

## SanDisk CompactFlash™ and MultiMediaCard

# Small Form Factor Solutions

SanDisk, the world's largest supplier of flash data storage products, has the small form factor solutions that today's ever smaller, more functional portable devices demand.

SanDisk offers two industry-standard removable solutions: CompactFlash™ memory cards and MultiMediaCards. Both provide the small size, forward and backward

compatibility, high capacities, and

low cost necessary to meet your data storage needs. Now and in the future.

Our popular CompactFlash cards are designed to store data, voice, text and music in a portable device. CompactFlash can then be used to bring information back to the computer for further enhancement, printing, or sending over the Internet. SanDisk CompactFlash features high capacities of up to 128 MB, proven compatibility across many platforms, and exceptional ease of handling.

The ultra-small SanDisk MultiMediaCard extends the removable flash memory capabilities to the ultra-small portable device market where ultra-small size and simple, low cost interface are key requirements for success.



# SanDisk CompactFlash for high capacity

## The defacto standard for digital cameras

Shipping in volume since 1995, SanDisk CompactFlash memory cards continue to revolutionize handheld electronics with unprecedented storage capacity. The CompactFlash card's matchbook size and half-ounce weight make it the world's first small, solid-state removable data storage system. Today, the CompactFlash storage specification is the industry standard for next-generation, small form factor consumer applications such as digital cameras, handheld PCs and voice recorders.

CompactFlash is currently available in 8 to 128MB capacities with 192MB capacity available in early 2000. SanDisk also has CompactFlash Type II in 160MB capacity with 300MB capacity available in early 2000.



Actual Size  
Comparison

*SanDisk continues to lead the industry in the development of new flash data storage technology standards. As inventor of the CompactFlash card, SanDisk was a founding member of the CompactFlash Association (CFA), a group of prominent computing, imaging, communications and consumer electronics companies committed to promoting the adoption of the CompactFlash storage specification as an industry standard. Today, the CFA has more than 150 member companies.*

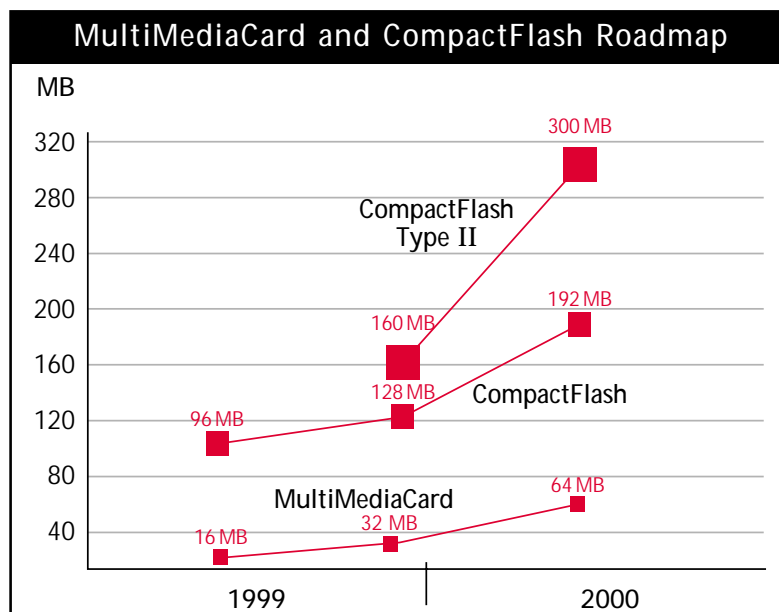
## SanDisk CompactFlash gives you a real competitive edge

