (36.4 mm)	
Width	1.685 in (42.8 mm)	1.685 in (42.8 mm)	
Thickness (Body)	0.130 in (3.30 mm)	0.130 in (3.30 mm)	
Thickness (Removable Edge)	0.155 in (3.94 mm)	0.155 in (3.94 mm)	
Weight	0.40 oz (11.4 g)	0.40 oz (11.4 g)	
<b>Ordering Information</b>			
Order Model	SDCFJ-YYY	SDCFH-YYY	
YYY:	64      64.2 MB	256      256.2 MB	
	128      128.4 MB	512      512.4 MB	
	256      256.9 MB	1024      1024.9 MB	
	512      512.4 MB	2048      2048.9 MB	
	1024      1024.9 MB	4096      4096.3 MB	
	2048      2048.9 MB	8192      8192.6 MB	
	4096      4096.3 MB		

Specifications subject to change without notice

**Other versions available:**

B: Standard

H: "Ultra" High-Speed

J: MLC/NAND

I: Industrial Temperature

Note: Capacities may vary by product family. Consult your SanDisk Sales Representative for correct ordering part numbers.

**Note 1:** All values quoted are typical at ambient temperature and nominal supply voltage unless otherwise stated.

**Note 2:** All performance timing assumes the controller is in the default (i.e., fastest) mode.

- **SanDisk CompactFlash®**

SanDisk CompactFlash revolutionized handheld electronics with unprecedented functionality when CompactFlash was first invented. The CompactFlash memory card's matchbook size and half-ounce weight make it the ideal solution for small devices that need high capacity flash memory. Today, the CompactFlash storage specification is the industry-standard for next-generation, small form factor consumer applications such as digital cameras and handheld PCs that need very high capacities. CompactFlash is available in capacities up to 4GB\* and the SanDisk Ultra® II CompactFlash is available in capacities up to 8GB.



- **SanDisk MultiMediaCard™**

The SanDisk MultiMediaCard is available in 32MB, 64MB, 128MB, and 256MB capacities. Weighing less than two grams and about the size of a postage stamp, the SanDisk MultiMediaCard is designed to meet the unique requirements of portable communications and computing markets for small size, upgradable capacities, and low cost.



- **SanDisk RS-MMC™ (Reduced-Size MultiMediaCard)**

The SanDisk RS-MMC is designed for use in the newest generation of ultra-small mobile phones. It is about half the size of a standard MultiMediaCard, and has the same simple, low power interface. This allows the RS-MMC to be used with an extender in a full size MMC slot. The RS-MMC is available in 32MB, 64MB, 128MB, 256MB and 512MB capacities.



\* 1 megabyte (MB) = 1 million bytes;  
1 gigabyte (GB) = 1 billion bytes

- **SanDisk Memory Stick PRO Duo™ Card**

The SanDisk Memory Stick PRO Duo card provides high capacity memory with the data transfer speeds of the Memory Stick PRO Interface. It was designed for use in the newest generation of mobile phones, digital still cameras, video cameras, digital music players and other size-sensitive mobile devices. The Memory Stick PRO Duo cards are also very secure with Advanced MagicGate™ copy protection included. Available in 32MB, 64MB, 128MB, 256MB, 512MB and 2GB capacities.



- **SanDisk TriFlash®**

SanDisk TriFlash is a single chip device ideal for storing audio, video, images and other data on small portable systems such as smart phones, MP3 players and handheld computers. It has a simple, high-performance serial interface that follows the industry standard SPI, MultiMediaCard, or SD card protocols. This allows the TriFlash to be seamlessly integrated into designs that already have a memory card slot. TriFlash is available today in 64MB, 128MB, 512MB and 1GB capacities.



- **SanDisk USB Flash Drive (UFD)**

The SanDisk UFD is available in 64MB, 128MB, 256MB, 512MB, 1GB and 2GB capacities. It is Hi-Speed USB 2.0 compliant. This drive was specifically designed to allow unique customization on the label. The SanDisk UFD is slim enough to plug into any USB port without obstructing adjacent ports.



