

3.5.3. CSD Register

The Card Specific Data (CSD) register contains configuration information required to access the card data. In Table 3-10, the cell type column defines the CSD field as Read only (R), One Time Programmable (R/W) or erasable (R/W/E). This table shows the value in “real world” units for each field and coded according to the CSD structure. The Model dependent column marks (with a check mark, \checkmark) the CSD fields that are model dependent. Note that the CSD register in the SD Card has a different structure than the CSD in the MultiMediaCard.

此卡的描述数据寄存器 (CSD) 包含了访问该卡数据时的必要配置信息。在表3-10里, “cell type” 栏内定义了CSD的区域是只读 (R)、一次编程 (R/W) 或可擦除的 (R/W/E) [译者注: 原文错误, 原文表内没有 (R/W/E) 这个内容, 正确信息为: “R/W” 是指可以多次擦写, “R/W (1)” 是指只能一次写入, 不可擦除]。该张表中所显示的值都对应真实的CSD结构中的各自区域和编码。CSD区域的样式是依照栏标记 (和一个复选标记 \checkmark) 的样式。注意SD卡内的CSD寄存器和MultiMedia卡的CSD寄存器有着不同的结构。

原文中此处是表3-10, 本节请参阅下一页的表格

NOTE: The device size indicates the user area size. It does not include the protected area that is used for security applications and is about 1 percent of the total card size.

注意: 这个设备的大小指示的是用户区域的大小。它不包括用于安全应用的保护区域, 这个区域大约占用了卡上总容量的1%。

The following sections describe the CSD fields and the relevant data types. If not explicitly defined otherwise, all bit strings are interpreted as binary coded numbers starting with the left bit first.

随后的章节说明了这些CSD区域和相关数据类型。如果不做其它明确的定义, 所有的位串都是将左边位作为首位的二进制编码。

译者注: 下一页表格中的每一项都有详细描述, 相关内容跟随在表格之后。

Table 3-10. CSD Register

Name	Field	Width	Cell Type	CSD-Slice	CSD Value	CSD Code
CSD structure	CSD_STRUCTURE	2	R	[127:126]	1.0	00b
Reserved	-	6	R	[125:120]	-	000000b
data read access-time-1	TAAC					
	Binary	8	R	[119:112]	1.5 msec	00100110b
	MLC	8	R	[119:112]	10 msec	00001111b
data read access-time-2 in CLK cycles (NSAC*100)	NSAC	8	R	[111:104]	0	00000000b
max. data transfer rate	TRAN_SPEED	8	R	[103:96]	25MHz	00110010b
card command classes	CCC	12	R	[95:84]	All (incl. WP, Lock/unlock)	1F5h
max. read data block length	READ_BL_LEN	4	R	[83:80]	512byte	1001b
partial blocks for read allowed	READ_BL_PARTIAL	1	R	[79:79]	Yes	1b
write block misalignment	WRITE_BLK_MISALIGN	1	R	[78:78]	No	0b
read block misalignment	READ_BLK_MISALIGN	1	R	[77:77]	No	0b
DSR implemented	DSR_IMP	1	R	[76:76]	No	0b
Reserved	-	2	R	[75:74]	-	00b
device size	C_SIZE	12	R	[73:62]	SD128=3843	F03h
					SD064=3807	EDFh
					SD032=1867	74Bh
					SD016= 899	383h
					SD008= 831	33Fh
max. read current @VDD min	VDD_R_CURR_MIN	3	R	[61:59]	100mA	111b
max. read current @VDD max	VDD_R_CURR_MAX	3	R	[58:56]	80mA	110b
max. write current @VDD min	VDD_W_CURR_MIN	3	R	[55:53]	100mA	111b

原文: SanDisk Secure Digital Card - Product Manual (Version 1.9 Document No. 80-13-00169 December 2003) 第3章的关于 CSD 寄存器的描述内容。
译者: 醇酒 2007.11.5 (请尊重我的劳动, 勿抄袭和修改本文中的内容), 若文中翻译有不妥之处, 请 Email 至: chunjiu@263.net 处指正, 不胜感激!

