SD NAND 存储功能描述（14）命令类 a

命令类

SD Memory Card 系统的命令集分为几类，如下表所示。每个类都支持一组卡片功能。表 4-20 根据卡支持的命令进行设置。一个 CCC 位对应一个支持的命令号，设置为 1。ccc 中包含强制命令的类总是被设置为 1。具有特定功能的卡可能需要支持一些可选命令。

例如，Combo Card 应该支持 CMD5。等级 0、2、4、5 和 8 是强制性的，所有 SD 存储卡都应支持。除 CMD40 外，SDHC 和 SDXC 是强制性的。其他类是可选的。支持的卡命令类(CCC)被编码为每个卡的卡特定数据(CSD)寄存器中的参数，为主机提供如何访问卡的信息。

Card Command Class (CCC)		0	1	2	3	4	5	6	7	8	9	10	11
Supported commands	class description	basic	reserved	block read	reserved	block write	erase	write protection	lock card	application specific	I/O mode	switch	reserved
CMD0	Mandatory	+											
CMD2	Mandatory	+											
CMD3	Mandatory	+											
CMD4	Mandatory	+											
CMD5	Optional										+		
CMD6[2]	Mandatory											+	
CMD7	Mandatory	+											
CMD8[3]	Mandatory	+											
CMD9	Mandatory	+											
CMD10	Mandatory	+											
CMD11[5]	Optional	+											
CMD12	Mandatory	+											
CMD13	Mandatory	+											
CMD15	Mandatory	+											
CMD16	Mandatory			+		+			+				
CMD17	Mandatory			+									
CMD18	Mandatory			+									
CMD19[5]	Optional			+									
CMD20[6]	Optional			+		+							
CMD23[7]	Optional			+		+							
CMD24[1]	Mandatory					+							
CMD25[1]	Mandatory					+							
CMD27[1]	Mandatory					+							
CMD28	Optional							+					
CMD29	Optional							+					
CMD30	Optional							+					
CMD32[1]	Mandatory						+						
CMD33[1]	Mandatory						+						
CMD34-37[2]	Optional											+	
CMD38[1]	Mandatory						+						
CMD40	Optional								+				
CMD42[4]	(Note 4)								+				
CMD50[2]	Optional											+	
CMD52	Optional										+		
CMD53	Optional										+		
CMD55	Mandatory									+			

Card Command Class (CCC)		0	1	2	3	4	5	6	7	8	9	10	11
Supported commands	class description	basic	reserved	block read	reserved	block write	erase	write protection	lock card	application specific	I/O mode	switch	reserved
CMD56	Mandatory									+			
CMD57[2]	Optional											+	
ACMD6	Mandatory									+			
ACMD13	Mandatory									+			
ACMD22[1]	Mandatory									+			
ACMD23[1]	Mandatory									+			
ACMD41	Mandatory									+			
ACMD42	Mandatory									+			
ACMD51	Mandatory									+			

