

SmartMedia™ Logical Format Specifications

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SSFDC Forum Technical Committee

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Revision History

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0. Introduction

This document covers the SmartMedia™ (SSFDC or Solid State Floppy Disk Card) logical format specifications that are recommended by the SSFDC Forum.

1. Outline of Logical Formats

The DOS•FAT format is recommended as the logical format for SmartMedia™.

Adoption of this format ensures data compatibility among different models.

The following parameters are required for the DOS•FAT format:

- 1) CHS parameters
- 2) Master boot sector
- 3) Partition setup

1.1. CHS Parameters

Since the DOS•FAT format originated from the formats of disk media (floppy disks and hard disks), it requires C-H-S parameters (cylinders (tracks), heads/track, sectors/head).

To maintain data compatibility, these parameters must be the same.

These parameters are defined in the “SmartMedia™ Physical Format Specifications,” and take on the values that are given in Table 1-1.

When using the DOS•FAT format, do not specify any values other than those listed in the table.

Table 1-1 Format Parameters

| Capacity | 1 MB | 2 MB | 4 MB | 8 MB |
|----------------------------|-------|-------|-------|--------|
| Number of cylinders | 125 | 125 | 250 | 250 |
| Number of heads per track | 4 | 4 | 4 | 4 |
| Number of sectors per head | 4 | 8 | 8 | 16 |
| Total number of sectors | 2,000 | 4,000 | 8,000 | 16,000 |
| Sector size (bytes) | 512 | 512 | 512 | 512 |

1.2. Master Boot Sector

The master boot sector is located in the first sector. Table 1-2 represents the data arrangement. Data should be laid out in a single partition configuration (Partitions 2 to 4 not used). The boot command area should not be utilized, i.e., there should not be any data or commands written in this area.

Table 1-2 Data Arrangement

| Offset | Parameter | |
|-----------|---------------------------|--------------------------|
| 000h–1BDh | Boot command (Not in use) | |
| 1BEh | Partition 1 | Boot ID |
| 1BFh | | Start head No. |
| 1C0h | | Start sector No. |
| 1C1h | | Start cylinder No. |
| 1C2h | | System ID |
| 1C3h | | End head No. |
| 1C4h | | End sector No. |
| 1C5h | | End cylinder No. |
| 1C6h–1C9h | | Start logical sector No. |
| 1CAh–1CDh | | Partition size |
| 1CEh–1DDh | | Partition 2 (Not in use) |
| 1DEh–1EDh | Partition 3 (Not in use) | |
| 1EEh–1FDh | Partition 4 (Not in use) | |
| 1FEh–1FFh | Fixed data (Signature) | |

(Note) Bit 6 and bit 7 of the sector No. are used for the 2 upper bits of the cylinder No.

1.3. Partition Setup

Each partition has a partition boot sector at its top where the type of FAT system, cluster size, number of directory entries, and other setup information of the partition is recorded. The partition boot sector is followed by a FAT table area, root directory area, and a data area. Table 1-3 shows the data arrangement.

Table 1-3 Data Arrangement

| Logical Sector | Area Name |
|----------------------|-----------------------|
| 0 | Master boot sector |
| 1– | Not in use |
| Partition top sector | Partition boot sector |
| . | FAT area |
| . | FAT area (Copy) |
| . | Root directory area |
| . | Data area |
| . | |
| . | |
| Partition end sector | |

2. Logical Format Specifications

To facilitate efficient data writing, the Logical Format Specifications adopt a logical format (Table 2-1) with the cluster size and the cluster starting position taken into account. In normal operation, it is recommended that initialization be performed according to these format specifications.

The initial data for the format is as follows:

For parameters, see PC Card Standard Vol. 7, 'Media Storage Formats Specification.'

