

## SanDisk MultiMediaCard

# Introducing a new standard in data storage.

The popular CompactFlash™ card from SanDisk revolutionized the mobile products marketplace providing small-size, high-capacity storage and easy connectivity to PCs. SanDisk, the world's leading supplier of flash data storage products, and Siemens, one of the world's largest semiconductor companies, have joined



*Actual Size*

forces to create the SanDisk MultiMediaCard.

The new MultiMediaCard takes flash technology one-step further, extending SanDisk's world-wide line of data storage solutions by bringing the same removable flash memory storage capabilities to portable smart phones, cellular phones, and pagers.



You need a way to keep pace with the demand for smaller, more functional personal communications devices. As you enhance the functions on these devices to include the ability to create, send and receive more and more

data, how will you provide for data storage? The new SanDisk MultiMediaCard is the removable flash memory solution designed to meet the portable communications market's need for size, upgradable capacities and cost.

# The next revolution in data storage applications.

The SanDisk MultiMediaCard is exactly what you need to provide portable, flexible data storage solutions for smart phones, cellular phones and pagers.

- Smallest removable form factor
- Upgradable capacities
- Forward and backward compatibility
- Low cost/simple interface

Until now, nothing has come close to meeting the requirements of the small, portable communications devices that are being designed today. At one quarter the size of CompactFlash, the SanDisk MultiMediaCard exceeds the unique requirements of the portable communications market for size and functionality.

The SanDisk MultiMediaCard also affords you the flexibility to offer lower system price points while allowing the consumer to easily add more memory for data storage as necessary. That means you can design a system to use a minimum amount of flash memory, without burdening the system with all of the storage options that end-users may want.

Once your system is designed and in the end-user's hands, there is no need to continue to upgrade the system to take advantage of second generation MultiMediaCard products. All future MultiMediaCards will be backward compatible to the systems you design today. Lower cost, higher capacity cards will be as easy to use as today's floppy disks.

The MultiMediaCard's simple seven pin connection makes for an easy interface to a variety of microprocessors. Not only does the SanDisk MultiMediaCard provide for a lower cost connector, performance is enhanced by using the new MultiMediaCard protocol.

## Endorsed by industry leaders.

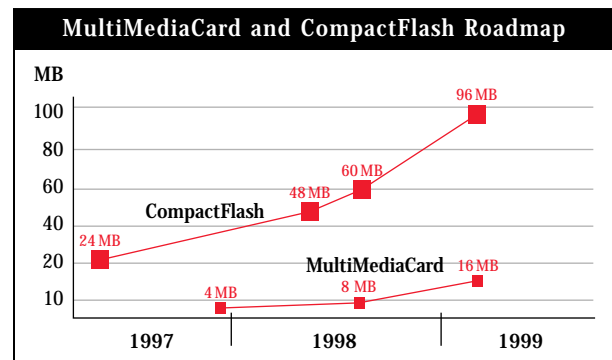
It's the unique combination of small form factor, upgradability, simple interface, and forward and backward compatibility that makes the SanDisk MultiMediaCard the data storage solution that is endorsed by industry leaders including Ericsson, Nokia, Motorola, and QUALCOMM. These unique benefits will propel the SanDisk MultiMediaCard to the forefront of the storage card marketplace, making it the defacto standard for portable communications.

## CompactFlash vs. MultiMediaCard different products, different applications, superior quality.



Actual Size Comparison

The ultra-thin SanDisk MultiMediaCard is designed to extend the removable flash memory capabilities to portable communications. The small size and simple interface are key requirements in this market. CompactFlash is designed to bring information back to the computer for further enhancement, printing or e-mail. High capacity, compatibility, and ease of handling are critical features for CompactFlash.



SanDisk's family of small form factor cards have the right size and capacity to meet your needs.

# Complete support for both SPI and MultiMediaCard protocols.

The SanDisk MultiMediaCard supports two modes of operation: a high performance MultiMediaCard mode and a simpler SPI mode. Because the SPI mode is supported directly by many microcontrollers on the market (including those offered by Texas Instruments and Motorola), it may be easier and faster to design products in the SPI mode. The MultiMediaCard mode is the full feature mode allowing for maximum performance and stackability. In MultiMediaCard mode, you can connect up to 30 cards on a single bus. By supporting both the MultiMediaCard mode and the SPI mode on the same card, forward and backward compatibility is maintained.