Name	Field	Width	Cell Type	CSD-Slice	CSD Value	CSD Code
max. write current @VDD max	VDD_W_CURR_MAX	3	R	[52:50]	80mA	110b
device size multiplier	C_SIZE_MULT	3	R	[49:47]	SD128=64 SD064=32 SD032=32 SD016=32 SD008=16	100b 011b 011b 011b 010b
erase single block enable	ERASE_BLK_EN	1	R	[46:46]	Yes	1b
erase sector size	SECTOR_SIZE	7	R	[45:39]	32blocks	0011111b
write protect group size	WP_GRP_SIZE	7	R	[38:32]	128sectors	1111111b
write protect group enable	WP_GRP_ENABLE	1	R	[31:31]	Yes	1b
Reserved for MultiMediaCard compatibility		2	R	[30:29]	-	00b
write speed factor				见译者注		
Binary	R2W_FACTOR	3	R	[28:26]	X16	100b
MLC	R2W_FACTOR	3	R	[28:26]	X4	010b
max. write data block length	WRITE_BL_LEN	4	R	[25:22]	512Byte	1001b
partial blocks for write allowed	WRITE_BL_PARTIAL	1	R	[21:21]	No	0
Reserved	-	5	R	[20:16]	-	00000b
File format group	FILE_FORMAT_GRP	1	R/W(1)	[15:15]	0	0b
copy flag (OTP)	COPY	1	R/W(1)	[14:14]	Not Original	1b
permanent write protection	PERM_WRITE_PROTECT	1	R/W(1)	[13:13]	Not Protected	0b
temporary write protection	TMP_WRITE_PROTECT	1	R/W	[12:12]	Not Protected	0b
File format	FILE_FORMAT	2	R/W(1)	[11:10]	HD w/partition	00b
Reserved		2	R/W	[9:8]	-	00b
CRC	CRC	7	R/W	[7:1]	-	CRC7
not used, always '1'	-	1	-	[0:0]	-	1b

译者注: 此处原文中有错误, 被写成 "[1:16] [1:4]", 表中的内容已经修正为正确信息。

CSD_STRUCTURE – describes the version of the CSD structure.

CSD_STRUCTURE 描述 CSD 结构的版本。

CSD structure	CSD_STRUCTURE	2	R	[127:126]	1.0	00b
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Table 3-11. CSD Register Structure

CSD_STRUCTURE	CSD Structure Version	Valid for SD Card Physical Specification Version	备注
0	CSD version No. 1.0	Version 1.0-1.01	版本 1.0-1.1
1-3	Reserved		保留

TAAC – Defines the asynchronous part (relative to the SD Card clock (CLK)) of the read access time.

TAAC 定义这个异步部分的读操作时间 (相对于 SD 卡的时钟 (CLK))。

data read access-time-1	TAAC					
	Binary	8	R	[119:112]	1.5 msec	00100110b
	MLC	8	R	[119:112]	10 msec	00001111b

Table 3-12. TAAC Access Time Definition

TAAC Bit Position	Code	备注
2:0	time unit 0=1ns, 1=10ns, 2=100ns, 3=1μs, 4=10μs, 5=100μs, 6=1ms, 7=10ms	时间单位
6:3	time value 0=reserved, 1=1.0, 2=1.2, 3=1.3, 4=1.5, 5=2.0, 6=2.5, 7=3.0, 8=3.5, 9=4.0, A=4.5, B=5.0, C=5.5, D=6.0, E=7.0, F=8.0	时间数值
7	Reserved	保留

NSAC – Defines the worst case for the clock dependent factor of the data access time. The unit for NSAC is 100 clock cycles. Therefore, the maximal value for the clock dependent part of the read access time is 25.5k clock cycles.

NSAC 定义了时钟的相关特性在最差情况下的数据访问时间。它的单位是 100 个时钟周期。所以, 该时钟的相关部分所确定的读访问时间的最大值是 25.5K (255*100, 参见表 3-10 中的说明) 个时钟周期。

The total read access time **Nac** as expressed in the Table 5-5 is the sum of **TAAC** and **NSAC**. It has to be computed by the host for the actual clock rate. The read access time should be interpreted as a typical delay for the first data bit of a data block from the end bit on the read commands.