	microSD	SD Card
<b>Interface</b>	SD or SPI	SD or SPI
<b>Performance</b> (Notes 1 & 2)		
Interface Transfer Speed (Max)	12.5 MB/sec	12.5 MB/sec
<b>Power Requirements</b> (Note 1)		
DC Input Voltage		
Commercial	2.7V to 3.6V	2.7V to 3.6V
Industrial	N/A	N/A
Typical Power Dissipation (Notes 3 & 4)		
Sleep	150 $\mu$ A max.	250 $\mu$ A
Read	<45 mA max.	<75 mA
Write	<50 mA max.	<75 mA
<b>Environmental Specifications</b>		
Temperature		
Operating Commercial	-25–85°C	-25–85°C
Operating Industrial	N/A	N/A
Non-Operating Commercial	-40–85°C	-40–85°C
Non-Operating Industrial	N/A	N/A
Humidity		
Operating	25°C/85% rel. humidity	25–95%, non-condensing
Non-Operating	40°C/85% rel. humidity	25–95%, non-condensing
Acoustic Noise (at 1 meter)	0 dB	0 dB
Vibration		
Operating	15 G peak to peak max.	15 G peak to peak max.
Non-Operating	15 G peak to peak max.	15 G peak to peak max.
Shock		
Operating	1,000 G max.	1,000 G max.
Non-Operating	1,000 G max.	1,000 G max.
Altitude (relative to sea level)		
Operating/Non-Operating	80,000 feet max.	80,000 feet max.
<b>Reliability and Maintenance</b>		
MTBF (Mean Time Between Failures)	>1,000,000 hours	>1,000,000 hours
Preventive Maintenance	None	None
Data Reliability	<1 non-recoverable error in $10^{16}$ bits read	<1 non-recoverable error in $10^{16}$ bits read
<b>Physical Specifications</b>		
Length	11 mm	32 mm $\pm$ 0.1 mm
Width	15 mm	24 mm $\pm$ 0.08 mm
Thickness (Body)	1.0 mm	2.1 mm $\pm$ 0.1 mm
Thickness (Removable Edge)	N/A	N/A
Weight	0.40 g. max.	2.0 g. max.
<b>Ordering Information</b>		
Order Model #	SDSDQ-YYY	SDSDJ-YYY
YYY:	32    32 MB 64    64 MB 128   128 MB 256   256 MB 512   512 MB	64    64.2 MB 128   128.2 MB 256   256.2 MB 512   512.4 MB 1024   1024.9 MB 2048   2048.9 MB

Specifications subject to change without notice

**Note 1:** All values quoted are typical at ambient temperature and nominal supply voltage unless otherwise stated.

**Note 2:** All performance timing assumes the controller is in the default (i.e., fastest) mode.

	SanDisk Ultra II SD Card	MiniSD
<b>Interface</b>	SD	SD or SPI
<b>Performance</b> (Notes 1 & 2) Interface Transfer Speed (Max)	12.5 MB/sec	12.5 MB/sec
<b>Power Requirements</b> (Note 1) <b>DC Input Voltage</b>		
Commercial	2.7V to 3.6V	2.7V to 3.6V
Industrial	N/A	N/A
<b>Typical Power Dissipation</b> (Notes 3 & 4)		
Sleep	250 µA	150
Read	<75 mA	<45 mA
Write	<75 mA	<50 mA
<b>Environmental Specifications</b>		
<b>Temperature</b>		
Operating Commercial	-25–85°C	-25–85°C
Operating Industrial	N/A	N/A
Non-Operating Commercial	-40–85°C	-40–85°C
Non-Operating Industrial	N/A	N/A
<b>Humidity</b>		
Operating	25–95%, non-condensing	8–95%, non-condensing
Non-Operating	25–95%, non-condensing	8–95%, non-condensing
<b>Acoustic Noise</b> (at 1 meter)	0 dB	0 dB
<b>Vibration</b>		
Operating	15 G peak to peak max.	15 G peak to peak max.
Non-Operating	15 G peak to peak max.	15 G peak to peak max.
<b>Shock</b>		
Operating	1,000 G max.	1,000 G max.
Non-Operating	1,000 G max.	1,000 G max.
<b>Altitude</b> (relative to sea level)		
Operating/Non-Operating	80,000 feet max.	80,000 feet max.
<b>Reliability and Maintenance</b>		
MTBF (Mean Time Between Failures)	>1,000,000 hours	>1,000,000 hours
Preventive Maintenance	None	None
Data Reliability	<1 non-recoverable error in 10 <sup>14</sup> bits read	<1 non-recoverable error in 10 <sup>14</sup> bits read
<b>Physical Specifications</b>		
Length	32 mm	21.5 mm
Width	24 mm ± 0.08 mm	20.0 mm
Thickness (Body)	2.1 mm ± 0.1 mm	1.4 mm
Thickness (Removable Edge)	N/A	N/A
Weight	2.0 g. max.	1.0 g. max.
<b>Ordering Information</b>		
Order Model #	SDDSDH-YYY	SDDSDM-YYY
YYY:	512 512 MB 1024 1024.9 MB 2048 2048.9 MB	16 16.1 MB 32 32.1 MB  64 64.2 MB 128 128.2 MB 256 256.2 MB 512 512.4 MB 1024 1024.9 MB

Specifications subject to change without notice

**Note 3:** Sleep mode currently is specified under the condition that all card inputs are static CMOS levels and in a "Not Busy" operating state.