Table 2-1 Logical Format Specifications

| | 1 MB | 2 MB | 4 MB | 8 MB |
|-----------------------------|--------------|--------------|--------------|---------------|
| Master boot sector | 0 | 0 | 0 | 0 |
| Not in use | 1-12 | 1-10 | 1-26 | 1-24 |
| Partition boot sector | 13 | 11 | 27 | 25 |
| FAT area | 14 | 12-13 | 28-29 | 26-28 |
| FAT area (Copy) | 15 | 14-15 | 30-31 | 29-31 |
| Root directory area | 16-31 | 16-31 | 32-47 | 32-47 |
| Storing Area | 32- 1,999 | 32- 3,999 | 48- 7,999 | 48- 15,999 |
| FAT system | 12 bit FAT | 12 bit FAT | 12 bit FAT | 12 bit FAT |
| Number of directory entries | 256 | 256 | 256 | 256 |
| Cluster size | 4 KB | 4 KB | 8 KB | 8 KB |
| Total number of clusters | 246 | 496 | 497 | 997 |
| Format capacity | 984 KB | 1,984 KB | 3,976 KB | 7,976 KB |

2.1. 1 MB

- DOS 12-bit FAT format
- Cluster size : 4 KB
- Total number of clusters : 246
- Number of directory entries : 256

Table 2-3 Logical Format Specifications

| Logical Sector No. | Area Name | Initial Set Data |
|--------------------|-----------------------|---------------------------------|
| 0 | Master boot sector | Table 2-4 |
| 1–12 | Not in use | “FFh, –, FFh” (Area not in use) |
| 13 | Partition boot sector | Table 2-5 |
| 14 | FAT area | “F8h, FFh, FFh, 00h, –, 00h” |
| 15 | FAT area (Copy) | “F8h, FFh, FFh, 00h, –, 00h” |
| 16–31 | Root directory area | “00h, –, 00h” |
| 32–1,999 | Data area | “FFh, –, FFh” (Area not in use) |

Table 2-4 Contents of Master Boot Sector

| Offset | Parameter | Data | |
|-----------|---------------------------|--------------------------|---------------|
| 000h–1BDh | Boot command (Not in use) | “00h, –, 00h” (Note1) | |
| 1BEh | Partition 1 | Boot ID | “80h” |
| 1BFh | | Start head No. | “03h” |
| 1C0h | | Start sector No. | “02h” |
| 1C1h | | Start cylinder No. | “00h” |
| 1C2h | | System ID | “01h” |
| 1C3h | | End head No. | “03h” |
| 1C4h | | End sector No. | “04h” |
| 1C5h | | End cylinder No. | “7Ch” |
| 1C6h–1C9h | | Start logical sector No. | “0000 000Dh” |
| 1CAh–1CDh | | Partition size | “0000 07C3h” |
| 1CEh–1DDh | | Partition 2 (Not in use) | “00h, –, 00h” |
| 1DEh–1EDh | Partition 3 (Not in use) | “00h, –, 00h” | |
| 1EEh–1FDh | Partition 4 (Not in use) | “00h, –, 00h” | |
| 1FEh–1FFh | Fixed data (Signature) | “AA55h” | |

Note 1: These values are default format values at shipment from the production site. The user can alter the settings.

Table 2-5 Contents of Partition Boot Sector

| Offset | Parameter | Data |
|-----------|--|------------------------|
| 000h–002h | Jump command | “E9h”, “0000h” (Note1) |
| 003h–00Ah | Manufacturer’s name and version (ASCII, 8 Bytes) | ‘ ‘ (Note2) |
| 00Bh–00Ch | Number of bytes per sector | “0200h” |
| 00Dh | Number of sectors per allocation unit | “08h” |
| 00Eh–00Fh | Number of reserved sectors | “0001h” |
| 010h | Number of FATs (File Allocation Tables) | “02h” |
| 011h–012h | Number of root directory entries | “0100h” |
| 013h–014h | Total number of partition sectors | “07C3h” |
| 015h | ID Byte | “F8h” |
| 016h–017h | Number of FAT sectors | “0001h” |
| 018h–019h | Number of sectors per track | “0004h” |
| 01Ah–01Bh | Number of heads | “0004h” |
| 01Ch–01Fh | Number of hidden sectors | “0000 000Dh” |
| 020h–023h | Total number of partition sectors (32 Bits) | “0000 0000h” |
| 024h | Physical drive No. | “00h” |
| 025h | Reserved | “00h” |
| 026h | Extended boot record signatures | “00h” |
| 027h–02Ah | Volume ID (4 Bytes) | “0000 0000h” |
| 02Bh–035h | Volume label (ASCII, 11 Bytes) | “00h, –, 00h” |
| 036h–03Dh | File system type (ASCII, 8 Bytes) | ‘FAT12 ‘ |
| 03Eh–1FDh | Reserved (IPL code area) | “00h, –, 00h” |
| 1FEh–1FFh | Fixed data (Signature) | “AA55h” |

Note 1: These values are default format values at shipment from the production site. The user can alter the settings.