读访问的时间总量 **Nac** 明确的在表 5-5 [译者注: 原文错误, 被标成表 5-17, 但这个表在文档中不存在, 经确认, 实际上是表 5-5] (译者注: 这是 SPI 模式下的表格, SD 专用模式的表格是: 表 4-17) 里体现为 **TAAC** 与 **NSAC** 的和。主控制器可以用来计算实际的时钟速率。读访问时间应该解释为: 它是由读取命令获取的数据块的首个 bit 到结束 bit 之间的典型延时。

data read access-time-2 in CLK cycles (NSAC*100)	NSAC	8	R	[111:104]	0	00000000b
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Table 5-5. Timing Constants Definitions

	Min	Max	Unit
NCS	0	-	8 Clock Cycles
NCR	0	8	8 Clock Cycles
NRC	1	-	8 Clock Cycles
NAC	1	See Note	8 Clock Cycles
NWR	1	-	8 Clock Cycles
NEC	0	-	8 Clock Cycles
NDS	0	-	8 Clock Cycles

NOTE: $\min [\{ (TAAC * f) + (NSAC * 100) \} * 1/8, \{ (100ms * f) * 1/8 \}]$ where units = (8 clocks) and “f” is the clock frequency.

TRAN_SPEED – Table 3-13 defines the maximum data transfer rate TRAN_SPEED.

TRAN_SPEED 表 3-13 定义最大的数据传送速率 TRAN_SPEED。

max. data transfer rate	TRAN_SPEED	8	R	[103:96]	25MHz	00110010b
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Table 3-13. Maximum Data Transfer Rate Definition

TRAN_SPEED Bit	Code
2:0	transfer rate unit 0 = 100kbit / s, 1 = 1Mbit / s, 2 = 10Mbit / s, 3 = 100Mbit / s, 4... 7 = reserved
6:3	time value 0=reserved, 1=1.0, 2=1.2, 3=1.3, 4=1.5, 5=2.0, 6=2.5, 7=3.0, 8=3.5, 9=4.0, A=4.5, B=5.0, C=5.5, D=6.0, E=7.0, F=8.0

CCC – The SD Card command set is divided into subsets (command classes). The card command class register CCC defines which command classes are supported by this card. A value of ‘1’ in a CCC bit means that the corresponding command class is supported. Table 3-14 lists the supported card command classes; refer to Table 4-2 for command class definitions.

CCC 是该卡命令规定的子集(命令类别), 定义了这个卡所能支持的命令类别。在 CCC 中的一个位的值为“1”则意味着对应的命令类别是可以支持的。表 3-14 列出了所支持的卡的命令类别; 可以参考表 4-2 中的命令类别定义。

card command classes	CCC	12	R	[95:84]	All (incl. WP, Lock/unlock)	1F5h
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Table 3-14. Supported Card Command Classes

CCC Bit	Supported Card Command Class
0	class 0
1	class 1
.....	
11	class 11

READ_BL_LEN – The maximum read data block length is computed as $2^{\text{READ_BL_LEN}}$. The maximum block length might therefore be in the range 512...2048 bytes. Note that in the SD Card, the WRITE_BL_LEN is always equal to READ_BL_LEN.

READ_BL_LEN 是最大的可读取数据块长度是用 $2^{\text{READ_BL_LEN}}$ 来计算的。所以, 这个最大块长度是在 512...2048 字节的范围内。注意: 在 SD 卡中, WRITE_BL_LEN 总是等于 READ_BL_LEN 的。

max. read data block length	READ_BL_LEN	4	R	[83:80]	512byte	1001b
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Table 3-15. Data Block Length

READ_BL_LEN	Block Length
0-8	Reserved
9	$2^9 = 512$ Bytes
10	$2^{10} = 1024$ Bytes
11	$2^{11} = 2048$ Bytes
12-15	Reserved

READ_BL_PARTIAL – READ_BL_PARTIAL is always set to 1 in the SD Card. Partial Block Read is always allowed in the SD Card. It means that smaller blocks can be used as well. The minimum block size is one byte.

READ_BL_PARTIAL=0 means that only the READ_BL_LEN block size can be used for block oriented data transfers.

