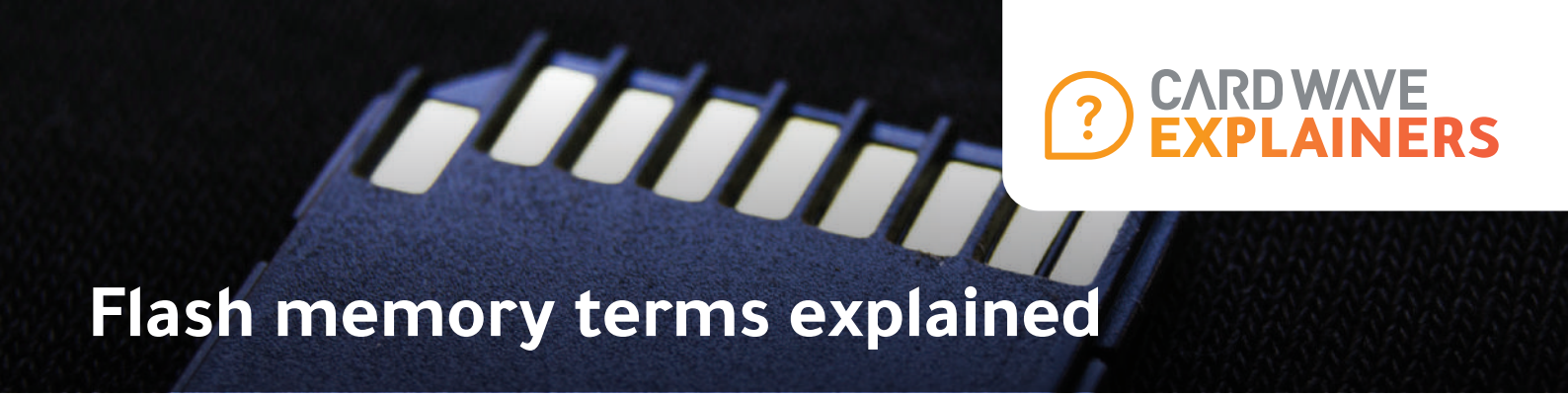

CARDWAVE EXPLAINERS

Flash memory terms explained

We often find customers struggle with the technical terms used by companies in the flash memory sector. Here we explain some of the most frequently used terms, to help those new to the sector do business with more confidence.

Data Storage

Checksum. A unique sequence of numbers and letters used as a 'fingerprint' for a file. If one byte of data is altered on the file, the checksum will change. Checksums are used to verify that two files are 100% identical.

Binary image. A BIN (binary) file contains just 1s and 0s. The combination of 1s and 0s represents the complete contents and structure of a file. It can be read by a computer and pieced together to form content we can understand such as words, pictures, and programs.

Sector size. The storage capacity of a defined area of a storage device. Also referred as a **disk sector** or **block.** Usually one sector of a drive can hold up to 512 bytes of data.

Cluster size. The smallest amount of disk space that can be used to hold a file.

Partition. A software-defined area of a physical storage device in which data can reside. A device can have a single partition which uses the all the available physical storage or can be split in to multiple partitions each of which use a part of the physical storage area.

NTFS, FAT, exFAT. Three standards for storing data on a flash drive. One is chosen when the drive is formatted, and it can't be changed later without wiping all the data. FAT32 is the oldest and most widely used standard. NTFS is a newer standard, and exFAT is newer still, and more widely supported than NTFS.

Duplication

Master candidate. A clean, new flash storage device we supply to a customer to show precisely what their duplicated cards will be like. It will have the same storage capacity, partition(s), and other technical attributes as the finished, duplicated cards.

Master. The storage device from which duplicates are created. All duplicates will be a precise copy of the master in every technical respect. The customer can test this to ensure it meets their needs, and sign it off before duplication begins.

Flash controller. A microprocessor on a solid-state storage device. The flash controller manages the interface with the host device and knows where data is stored. It constantly monitors performance and can manage endurance, keep track of bad blocks (which are unusable), and do other tasks. The flash controller determines a storage device's performance and reliability.

Fixed BOM. A storage device whose key components are locked down. These are usually memory, controller and the firmware that runs the controller. Cardwave will use a fixed BOM when a customer has a precise performance requirement.

Non-fixed BOM. A storage device which is flexible in its key components. At Cardwave we set a minimum specification that ensures customers get devices which perform well, but do not exclude higher performing devices in any batch from our suppliers. This gives our customers a minimum performance level which they can guarantee to their own customers.

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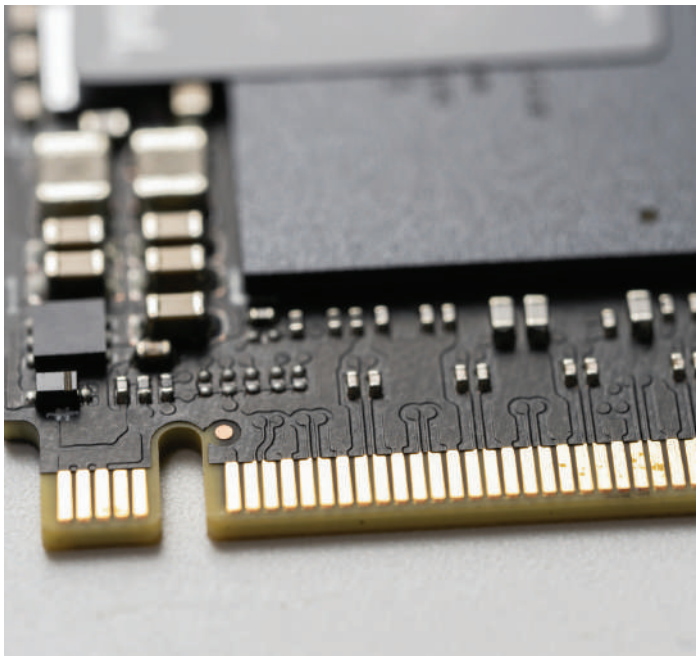
More about NAND

NAND. In the first generation of flash memory, cells were arranged in rows and columns. We call this 2D planar memory. Today memory is layered or stacked, and we call this 3D flash memory or NAND. 3D flash memory enables higher capacities, better performance and greater reliability. It is non volatile, meaning it does not require power to retain its data. NAND is the preferred technology in mass-market consumer products. Each manufacturer has its own name for NAND and develops its own NAND technologies.



SLC. Single Level Cell. A type of NAND that only stores 1 bit of information per cell. SLC was the first generation of flash memory used in Solid State Discs (SSDs) and CompactFlash cards. It is now more commonly used for high-end, data intensive applications and it is the most expensive type of flash memory available.

MLC. Multi Level Cell. A type of NAND that stores 2 bits per cell. MLC technology was instrumental in bringing the cost of flash memory down and making mobile devices, digital cameras and mobile storage more affordable.

TLC. Triple Level Cell. A type of NAND that stores 3 bits per cell. TLC is not as reliable as MLC or SLC but if managed correctly (with a good flash controller), TLC flash memory is appropriate for applications that require low-intensity read/write operations.

QLC. Quad Level Cell. A type of NAND that stores 4 bits per cell. QLC is predominantly used for SSDs. It is more affordable than the technologies used to make conventional hard disk drives. QLC is similar to TLC in that it is not suitable for high-end, data intensive applications.

How Cardwave can help

Cardwave provides consultancy services to help device makers select memory for their products. We help our customers find the right memory, in the right quantity, at the right price. This includes helping customers understand the complexities of how flash memory works and relevant technical terminology, so that they can make informed decisions about what is best for their product and understand how we use our skills and expertise to provide them with world-class services.

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