**Note 4:** The currents specified show the bounds of programmability of the product.



SanDisk offers a broad range of flash data storage products, including PC cards, memory modules, CompactFlash®, SD™, miniSD, MultiMediaCard™, xD™, RS-MMC™, OEM USB and Memory Stick PRO Duo™. All of these products share the leading edge technology for which SanDisk is known.

SanDisk is the inventor or co-developer of most of the flash memory card form factors on the market today, including CompactFlash, MultiMediaCard, SD, Memory Stick PRO™, TriFlash and microSD.

In 2000, SanDisk entered into a joint flash fabrication venture called FlashVision LLC, which produces NAND wafers at a plant located in Yokkaichi, Japan. In 2002, SanDisk launched the world's first Multi-Level Cell NAND-based flash memory products, and today SanDisk is one of only two companies manufacturing MLC NAND flash memory.

Beyond the core flash memory technology, SanDisk continues to evolve flash card functionality and performance levels to meet the needs of emerging applications such as mobile phones, PDAs, portable audio, digital video, digital imaging and more. This brochure highlights all of the products currently available for OEM customers. For more accurate and up-to-date product information and specifications, please visit the SanDisk website at [www.sandisk.com](http://www.sandisk.com).

#### • SanDisk microSD™ Card

Measuring just 11mm by 15mm and 1mm thick, the new SanDisk microSD card is the ultimate storage solution for the next generation of increasingly compact mobile phones. Two-thirds the size of a SIM module, microSD cards are even smaller than many embedded memory devices.



Available in capacities ranging from 32MB to 512MB, the SanDisk microSD card gives mobile phone designers and manufacturers more flexibility. In addition, the SanDisk microSD removable card makes it easy for mobile phone users to transport their personal content like contact lists and saved photos, high fidelity ring tones, applications, and system settings from one mobile phone to another when they need to upgrade their phone or service.

#### • SanDisk SD™ Card

The SD Card is a flash memory storage device designed to meet the security, capacity and performance requirements inherent in the latest consumer electronics devices. Key enhancements over the MultiMediaCard include cryptographic security for protection of copyrighted data, more than a 5X improvement in maximum data transfer rate, and a user selectable write protect switch on the card casing. The standard SD is offered in capacities from 64MB to 2GB and the SanDisk Ultra II SD is available in 512MB and 1GB capacities.



#### • SanDisk miniSD™ Card

The miniSD card is the world's smallest removable flash storage card, designed specifically to meet the needs of today's small mobile phones. SanDisk miniSD is based on the popular SD card. It uses the same powerful, simple, high performance interface SD offers. The miniSD offers full compatibility and interoperability with any SD host by using an available passive adapter. The SanDisk miniSD card is available in capacities up to 1GB.