READ_BL_PARTIAL=1 means that smaller blocks can be used as well. The minimum block size will be equal to minimum addressable unit (one byte)

READ_BL_PARTIAL 在 SD 卡中总是为 1。块的部分读取在 SD 卡上总是被允许的。它意味着可以使用适当小的块。块最小可以小为 1 个字节。

READ_BL_PARTIAL = 0 意味着块大小只能使用 READ_BL_LEN 的大小来做数据传送。

READ_BL_PARTIAL = 1 意味着可以使用小的块。最小的块将等于最小的地址单元 (一个字节)。

partial blocks for read allowed	READ_BL_PARTIAL	1	R	[79:79]	Yes	1b
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WRITE_BLK_MISALIGN – Defines if the data block to be written by one command can be spread over more than one physical block of the memory device. The size of the memory block is defined in WRITE_BL_LEN.

WRITE_BLK_MISALIGN=0 signals that crossing physical block boundaries is invalid.

WRITE_BLK_MISALIGN=1 signals that crossing physical block boundaries is allowed.

WRITE_BLK_MISALIGN 定义是否可以用一条写入命令来涵盖存储器设备上多于一个物理块。这个块的大小定义在 WRITE_BL_LEN 中。

WRITE_BLK_MISALIGN = 0 表示跨过物理块的界线是不允许的。

WRITE_BLK_MISALIGN = 1 表示跨过物理块的界线是被允许的。

write block misalignment	WRITE_BLK_MISALIGN	1	R	[78:78]	No	0b
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READ_BLK_MISALIGN – Defines if the data block to be read by one command can be spread over more than one physical block of the memory device. The size of the memory block is defined in READ_BL_LEN.

READ_BLK_MISALIGN=0 signals that crossing physical block boundaries is invalid.

READ_BLK_MISALIGN=1 signals that crossing physical block boundaries is allowed.

READ_BLK_MISALIGN 定义是否可以用一条读取命令来涵盖存储器设备上多于一个物理块。这个块的大小定义在 READ_BL_LEN 中。

READ_BLK_MISALIGN = 0 表示跨过物理块的界线是不允许的。

READ_BLK_MISALIGN = 1 表示跨过物理块的界线是被允许的。

read block misalignment	READ_BLK_MISALIGN	1	R	[77:77]	No	0b
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DSR_IMP – Defines if the configurable driver stage is integrated on the card. If set, a driver stage register (DSR) must be implemented also.

DSR_IMP 定义卡上是否集成了可配置的驱动级。如果被设置了, 一个驱动级寄存器 (DSR) 必须是可用的。(DSR_IMP = 0 没有可用的 SDR。)

DSR implemented	DSR_IMP	1	R	[76:76]	No	0b
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Table 3-16. DSR Implementation Code Table

DSR_IMP	DSR Type	备注
0	no DSR implemented	没有SDR可用

C_SIZE (Device Size) – This parameter is used to compute the card capacity (does not include security protected area). The memory capacity of the card is computed from the entries C_SIZE, C_SIZE_MULT and READ_BL_LEN as follows:

$$\text{memory capacity} = \text{BLOCKNR} * \text{BLOCK_LEN}$$

Where:

$$\begin{aligned}\text{BLOCKNR} &= (\text{C_SIZE}+1) * \text{MULT} \\ \text{MULT} &= (\text{C_SIZE_MULT} < 8) * 2^{(\text{C_SIZE_MULT}+2)} \\ \text{BLOCK_LEN} &= (\text{READ_BL_LEN} < 12) * 2^{(\text{READ_BL_LEN})}\end{aligned}$$

Therefore, the maximum capacity which can be coded is $4096*512*2048 = 4$ GBytes. Example: A four MByte card with BLOCK_LEN = 512 can be coded with C_SIZE_MULT = 0 and C_SIZE = 2047.

