FLASH MEMORY PART 2

An overview was provided for two fairly common formats; MultiMedia Card and Secure Digital. In this installment, we will wrap things up with an overview of four other common formats: CompactFlash, SmartMedia, xD, and Memory Stick (yes, there are actually even MORE, but these six constitute the ones used most in the Flash Memory universe). It would be convenient for consumers if manufacturers could all agree on one format of flash memory, but don't hold your breath for that to happen! With flash memory being used in various devices such as MP3 players, PDAs, mobile phones and digital cameras, one can count on having as many choices in devices as in the memory required for them. This Tech Tip will cover some of the basics of each format mentioned, providing information on the history and technology of each.

CompactFlash

CompactFlash technology was developed by SanDisk in1994, making it one of the oldest flash memory formats currently in use. According to the CompactFlash Association, CompactFlash cards have the potential for capacities up to 137 GB and data transfer rates of up to 66 MB/s. But, current devices can realistically be expected to have capacities of up to 12 GB and data transfer rates of up to 16 MB/s. Both of which are still very impressive (and currently very expensive for the large capacity cards). Every

CompactFlash card is 43mm wide and 36mm long, but depending on the type of card, they can have two different thicknesses. Type 1 CompactFlash cards are 3.3mm thick, Type 2 CompactFlash cards are 5.5mm thick, and these dimensions make the cards fairly large as compared to other flash memory. The connections for these cards are found at one end and feature two rows of 25 sockets that supply either 3.3V or 5V to the card (they can operate on either). This 1 GB SanDisk model is an example of a typical Type II CompactFlash card. The larger size of the CompactFlash cards may seem like a disadvantage, but it is necessary for one of the main advantages. It is the only format of flash memory where the controller is actually onboard, making it more universally compatible and capable of increased performance by unloading the processing burden from slower devices that it may interface with. The thickness of the cards can also be considered a bonus for two other reasons. There is plenty of space inside for large capacity high density memory modules, and the longevity of the device may be increased since they are more rugged than many other form factors.Microdrives are a separate type of compact storage devicefirst developed by IBM, but they share the same interface and general dimensions as a Type 2CompactFlash card (Microdrives actually have teeny-tiny spinning discs in them – they are not solid state flash memory like CompactFlash).

Computer Geeks sells a2.2 GB Microdrive by MagicStor.

SmartMedia

SmartMedia was first developed by Toshiba, and the technical name for it is actually Solid-State Floppy-Disk Card (or SSFDC for short). Just as CompactFlash has a group backing it, Smart Media is promoted by the SSFDC Forum. All SmartMedia is 37 mm wide by 45 mm long by about 0.75 mm thick, with a notch found in one corner, and exposed "golden" contacts on the back side. At less than 1mm thick, SmartMedia is easily the thinnest of the flash memory formats. The maximum capacity one can expect to find for SmartMedia is a mere 128 MB, making it a less than appealing solution for modern mass storage. SmartMedia's popularity has been on the decline for years as more powerful technologies have emerged to replace it. Computer Geeks stocks 128 MB and 64MB SmartMedia cards as well as a couple of adapters that let you use a SmartMedia card in a CompactFlash or PCMCIA (notebook) slot.

The extremely low profile is in part achieved by the lack of an onboard controller, and by the fact that SmartMedia is basically just memory modules embedded in a plastic card. The controlling is conducted by the device using the memory, which is how all flash memory but CompactFlash operate anyway. Early SmartMedia cards operated on 5V, but the current standard uses 3.3V. Older 5V cards can not be used in 3.3V SmartMedia devices, so it is important to know the difference between them. Holding a SmartMedia card so the exposed electrical contacts are facing you and positioned at the

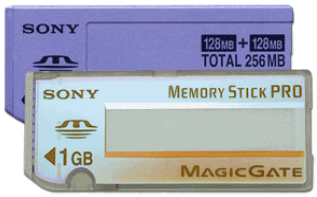
top of the card, if the notch is on the left it operates on 5V, if the notch is on the right it operates on 3.3V. This notch also prevents one type of card from being fully inserted into a device that is not designed to accept it.

xD

The xD (eXtreme Digital) format was launched by Fujifilm and Olympus in 2002, and is promoted by the group at the official xD-Picture Card website (http://www.xd-picture.com/). With a complete name of xD-Picture Card, this format was intended solely for use with digital cameras, although it did find applications elsewhere. Fujifilm and Olympus were two of the biggest supporters of SmartMedia, and the launch of xD was a pretty good sign that the future of SmartMedia was limited. Each xD card measures a mere 20mm by 25mm by 1.7mm, making them smaller in overall size than even SD and MMC cards. The maximum capacity of xD cards is expected to be 8 GB, but typical cards can be expected up to 1 GB in size. The read speeds of xD cards is up to 5 MB/s, while write speeds can be up to 3 MB/s, making them fast, but not the fastest. xD cards also operate on 3.3V, and are promoted not only for their minimal size, but for their low power consumption. This 128MB Olympus model is an example of a typical xD card.

Memory Stick

Memory Stick flash memory was first launched back in 1998, and although it has the



support of many manufacturers, it seems to be most prominently used in Sony brand devices, including digital audio devices, cameras and even televisions. Memory Stick is promoted by the group at the official Memory Stick website, which has a good deal of information about the media and applications for it. Memory Stick flash memory looks a bit like a stick of gum, but slightly smaller, measuring about 50 mm by 21.5 mm by 2.8 mm. Current models can be expected with capacities of up to 2 GB, and Memory Sticks with capacities of 4 GB to 8 GB may be available soon. According to the Memory Stick website, maximum (theoretical) data transfer rates of up to 160 Mbps can be expected, although real world results will most definitely be lower. Expect a memory Stick to actually provide read speeds of up to 2.45 MB/s, and write speeds of up to 1.5 MB/s. Memory Sticks come in four flavors (so to speak) the original Memory Stick, Memory Stick PRO and Duo versions of each. Memory Stick PRO offers faster speeds and larger capacities over the original Memory Stick. The Duo modules are smaller and actually use an adapter to fit into Memory Stick slots. Note that not all devices that take Memory Sticks can use Memory Stick PRO modules – be sure to check your manual.

This 256MB SanDisk model is an example of a typical Memory Stick card.

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