	MultiMediaCard	RS-MMC
<b>Interface</b>	MultiMediaCard or SPI	MultiMediaCard or SPI
<b>Performance</b> (Notes 1 & 2)		
Interface Transfer Speed (Max)	2.5 MB/sec	2.5 MB/sec
<b>Power Requirements</b> (Note 1)		
<b>DC Input Voltage</b>		
Commercial	2.7V to 3.6V	2.7V to 3.6V
Industrial	N/A	N/A
<b>Typical Power Dissipation</b> (Notes 3 & 4)		
Sleep	150 µA	150 µA
Read	<50 mA	<50 mA
Write	<60 mA	<60 mA
<b>Environmental Specifications</b>		
<b>Temperature</b>		
Operating Commercial	-25-85°C	-25-85°C
Operating Industrial	N/A	N/A
Non-Operating Commercial	-40-85°C	-40-85°C
Non-Operating Industrial	N/A	N/A
<b>Humidity</b>		
Operating	8-95%, non-condensing	8-95%, non-condensing
Non-Operating	8-95%, non-condensing	8-95%, non-condensing
<b>Acoustic Noise</b> (at 1 meter)	0 dB	0 dB
<b>Vibration</b>		
Operating	15 G peak to peak max.	15 G peak to peak max.
Non-Operating	15 G peak to peak max.	15 G peak to peak max.
<b>Shock</b>		
Operating	1,000 G max.	1,000 G max.
Non-Operating	1,000 G max.	1,000 G max.
<b>Altitude</b> (relative to sea level)		
Operating/Non-Operating	80,000 feet max.	80,000 feet max.
<b>Reliability and Maintenance</b>		
MTBF (Mean Time Between Failures)	>1,000,000 hours	>1,000,000 hours
Preventive Maintenance	None	None
Data Reliability	<1 non-recoverable error in 10 <sup>14</sup> bits read	<1 non-recoverable error in 10 <sup>14</sup> bits read
<b>Physical Specifications</b>		
Length	32 mm	18 mm
Width	24 mm	24 mm
Thickness (Body)	1.4 mm	1.4 mm
Thickness (Removable Edge)	N/A	N/A
Weight	1.8 g. max.	1.0 g. max.
<b>Ordering Information</b>		
Order Model #	SDMJ-YYY	SDMRJ-YYY
YYY:	32    32.1 MB 64    64.2 MB 128   128.2 MB 256   256.9 MB	64    64.2 MB 128   128.2 MB 512   512.4 MB

Specifications subject to change without notice

**Note 3:** Sleep mode currently is specified under the condition that all card inputs are static CMOS levels and in a "Not Busy" operating state.

**Note 4:** The currents specified show the bounds of programmability of the product.



	Memory Stick PRO Duo		TriFlash
<b>Interface</b>	Memory Stick PRO		MultiMediaCard SD or SPI
<b>Performance</b> (Notes 1 & 2) Interface Transfer Speed (Max)	20 MB/sec		12.5 MB/sec
<b>Power Requirements</b> (Note 1) <b>DC Input Voltage</b>			
Commercial	2.7V to 3.6V		2.7V to 3.6V
Industrial	N/A		N/A
<b>Typical Power Dissipation</b> (Notes 3 & 4)	Typical	Max	
Sleep	125 µA	1 mA	150 µA max.
Read	<50 mA	65 mA	<45 mA max.
Write	<75 mA	100 mA	<50 mA max.
<b>Environmental Specifications</b> <b>Temperature</b>			
Operating Commercial	-25–85°C		-25–85°C
Operating Industrial	N/A		N/A
Non-Operating Commercial	-40–85°C		-40–85°C
Non-Operating Industrial	N/A		N/A
<b>Humidity</b>			
Operating	25–85%, non-condensing		8–95%, non-condensing
Non-Operating	Max 95% (saturated state)		8–95%, non-condensing
<b>Acoustic Noise</b> (at 1 meter)	0 dB		0 dB
<b>Vibration</b>			
Operating	15 G peak to peak max.		15 G peak to peak max.
Non-Operating	15 G peak to peak max.		15 G peak to peak max.
<b>Shock</b>			
Operating	1,000 G max.		1,000 G max.
Non-Operating	1,000 G max.		1,000 G max.
<b>Altitude</b> (relative to sea level)			
Operating/Non-Operating	80,000 feet max.		80,000 feet max.
<b>Reliability and Maintenance</b> MTBF (Mean Time Between Failures)	>1,000,000 hours		>1,000,000 hours
Preventive Maintenance	None		None
Data Reliability	<1 non-recoverable error in 10 <sup>14</sup> bits read		<1 non-recoverable error in 10 <sup>14</sup> bits read
<b>Physical Specifications</b> Length	20 mm		12 mm (64/128/256 MB) 10 mm (32 MB)
Width	31 mm		18 mm (64/128/256 MB) 12 mm (32 MB)
Thickness (Body)	1.6 mm		1.2 mm max.
Thickness (Removable Edge)	N/A		N/A
Weight	2.0 g. max.		0.35g (64/128/256 MB) 0.20g (32 MB)
<b>Ordering Information</b> Order Model #	SDMSPC-YYY	SDMSPD-YYY	SDQXAJHP-YYY
Where X:			S = SD interface
YYY:	32    32.1 MB	64    64 MB 128    128 MB 256    256 MB 512    512 MB	SDQSAJHL-YYY 32    32 MB  SDQSAJHL-YYY 64    64 MB 128    128 MB 256    256 MB 512    512 MB 1024    1024 MB

Specifications subject to change without notice

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