C_SIZE (设备大小) 这个参数用于计算卡的容量 (不包括安全保护区域)。卡的存储容量是通过 C_SIZE、C_SIZE_MULT 和 READ_BL_LEN 来计算的, 请看这个公式:

$$\text{存储器容量} = \text{BLOCKNR} * \text{BLOCK_LEN}$$

而那些参数是:

$$\begin{aligned}\text{BLOCKNR} &= (\text{C_SIZE}+1) * \text{MULT} \\ \text{MULT} &= (\text{C_SIZE_MULT} < 8) * 2^{(\text{C_SIZE_MULT}+2)} \\ \text{BLOCK_LEN} &= (\text{READ_BL_LEN} < 12) * 2^{(\text{READ_BL_LEN})}\end{aligned}$$

因此, 最大的容量可以编码为: $4096*512*2048 = 4$ GByte。举例来说: 4 MByte 的卡 BLOCK_LEN = 512 可以编码为 C_SIZE_MULT = 0 和 C_SIZE = 2047。

device size	C_SIZE	12	R	[73:62]	SD128=3843	F03h
					SD064=3807	EDFh
					SD032=1867	74Bh
					SD016= 899	383h
					SD008= 831	33Fh

VDD_R_CURR_MIN, VDD_W_CURR_MIN – The maximum values for read and write currents at the minimal VDD power supply are coded in Table 3-17.

VDD_R_CURR_MIN, VDD_W_CURR_MIN 是在最小限度的电压供应下, 读取和写入操作所需求的最大电流值。编码在表 3-17 中。

max. read current @VDD min	VDD_R_CURR_MIN	3	R	[61:59]	100mA	111b
max. write current @VDD min	VDD_W_CURR_MIN	3	R	[55:53]	100mA	111b

Table 3-17. VDD Minimum Current Consumption

VDD_R_CURR_MIN VDD_W_CURR_MIN	Code For Current Consumption @ VDD
2:0	0=0.5mA; 1=1mA; 2=5mA; 3=10mA; 4=25mA; 5=35mA; 6=60mA; 7=100mA

VDD_R_CURR_MAX, VDD_W_CURR_MAX – The maximum values for read and write currents at the maximum VDD power supply are coded Table 3-18.

VDD_R_CURR_MAX, VDD_W_CURR_MAX 是在最大电压供应下, 读取和写入操作需求的最大电流值。编码在表 3-18 中。

max. read current @VDD max	VDD_R_CURR_MAX	3	R	[58:56]	80mA	110b
max. write current @VDD max	VDD_W_CURR_MAX	3	R	[52:50]	80mA	110b

Table 3-18. VDD Maximum Current Consumption

VDD_R_CURR_MAX VDD_W_CURR_MAX	Code For Current Consumption @ VDD
2:0	0=1mA; 1=5mA; 2=10mA; 3=25mA; 4=35mA; 5=45mA; 6=80mA; 7=200mA

C_SIZE_MULT (Device Size Multiplier) – This parameter is used for coding a factor MULT for computing the total device size (see 'C_SIZE'). The factor MULT is defined as $2^{(C_SIZE_MULT+2)}$.

C_SIZE_MULT (设备大小的乘数) 这个参数用来表示 MULT, 用于计算设备的容量大小 (参考 “C_SIZE”)。MULT 定义为 $2^{(C_SIZE_MULT+2)}$ 。

device size multiplier	C_SIZE_MULT	3	R	[49:47]	SD128=64	100b
					SD064=32	011b
					SD032=32	011b
					SD016=32	011b
					SD008=16	010b

Table 3-19. Multiply Factor For The Device Size

C_SIZE_MULT	MULT	C_SIZE_MULT	MULT	C_SIZE_MULT	MULT	C_SIZE_MULT	MULT
0	$2^2 = 4$	2	$2^4 = 16$	4	$2^6 = 64$	6	$2^8 = 256$
1	$2^3 = 8$	3	$2^5 = 32$	5	$2^7 = 128$	7	$2^9 = 512$

ERASE_BLK_EN – defines whether erase of one write block (see WRITE_BL_LEN) is allowed (other than SECTOR_SIZE given below). If ERASE_BLK_EN is 0, the host can erase a unit of SECTOR_SIZE. If ERASE_BLK_EN is 1, the host can erase either a unit of SECTOR_SIZE or a unit of WRITE_BLK_LEN.

ERASE_BLK_EN 定义擦除一个可写块 (参见 WRITE_BL_LEN) 是否为允许的 (即除了下面给出的 SECTOR_SIZE 之外)。

ERASE_BLK_EN = 0 主控制器只能擦除一个 SECTOR_SIZE 单元。

ERASE_BLK_EN = 1 主控制器可以擦除一个 SECTOR_SIZE 单元或一个 WRITE_BLK_LEN 单元。

erase single block enable	ERASE_BLK_EN	1	R	[46:46]	Yes	1b
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SECTOR_SIZE – The size of an erasable sector. The contents of this register is a 7-bit binary coded value, defining the number of write blocks (see WRITE_BL_LEN). The actual size is computed by increasing this number by one. A value of zero means 1 write block, 127 means 128 blocks.