MultiMediaCard vs. SPI		
	MultiMediaCard	SPI
Card Addressing	In Protocol	In H/W
Stackable Cards	Up to 30	Up to 10
Speed (CLK)	0-20 MHz	0-5 MHz
Command Set	3 Read/Write Modes	1 Single Block Read/Write

## Open your business to a world of new applications.

New applications require high storage capacities that grow as the demand for memory grows. SanDisk enables you to keep pace by providing your customers with the memory capacity to meet their needs. With the SanDisk MultiMediaCard, phones can safely store Yellow Pages, detailed maps, full color photos, PowerPoint presentations, and even more phone numbers than possible today. Portable communications devices will be able to receive e-mail and voice mail. And, they'll have the ability to record and play back important conversations, music, or directions. Security will not be an issue as these phones can be configured to be used only when a MultiMediaCard with the appropriate user identification is inserted. The MultiMediaCard can also serve as the owner's "personality" card to be used when borrowing or leasing another phone, with the billing information going to the correct person.

Pagers are also being designed to receive e-mail, faxes, stock quotes and news, and will require more and more data storage capacities as the user's thirst for information

increases. The SanDisk MultiMediaCard opens a world of design possibilities by providing higher storage capacities in a small form factor for all kinds of applications. More capacity and more flexibility mean more ways for you to grow your business.

## Broad industry support.

The MMCA (MultiMediaCard Association) has been formed to promote the adoption of the MultiMediaCard across many platforms. The MMCA is comprised of 25 companies including Canon, Ericsson, Hitachi, Motorola, NEC, Nokia, Qualcomm, SanDisk, Siemens, and Sony. In order to provide for maximum compatibility with desktops, the SanDisk MultiMediaCard will also support the DOS file format. This DOS file format will enable accessories to be easily developed for connectivity to the desktop.

## On the leading edge of enabling technologies.

The portable communications phenomenon has taken the world by storm, enabling people everywhere to communicate at a moment's notice. Technology will continue to evolve, allowing for faster processing, faster communications, and enhanced displays. Virtual Display technology, for example, will allow for high resolution images to be viewed in small, portable hand-held devices. All of these capabilities combined will create a need for high capacity data storage in portable communications devices. The SanDisk MultiMediaCard will enhance and enable new technology breakthroughs by providing the means to store and retrieve data conveniently. Because SanDisk keeps up with the ever-changing marketplace, you can keep pace by delivering the leading edge products and services that your customers demand.



**SanDisk** 

# SanDisk MultiMediaCard preliminary specifications

CAPACITIES	
SDMB-2	2.0 MB
SDMB-4	4.0 MB
SDMB-8	8.0 MB
SYSTEM PERFORMANCE (see notes 1 and 2)	
Data Transfer Rate to/from Flash	2.0 MB/sec burst
Data Transfer Rate to/from host	2.5 MB/sec burst
Block Read Access Time	1.5 ms
Power-up to read	50 ms
Sleep to read	1 ms
Sleep to write	1 ms
SYSTEM POWER REQUIREMENTS	
Voltage Operation (External Vpp not required)	2.7 – 3.6 V
Power Consumption	
Read	<33 mA
Write	<35 mA
Standby	100 $\mu$ A
READ	
512 Byte Block Read (Read Multiple Block Command also Available)	

ENVIRONMENTAL SPECIFICATIONS	
Temperature:	
Operating	-25°C to 85°C
Non-Operating	-40°C to 85°C
Humidity:	
Operating	8% to 95%, non-condensing
Non-Operating	8% to 95%, non-condensing
Acoustic Noise (at 1 meter)	0dB
Vibration:	
Operating	15 G peak-to-peak max.
Non-Operating	15 G peak-to-peak max.
Shock:	
Operating	1,000 G max.
Non-Operating	1,000 G max.
SYSTEM RELIABILITY AND MAINTENANCE	
MTBF (Mean Time Between Failures)	>1,000,000 hours
Preventive Maintenance	None
Data Reliability	<1 non-recoverable error in 10 <sup>11</sup> bits read
Endurance	300,000 write/erase cycles
PHYSICAL SPECIFICATIONS	
Length	32mm $\pm$ 0.1mm
Width	24mm $\pm$ 0.08mm
Thickness	1.4mm $\pm$ 0.1mm
Weight	1.5 g. maximum

**Ordering Information:**  
To order SanDisk MultiMediaCards, call SanDisk at **408-542-0595** and refer to the following model numbers:

**SDMB-2      2.0 MB**  
**SDMB-4      4.0 MB**  
**SDMB-8      8.0 MB**

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

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

## about SanDisk

SanDisk Corporation, the world's largest supplier of flash data storage products, designs, manufactures and markets industry-standard, solid-state data, digital imaging and audio storage products using its patented, high density flash memory and controller technology. SanDisk is based in Sunnyvale, CA.

To order, or for more information, call: 408-542-0595.

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