Note 2: These values are default format values at shipment from the production site. When format commands in Windows® 95 and 98 are used, these values may be different.

2.2. 2 MB

- DOS 12-Bit FAT format
- Cluster size : 4 KB
- Total number of clusters : 496
- Number of directory entries : 256

Table 2-6 Logical Format Specifications

| Logical Sector No. | Area Name | Initial Set Data |
|--------------------|-----------------------|---------------------------------|
| 0 | Master boot sector | Table 2-7 |
| 1-10 | Not in use | “FFh, –, FFh” (Area not in use) |
| 11 | Partition boot sector | Table 2-8 |
| 12 | FAT area | “F8h, FFh, FFh, 00h, –, 00h” |
| 13 | | “00h, –, 00h” |
| 14 | FAT area (Copy) | “F8h, FFh, FFh, 00h, –, 00h” |
| 15 | | “00h, –, 00h” |
| 16-31 | Root directory area | “00h, –, 00h” |
| 32-3,999 | Data area | “FFh, –, FFh” (Area not in use) |

Table 2-7 Contents of Master Boot Sector

| Offset | Parameter | Data |
|-----------|---------------------------|--------------------------|
| 000h-1BDh | Boot command (Not in use) | “00h, –, 00h” (Note1) |
| 1BEh | Partition 1 | Boot ID |
| 1BFh | | Start head No. |
| 1C0h | | Start sector No. |
| 1C1h | | Start cylinder No. |
| 1C2h | | System ID |
| 1C3h | | End head No. |
| 1C4h | | End sector No. |
| 1C5h | | End cylinder No. |
| 1C6h-1C9h | | Start logical sector No. |
| 1CAh-1CDh | | Partition size |
| 1CEh-1DDh | Partition 2 (Not in use) | “00h, –, 00h” |
| 1DEh-1EDh | Partition 3 (Not in use) | “00h, –, 00h” |
| 1EEh-1FDh | Partition 4 (Not in use) | “00h, –, 00h” |
| 1FEh-1FFh | Fixed data (Signature) | “AA55h” |

Note 1: These values are default format values at shipment from the production site. The user can alter the settings.

Table 2-8 Contents of Partition Boot Sector

| Offset | Parameter | Data |
|-----------|--|------------------------|
| 000h–002h | Jump command | “E9h”, “0000h” (Note1) |
| 003h–00Ah | Manufacturer’s name and version (ASCII, 8 Bytes) | ‘ ‘ (Note2) |
| 00Bh–00Ch | Number of bytes per sector | “0200h” |
| 00Dh | Number of sectors per allocation unit | “08h” |
| 00Eh–00Fh | Number of reserved sectors | “0001h” |
| 010h | Number of FATs (File Allocation Tables) | “02h” |
| 011h–012h | Number of root directory entries | “0100h” |
| 013h–014h | Total number of partition sectors | “0F95h” |
| 015h | ID Byte | “F8h” |
| 016h–017h | Number of FAT sectors | “0002h” |
| 018h–019h | Number of sectors per track | “0008h” |
| 01Ah–01Bh | Number of heads | “0004h” |
| 01Ch–01Fh | Number of hidden sectors | “0000 000Bh” |
| 020h–023h | Total number of partition sectors (32 Bits) | “0000 0000h” |
| 024h | Physical drive No. | “00h” |
| 025h | Reserved | “00h” |
| 026h | Extended boot record signature | “00h” |
| 027h–02Ah | Volume ID (4 bytes) | “0000 0000h” |
| 02Bh–035h | Volume label (ASCII, 11 Bytes) | “00h, –, 00h” |
| 036h–03Dh | File system type (ASCII, 8 Bytes) | ‘FAT12 ‘ |
| 03Eh–1FDh | Reserved (IPL code area) | “00h, –, 00h” |
| 1FEh–1FFh | Fixed data (Signature) | “AA55h” |

Note 1: These values are default format values at shipment from the production site. The user can alter the settings.