SECTOR_SIZE 这个可擦除扇区的大小。这个寄存器是一个 7 位的二进制编码值, 定义了可写块的数量 (参阅 WRITE_BL_LEN)。实际大小是这个数量加上 1。一个 0 意味着 1 个可写块, 127 是 128 个可写块。

erase sector size	SECTOR_SIZE	7	R	[45:39]	32blocks	0011111b
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WP_GRP_SIZE – The size of a write protected group. The contents of this register is a 7-bit binary coded value, defining the number of Erase Groups (see SECTOR_SIZE). The actual size is computed by increasing this number by one. A value of zero means 1 erase group, 127 means 128 erase groups.

WP_GRP_SIZE 这个写保护组的大小。这个寄存器是一个 7 位的二进制编码值, 定义可擦除组数量 (参阅 SECTOR_SIZE)。实际大小是这个数量加上 1。一个 0 意味着 1 个可擦除组, 127 是 128 个可擦除组。

write protect group size	WP_GRP_SIZE	7	R	[38:32]	128sectors	1111111b
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WP_GRP_ENABLE – A value of ‘0’ means no group write protection possible.

WP_GRP_ENABLE 一个 “0” 表示没有写保护组存在, “1” 则相反。

write protect group enable	WP_GRP_ENABLE	1	R	[31:31]	Yes	1b
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R2W_FACTOR – Defines the typical block program time as a multiple of the read access time. Table 3-20 defines the field format.

R2W_FACTOR 将典型的块编程 (烧录) 时间定义为读取访问时间的倍数。表 3-20 定义了这个区域的格式。

write speed factor						
Binary	R2W_FACTOR	3	R	[28:26]	X16	100b
MLC	R2W_FACTOR	3	R	[28:26]	X4	010b

Table 3-20. R2W_FACTOR

R2W_FACTOR	Multiples of Read Access Time	备注
0	1	
1	2 (write half as fast as read)	半个快速写和读取一样
2	4	
3	8	
4	16	
5	32	
6, 7	Reserved	保留

WRITE_BL_LEN – The maximum write data block length is computed as $2^{\text{WRITE_BL_LEN}}$. The maximum block length might therefore be in the range from 512 up to 2048 bytes. A Write Block Length of 512 bytes is always supported. Note that in the SD Card, the WRITE_BL_LEN is always equal to READ_BL_LEN.

WRITE_BL_LEN 这个最大的写入数据块长度是用 $2^{\text{WRITE_BL_LEN}}$ 来计算的。这个最大的块长度的范围可以是 512 到 2048 字节。当写入块的长度设定为 512 时总是被支持的 (译者注: 即 SD 卡系统的默认值)。注意: 在 SD 卡中, WRITE_BL_LEN 总是等于 READ_BL_LEN 的。

max. write data block length	WRITE_BL_LEN	4	R	[25:22]	512Byte	1001b
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Table 3-21. Data Block Length

WRITE_BL_LEN	Block Length	备注
0-8	Reserved	保留
9	$2^9 = 512$ Bytes	
10	$2^{10} = 1024$ Bytes	
11	$2^{11} = 2048$ Bytes	
12-15	Reserved	保留

WRITE_BL_PARTIAL – Defines whether partial block sizes can be used in block write commands.

WRITE_BL_PARTIAL = '0' means that only the WRITE_BL_LEN block size, and its partial derivatives in resolution of units of 512 blocks, can be used for block oriented data write.

WRITE_BL_PARTIAL = '1' means that smaller blocks can be used as well. The minimum block size is one byte.