- World's first small form factor data storage system
- Full compliance with open industry standards
- Forward and backward compatibility
- Built-in ATA interface for easy, plug-and-play interoperability
- Dynamic 3V/5V support
- Low power consumption
- High capacities (up to 128MB)
- Compatibility across many platforms
- Compatible with all major operating systems, including DOS, Windows® 95/98, Windows® NT 4.0, Windows® CE and Apple System 7

| Product Comparison             |                   |   |                      |
|--------------------------------|-------------------|---|----------------------|
|                                | MultiMediaCard    | CompactFlash                                  | CompactFlash Type II |
| Interface                      | Serial            | Parallel                                      | Parallel             |
| Number of Pins                 | 7                 | 50  | 50                   |
| Total Volume of Memory Card    | 1075 sq mm        | 5141 sq mm                                    | 7789 sq mm           |
| <b>Form Factor</b>             |                   |   |                      |
| Thickness                      | 1.4 mm (0.055 in) | 3.3 mm (0.13 in)                              | 5.0 mm               |
| Width                          | 24 mm (0.94 in)   | 42.8 mm (1.685 in)                            | 42.8 mm (1.685 in)   |
| Height                         | 32 mm (1.26 in)   | 36.4 mm (1.433 in)                            | 36.4 mm (1.433 in)   |
| Weight                         | 1.5 g. max.       | 11.4 g. max.                                  | 13.5 g. max.         |
| Current Capacity               | 8, 16, 32, 64* MB | 8, 16, 32, 48, 64, 80, 96, 128, 160*, 192* MB | 160, 300* MB         |
| Op. Voltage                    | 2.7-3.6V          | 3V/5V Dynamic                                 | 3V/5V Dynamic        |
| On Board ECC                   | Yes               | Yes   | Yes                  |
| Op. Shock                      | 1KG's             | 2KG's   | 2KG's                |
| Forward/Backward Compatibility | Yes               | Yes   | Yes                  |
| ROM Version                    | Yes               | N/A   | N/A                  |
| Other I/O Functions            | No                | Yes**   | Yes**                |

\* Preliminary. Available Q1 2000

\*\* Not available from SanDisk



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

## Look to SanDisk for the best small form factor solutions

Whether your newest designs call for high capacity or ultra-small size, SanDisk has the small form factor solutions for today's most advanced portable and handheld devices. For more information on SanDisk CompactFlash and MultiMediaCard products, call 408-542-0595.

# SanDisk CompactFlash and MultiMediaCard specifications

| SYSTEM PERFORMANCE<br>(see notes 1 and 2) |       | CompactFlash and CompactFlash Type II | MultiMediaCard                    |
|---|-------|---------------------------------------|-----------------------------------|
| <b>Start-up Time</b>                      |       |                                       |                                   |
| Sleep to write                            |       | 2.5 msec max.                         | 1.0 msec max.                     |
| Sleep to read                             |       | 2.0 msec max.                         | 1.0 msec max.                     |
| Reset to ready                            |       | 50 msec typical,<br>400 msec max.     | 50 msec typical,<br>400 msec max. |
| Data Transfer Rate to/from Flash          |       | 4.0 MB/sec burst                      | 2.0 MB/sec burst                  |
| Data Transfer Rate to/from host           |       | 6.0 MB/sec burst                      | 2.5 MB/sec burst                  |
| Active to Sleep Delay                     |       | Programmable                          | N/A                               |
| Controller Overhead Command to DRQ        |       | <1.25 msec                            | N/A                               |
| <b>POWER REQUIREMENTS (see note 1)</b>    |       |                                       |                                   |
| <b>DC Input Voltage</b>                   |       |                                       |                                   |
| Commercial                                |       | 3V ± 5%, 5V ± 10%                     | 2.7V to 3.6V                      |
| Industrial                                |       | 3V ± 5%, 5V ± 5%                      | N/A                               |
| <b>Typical Power Dissipation</b>          |       |                                       |                                   |
| Read                                      |       | 200 µA (3.3V)<br>500 µA (5V)          | 100 µA                            |
|   | Write | 32-45 mA (3.3V)<br>46-75 mA (5V)      | <33 mA                            |
| Standby                                   |       | 32-60 mA (3.3)<br>46-90 mA (5V)       | <33 mA                            |