Note 2: These values are default format values at shipment from the production site. When format commands in Windows® 95 and 98 are used, these values may be different.

2.3. 4 MB

- DOS 12-bit FAT format
- Cluster size : 8 KB
- Total number of clusters : 497
- Number of directory entries : 256

Table 2-9 Logical Format Specifications

| Logical Sector No. | Area Name | Initial Set Data |
|--------------------|-----------------------|---------------------------------|
| 0 | Master boot sector | Table 2-10 |
| 1-26 | Not in use | “FFh, -, FFh” (Area not in use) |
| 27 | Partition boot sector | Table 2-11 |
| 28 | FAT area | “F8h, FFh, FFh, 00h, -, 00h” |
| 29 | | “00h, -, 00h” |
| 30 | FAT area (Copy) | “F8h, FFh, FFh, 00h, -, 00h” |
| 31 | | “00h, -, 00h” |
| 32-47 | Root directory area | “00h, -, 00h” |
| 48-7,999 | Data area | “FFh, -, FFh” (Area not in use) |

Table 2-10 Contents of Master Boot Sector

| Offset | Parameter | Data |
|-----------|---------------------------|--------------------------|
| 000h-1BDh | Boot command (Not in use) | “00h, -, 00h” (Note1) |
| 1BEh | Partition 1 | Boot ID |
| 1BFh | | Start head No. |
| 1C0h | | Start sector No. |
| 1C1h | | Start cylinder No. |
| 1C2h | | System ID |
| 1C3h | | End head No. |
| 1C4h | | End sector No. |
| 1C5h | | End cylinder No. |
| 1C6h-1C9h | | Start logical sector No. |
| 1CAh-1CDh | | Partition size |
| 1CEh-1DDh | | Partition 2 (Not in use) |
| 1DEh-1EDh | Partition 3 (Not in use) | “00h, -, 00h” |
| 1EEh-1FDh | Partition 4 (Not in use) | “00h, -, 00h” |
| 1FEh-1FFh | Fixed data (Signature) | “AA55h” |

Note 1: These values are default format values at shipment from the production site. The user can alter the settings.

Table 2-11 Contents of Partition Boot Sector

| Offset | Parameter | Data |
|-----------|--|------------------------|
| 000h–002h | Jump command | “E9h”, “0000h” (Note1) |
| 003h–00Ah | Manufacturer’s name and version (ASCII, 8 Bytes) | ‘ ‘ (Note2) |
| 00Bh–00Ch | Number of bytes per sector | “0200h” |
| 00Dh | Number of sectors per allocation unit | “10h” |
| 00Eh–00Fh | Number of reserved sectors | “0001h” |
| 010h | Number of FATs (File Allocation Tables) | “02h” |
| 011h–012h | Number of root directory entries | “0100h” |
| 013h–014h | Total number of partition sectors | “1F25h” |
| 015h | ID Byte | “F8h” |
| 016h–017h | Number of FAT sectors | “0002h” |
| 018h–019h | Number of sectors per track | “0008h” |
| 01Ah–01Bh | Number of heads | “0004h” |
| 01Ch–01Fh | Number of hidden sectors | “0000 001Bh” |
| 020h–023h | Total number of partition sectors (32 Bits) | “0000 0000h” |
| 024h | Physical drive No. | “00h” |
| 025h | Reserved | “00h” |
| 026h | Extended boot record signatures | “00h” |
| 027h–02Ah | Volume ID (4 Bytes) | “0000 0000h” |
| 02Bh–035h | Volume label (ASCII, 11 Bytes) | “00h, –, 00h” |
| 036h–03Dh | File system type (ASCII, 8 Bytes) | ‘FAT12 ‘ |
| 03Eh–1FDh | Reserved (IPL code area) | “00h, –, 00h” |
| 1FEh–1FFh | Fixed data (Signature) | “AA55h” |

Note 1: These values are default format values at shipment from the production site. The user can alter the settings.