WRITE_BL_PARTIAL 定义了“块写入”命令是否能用于不完整的块。

WRITE_BL_PARTIAL = 0 意味着块的大小只能是 WRITE_BL_LEN, 和它相关联的部分 (partial) 必须是 512 个单元的块, 能用于块索引数据的写入。

WRITE_BL_PARTIAL = 1 意味着设置很小的块也能使用。最小的块大小是 1 个字节。

partial blocks for write allowed	WRITE_BL_PARTIAL	1	R	[21:21]	No	0
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FILE_FORMAT_GROUP – Indicates the selected group of file formats. This field is read-only for ROM. The usage of this field is shown in Table 3-22.

FILE_FORMAT_GROUP 指示被选中组件的文件格式。这个区域是 ROM, 只能读取。它的使用方法显示在表 3-22 里面。

File format group	FILE_FORMAT_GRP	1	R/W(1)	[15:15]	0	0b
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Table 3-22. File Format

FILE_FORMAT_GRP	FILE_FORMAT	Type	备注
0	0	Hard disk-like file system with partition table	有分配表, 类似硬盘的文件系统
0	1	DOS FAT (floppy-like) with boot sector only (no partition table)	只有启动扇区DOS FAT (类似软盘) (没有分配表)
0	2	Universal File Format	通用文件格式
0	3	Others/Unknown	其它的/未知的
1	0, 1, 2, 3	Reserved	保留

COPY – This bit marks the card as an original (‘0’) or non-original (‘1’). Once set to non-original, this bit cannot be reset to original. The definition of “original” and “non-original” is application dependent and changes no card characteristics.

COPY 这个位标志此卡是否为原创 (0) 或非原创 (1)。一旦设置为非原创, 这个位不能重置成原创。“原创”和“非原创”的定义是由应用程序来确定和修改的, 并非卡的特性。

copy flag (OTP)	COPY	1	R/W(1)	[14:14]	Not Original	1b
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PERM_WRITE_PROTECT – Permanently protects the whole card content, except the secured protected area, against overwriting or erasing (all write and erase commands for this card are permanently disabled). The default value is ‘0’, i.e., not permanently write protected.

PERM_WRITE_PROTECT 永久地保护该卡上除了安全保护区域内的所有内容, 禁止改写或擦除 (该卡所有的写入和擦除命令都无效了)。它的缺省值为 “0”, 也就是没有永久性地写入保护。译者注: 这个特性位只能写入一次, 因此它可以用来将 SD 卡设置成只读的 ROM, 而使用者无法改写其中的内容。

permanent write protection	PERM_WRITE_PROTECT	1	R/W(1)	[13:13]	Not Protected	0b
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TMP_WRITE_PROTECT – Temporarily protects the whole card content, except the secured protected area, from being overwritten or erased (all write and erase commands for this card are temporarily disabled). This bit can be set and reset. The default value is '0', i.e., not write protected.

TMP_WRITE_PROTECT 临时性地保护该卡上除了安全保护区域内的所有内容, 后期可以改写或擦除 (该卡所有的写入和擦除命令是临时失效)。该位可以被设置和重置。它的缺省值为“0”, 也就是没有写入保护。

temporary write protection	TMP_WRITE_PROTECT	1	R/W	[12:12]	Not Protected	0b
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FILE_FORMAT – Indicates the file format on the card. This field is read-only for ROM. The following formats are defined.

FILE_FORMAT 说明了该卡上的文件格式。这个区域是 ROM, 只能读取。下面是格式的定义:

File format	FILE_FORMAT	2	R/W(1)	[11:10]	HD w/partition	00b
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Table 3-22. File Format

FILE_FORMAT_GRP	FILE_FORMAT	Type	备注
0	0	Hard disk-like file system with partition table	有分配表, 类似硬盘的文件系统
0	1	DOS FAT (floppy-like) with boot sector only (no partition table)	只有启动扇区DOS FAT (类似软盘) (没有分配表)
0	2	Universal File Format	通用文件格式
0	3	Others/Unknown	其它的/未知的
1	0, 1, 2, 3	Reserved	保留

CRC – The CRC field carries the check sum for the CSD contents. The checksum has to be recalculated by the host for any CSD modification. The default corresponds to the initial CSD contents.

CRC 这个 CRC 区域带有 CSD 内容的校验和。这个校验和在主控制器对 CSD 做任何修改后肯定会重新计算。缺省值符合 CSD 初始化时候的内容。

CRC	CRC	7	R/W	[7:1]	–	CRC7
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