| ENVIRONMENTAL SPECIFICATIONS       |  | CompactFlash and CompactFlash Type II                  | MultiMediaCard   |
|------------------------------------|--|--|--|
| <b>Temperature:</b>                |  |  |  |
| Operating Commercial               |  | 0-60°C   | -25-85°C   |
| Operating Industrial               |  | -40-85°C   | N/A  |
| Non-Operating Commercial           |  | -25-85°C   | -40-85°C   |
| Non-Operating Industrial           |  | -50-100°C  | N/A  |
| <b>Humidity:</b>                   |  |  |  |
| Operating                          |  | 8% to 95%, non-condensing                              | 8% to 95%, non-condensing                              |
| Non-Operating                      |  | 8% to 95%, non-condensing                              | 8% to 95%, non-condensing                              |
| Acoustic Noise (at 1 meter)        |  | 0dB  | 0dB  |
| <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.   | 1,000 G max.   |
| Non-Operating                      |  | 2,000 G max.   | 1,000 G max.   |
| <b>RELIABILITY AND MAINTENANCE</b> |  |  |  |
| <b>MTBF</b>                        |  |  |  |
| (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 |

- Note 1: All values quoted are typical at ambient temperature and nominal supply voltages unless otherwise stated.
- Note 2: All performance timing assumes the controller is in the default (i.e., fastest) mode.
- 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: That currents specified show the bounds of programmability of the product.
- Note 5: CF interface surface mount header and ejector may be ordered from 3M Company. To order, call: 1-800-225-5373.

| ORDERING INFORMATION |                          |              |              | CompactFlash         | CompactFlash Type II | MultiMediaCard |
|----------------------|--------------------------|--------------|--------------|----------------------|----------------------|----------------|
| Order Model #:       | SDCFBX-YY-ZZZ            |              |              | SDCF2BX-YY-ZZZ       |                      | SDMB-YY        |
| Where X:             | I Industrial temp. grade |              |              | Standard temp. grade |                      |                |
| YY:                  | 8 8.0MB                  | 80 80.2MB    | 160 160.4MB  | 8 8.0MB              |                      |                |
|                      | 16 16.1MB                | 96 96.2MB    | 300 300.0MB* | 16 16.3MB            |                      |                |
|                      | 32 32.1MB                | 128 128.0MB  |              | 32 32.1MB            |                      |                |
|                      | 48 48.4MB                | 160 160.0MB* |              | 64 64.0MB*           |                      |                |
|                      | 64 64.2MB                | 192 192.4MB* |              |                      |                      |                |
| ZZZ:                 | 101 Standard             |              |              |                      |                      |                |

\*Preliminary



Actual Size



Actual Size

# SanDisk MultiMediaCard for ultra-small size

## The defacto for small and consumer electronic devices

If it's ultra-small size you need, the SanDisk MultiMediaCard is the solution. The MultiMediaCard is the world's smallest solid-state storage device, bringing removable flash memory storage capabilities to the newest portable Internet music players, digital camcorders and smart phones.

Weighing less than two grams and about the size of a postage stamp, the MultiMediaCard meets the unique requirements of the portable communications and computing markets for small size, forward and backward compatibility, low power, low cost, and rugged data storage. The SanDisk MultiMediaCard is available in 8 to 32MB capacities, with 64MB available in early 2000.



Actual Size Comparison

## SanDisk MultiMediaCard offers small size and big benefits:

- Smallest removable form factor
- Forward and backward compatibility
- Low cost 7-pin interface
- SPI interface for quick time to market
- Rugged and reliable mechanical construction
- Low power consumption

*Co-inventor of the MultiMediaCard with Infineon Technologies AG (formerly Siemens AG), SanDisk was a founding member of the MultiMediaCard Association, formed to promote the MultiMediaCard as an open industry standard, ensuring its wide adoption into many consumer electronics products.*

# about SanDisk

SanDisk Corporation is the world's largest supplier of flash data storage products. For more than a decade, SanDisk has been designing, manufacturing and marketing industry-standard, solid-state data, digital imaging and audio storage products. Whether you are designing digital cameras, hand-held PCs, voice recorders or the latest internet music players, SanDisk Flash data storage offers you the best in overall compatibility, performance, reliability and cost. Your designs deserve the best flash data storage solutions. Insist on SanDisk Flash technology.

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