Note 2: These values are default format values at shipment from the production site. When format commands in Windows® 95 and 98 are used, these values may be different.

2.4. 8 MB

- DOS 12-bit FAT format
- Cluster size : 8 KB
- Total number of clusters : 997
- Number of directory entries : 256

Table 2-12 Logical Format Specifications

| Logical Sector No. | Area Name | Initial Set Data |
|--------------------|-----------------------|---------------------------------|
| 0 | Master boot sector | Table 2-13 |
| 1–24 | Not in use | “FFh, –, FFh” (Area not in use) |
| 25 | Partition boot sector | Table 2-14 |
| 26 | FAT area | “F8h, FFh, FFh, 00h, –, 00h” |
| 27–28 | | “00h, –, 00h” |
| 29 | FAT area (Copy) | “F8h, FFh, FFh, 00h, –, 00h” |
| 30–31 | | “00h, –, 00h” |
| 32–47 | Root directory area | “00h, –, 00h” |
| 48–15,999 | Data area | “FFh, –, FFh” (Area not in use) |

Table 2-13 Contents of Master Boot Sector

| Offset | Parameter | Data |
|-----------|---------------------------|--------------------------|
| 000h–1BDh | Boot command (Not in use) | “00h, –, 00h” (Note1) |
| 1BEh | Partition 1 | Boot ID |
| 1BFh | | Start head No. |
| 1C0h | | Start sector No. |
| 1C1h | | Start cylinder No. |
| 1C2h | | System ID |
| 1C3h | | End head No. |
| 1C4h | | End sector No. |
| 1C5h | | End cylinder No. |
| 1C6h–1C9h | | Start logical sector No. |
| 1CAh–1CDh | | Partition size |
| 1CEh–1DDh | | Partition 2 (Not in use) |
| 1DEh–1EDh | Partition 3 (Not in use) | “00h, –, 00h” |
| 1EEh–1FDh | Partition 4 (Not in use) | “00h, –, 00h” |
| 1FEh–1FFh | Fixed data (Signature) | “AA55h” |

Note 1: These values are default format values at shipment from the production site. The user can alter the settings.

Table 2-14 Contents of Partition Boot Sector

| Offset | Parameter | Data |
|-----------|--|------------------------|
| 000h–002h | Jump command | “E9h”, “0000h” (Note1) |
| 003h–00Ah | Manufacturer’s name and version (ASCII, 8 Bytes) | ‘ ‘ (Note2) |
| 00Bh–00Ch | Number of bytes per sector | “0200h” |
| 00Dh | Number of sectors per allocation unit | “10h” |
| 00Eh–00Fh | Number of reserved sectors | “0001h” |
| 010h | Number of FATs (File Allocation Tables) | “02h” |
| 011h–012h | Number of root directory entries | “0100h” |
| 013h–014h | Total number of partition sectors | “3E67h” |
| 015h | ID Byte | “F8h” |
| 016h–017h | Number of FAT sectors | “0003h” |
| 018h–019h | Number of sectors per track | “0010h” |
| 01Ah–01Bh | Number of heads | “0004h” |
| 01Ch–01Fh | Number of hidden sectors | “0000 0019h” |
| 020h–023h | Total number of partition sectors (32 Bits) | “0000 0000h” |
| 024h | Physical drive No. | “00h” |
| 025h | Reserved | “00h” |
| 026h | Extended boot record signatures | “00h” |
| 027h–02Ah | Volume ID (4 Bytes) | “0000 0000h” |
| 02Bh–035h | Volume label (ASCII, 11 Bytes) | “00h, –, 00h” |
| 036h–03Dh | File system type (ASCII, 8 Bytes) | ‘FAT12 ‘ |
| 03Eh–1FDh | Reserved (IPL code area) | “00h, –, 00h” |
| 1FEh–1FFh | Fixed data (Signature) | “AA55h” |

Note 1: These values are default format values at shipment from the production site. The user can alter the settings.

Note 2: These values are default format values at shipment from the production site. When format commands in Windows® 95 and 98 are used, these values may be different.