

# DSi SD/MMC Protocol: CSD Register (128bit Card-Specific Data) Version 2.0

[Contents](#) [Prev](#)  
[Index](#) [Next](#)

## CSD Register (CSD Version 2.0) (SDHC/SDXC)

The field name in parenthesis is set to fixed value and indicates that the host is not necessary to refer these fields. The fixed values enables host, which refers to these fields, to keep compatibility to CSD Version 1.0.

The Cell Type field is coded as follows: R=readable, W(1)=writable once, W=multiple writable.

Bit	Size	Type	Name	Field	Value
127-126	2	R	CSD structure	CSD_STRUCTURE	01b
125-120	6	R	reserved	-	000000b
119-112	8	R	data read access-time-1	(TAAC)	0Eh
111-104	8	R	data read access-time-2	(NSAC)	00h
103-96	8	R	max data transfer rate	(TRAN_SPEED)	32h, 5Ah, 0Bh, 2Bh
95-84	12	R	card command classes	CCC	x1x110110101b
83-80	4	R	max read data block length	(READ_BL_LEN)	9
79	1	R	partial blocks for read allowed	(READ_BL_PARTIAL)	0
78	1	R	write block misalignment	(WRITE_BLK_MISALIGN)	0
77	1	R	read block misalignment	(READ_BLK_MISALIGN)	0
76	1	R	DSR implemented	DSR_IMP	x
75-70	6	R	reserved	-	000000b
69-48	22	R	device size	C_SIZE	xxxxxxh
47	1	R	reserved	-	0
46	1	R	erase single block enable	(ERASE_BLK_EN)	1
45-39	7	R	erase sector size	(SECTOR_SIZE)	7Fh
38-32	7	R	write protect group size	(WP_GRP_SIZE)	00h
31	1	R	write protect group enable	(WP_GRP_ENABLE)	0
30-29	2	R	reserved	-	00b
28-26	3	R	write speed factor	(R2W_FACTOR)	010b
25-22	4	R	max write data block length	(WRITE_BL_LEN)	9
21	1	R	partial blocks for write allowed	(WRITE_BL_PARTIAL)	0
20-16	5	R	reserved	-	00000b
15	1	R	File format group	(FILE_FORMAT_GRP)	0
14	1	R/W(1)	copy flag	COPY	x
13	1	R/W(1)	permanent write protection	PERM_WRITE_PROTECT	x
12	1	R/W	temporary write protection	TMP_WRITE_PROTECT	x
11-10	2	R	File format	(FILE_FORMAT)	00b
9-8	2	R	reserved	-	00b
7-1	7	R/W	CRC	CRC	xxh
0	1	-	not used, always '1'	-	1

## C\_SIZE

This field is expanded to 22 bits and can indicate up to 2 TBytes (that is the same as the maximum memory space specified by a 32-bit block address.)

This parameter is used to calculate the user data area capacity in the SD memory card (not include the protected area). The user data area capacity is calculated from C\_SIZE as follows:

$$\text{memory capacity} = (\text{C\_SIZE} + 1) * 512\text{KByte}$$

The Minimum user area size of SDHC Card is 4,211,712 sectors (2GB + 8.5MB).

The Minimum value of C\_SIZE for SDHC in CSD Version 2.0 is 001010h (4112).

The Maximum user area size of SDHC Card is (32GB - 80MB).

The Maximum value of C\_SIZE for SDHC in CSD Version 2.0 is 00FF5Fh (65375).

The Minimum user area size of SDXC Card is 67,108,864 sectors (32GB).

The Minimum value of C\_SIZE for SDXC in CSD Version 2.0 is 00FFFFh (65535).

## TRAN\_SPEED

TRAN\_SPEED is variable depends on bus speed mode of SD Interface.

When CMD0 is received, this field is reset to 32h.

On SDSC (but not SDHC/SDXC), CMD6 does the same reset stuff?

32h	SDSC/SDHC/SDXC in Default Speed mode	(25MHz)
5Ah	SDSC/SDHC/SDXC in High Speed mode	(50MHz)
0Bh	SDHC/SDXC in SDR50 or DDR50 mode	(100Mbit/sec)
2Bh	SDHC/SDXC in SDR104 mode	(200Mbit/sec)

UHS-II mode is not related to this field.

## CCC, DSR\_IMP, COPY, PERM\_WRITE\_PROTECT, TMP\_WRITE\_PROTECT

Definition of these fields is same as in CSD Version 1.0.

## TAAC, NSAC, R2W\_FACTOR

In SDHC/SDXC, these fields should be fixed to TAAC=0Eh (1 ms), NSAC=00h, and R2W\_FACTOR=02h (mul4).

The host should not use TAAC, NSAC, and R2W\_FACTOR to calculate timeout and should uses fixed timeout

values for read and write operations (See 4.6.2).

**READ\_BL\_LEN, WRITE\_BL\_LEN**

These two fields are fixed to 9h (which indicates 512 Bytes).

**READ\_BL\_PARTIAL, WRITE\_BL\_PARTIAL, READ\_BLK\_MISALIGN, WRITE\_BLK\_MISALIGN**

These four fields are fixed to 0 (partial block read and physical page crossing prohibited for block read/write).

**SECTOR\_SIZE**

This field is fixed to 7Fh, which indicates 64 KBytes. This value is not related to erase operation. SDHC and SDXC Cards indicate memory boundary by AU size and this field should not be used.

**ERASE\_BLK\_EN**

This field is fixed to 1, which means the host can erase one or multiple units of 512 bytes.

**WP\_GRP\_SIZE, WP\_GRP\_ENABLE**

These field are fixed to WP\_GRP\_SIZE=00h, and WP\_GRP\_ENABLE=0. SDHC and SDXC Cards do not support write protected groups.

**FILE\_FORMAT\_GRP****FILE\_FORMAT**

These fields are set to 0. Host should not use these fields.

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