Card Command Classes (CCCs) in SD Mode

注(1):与写和擦除相关的命令仅对可写类型的 CardsI 是强制性的

注(2):该命令在 1.10 版本中定义

注(3):该命令是 2.00 版本中新定义的

注(4):该命令在 1.01 和 1.10 版本中是可选的，从 2.00 版本开始是必选的

注(5):必须使用 UHS-I 卡

注(6):不支持 SDSC。SDHC 可选，SDXC 必选。

注(7):不支持 SDSC。UHS104 卡必选。

命令详细说明

下表详细描述了所有 SD 存储卡总线命令。响应 R1-R3。

下一章描述了寄存器 CID、CSD 和 DSR。该卡将忽略参数中的填充位和保留位。

CMD INDEX	type	argument	resp	abbreviation	command description
CMD0	bc	[31:0] stuff bits	-	GO_IDLE_STATE	Resets all cards to idle state
CMD1	reserved				
CMD2	bcr	[31:0] stuff bits	R2	ALL_SEND_CID	Asks any card to send the CID numbers on the CMD line (any card that is connected to the host will respond)
CMD3	bcr	[31:0] stuff bits	R6	SEND_RELATIVE_ADDR	Ask the card to publish a new relative address (RCA)
CMD4	bc	[31:16] DSR [15:0] stuff bits	-	SET_DSR	Programs the DSR of all cards
CMD5	reserved for I/O cards (refer to the "SDIO Card Specification")				
CMD7	ac	[31:16] RCA [15:0] stuff bits	R1b (only from the selected card)	SELECT/DESELECT_CARD	Command toggles a card between the stand-by and transfer states or between the programming and disconnect states. In both cases, the card is selected by its own relative address and gets deselected by any other address; address 0 deselects all. In the case that the RCA equals 0, then the host may do one of the following: - Use other RCA number to perform card de-selection. - Re-send CMD3 to change its RCA number to other than 0 and then use CMD7 with RCA=0 for card de-selection.
CMD8	bcr	[31:12]reserved bits [11:8]supply voltage(VHS) [7:0]check pattern	R7	SEND_IF_COND	Sends SD Memory Card interface condition, which includes host supply voltage information and asks the card whether card supports voltage. Reserved bits shall be set to '0'.
CMD9	ac	[31:16] RCA [15:0] stuff bits	R2	SEND_CSD	Addressed card sends its card-specific data (CSD) on the CMD line.
CMD10	ac	[31:16] RCA [15:0] stuff bits	R2	SEND_CID	Addressed card sends its card identification (CID) on CMD the line.
CMD11	ac	[31:0] reserved bits (all 0)	R1	VOLTAGE_SWITCH	Switch to 1.8V bus signaling level.
CMD12	ac	[31:0] stuff bits	R1b	STOP_TRANSMISSION	Forces the card to stop transmission
CMD13	ac	[31:16] RCA [15:0] stuff bits	R1	SEND_STATUS	Addressed card sends its status register.
CMD14	reserved				

CMD INDEX	type	argument	resp	abbreviation	command description
CMD15	ac	[31:16] RCA [15:0] reserved bits	-	GO_INACTIVE_ STATE	Sends an addressed card into the *Inactive State*. This command is used when the host explicitly wants to deactivate a card. Reserved bits shall be set to '0'.

Basic Commands (class 0)

CMD INDEX	type	argument	resp	abbreviation	command description
CMD16	ac	[31:0] block length	R1	SET_BLOCKLEN	In the case of a Standard Capacity SD Memory Card, this command sets the block length (in bytes) for all following block commands (read, write, lock). Default block length is fixed to 512 Bytes. Set length is valid for memory access commands only if partial block read operation are allowed in CSD. In the case of SDHC and SDXC Cards, block length set by CMD16 command doesn't affect memory read and write commands. Always 512 Bytes fixed block length is used. This command is effective for LOCK_UNLOCK command. In both cases, if block length is set larger than 512Bytes, the card sets the BLOCK_LEN_ERROR bit. In DDR50 mode, data is sampled on both edges of the clock. Therefore, block length shall always be even.
CMD17	adtc	[31:0] data address[2]	R1	READ_SINGLE_ BLOCK	In the case of a Standard Capacity SD Memory Card, this command, this command reads a block of the size selected by the SET_BLOCKLEN command.[1] In case of SDHC and SDXC Cards, block length is fixed 512 Bytes regardless of the SET_BLOCKLEN command.
CMD18	adtc	[31:0] data address[2]	R1	READ_MULTIPLE_ BLOCK	Continuously transfers data blocks from card to host until interrupted by a STOP_TRANSMISSION command. Block length is specified the same as READ_SINGLE_BLOCK command.
CMD19	adtc	[31:0] reserved bits (all 0)	R1	SEND_TUNING_ BLOCK	64 bytes tuning pattern is sent for SDR50 and SDR104.
CMD20	ac	[31:28]Speed Class Control [27:0]Reserved (all-0)	R1b	SPEED_CLASS_CON TROL	Speed Class control command. Refer to Section 4.13.2.8.

CMD INDEX	type	argument	resp	abbreviation	command description
CMD21 CMD22	reserved				
CMD23	ac	[31:0] Block Count	R1	SET_BLOCK_COUNT	Specify block count for CMD18 and CMD25.

Block-Oriented Read Commands (class 2)

1) 传输的数据不能跨越物理块边界，除非在 CSD 中设置了 READ_BLK_MISALIGN2)

2) SDSC 卡(CCS=0)使用字节单位地址，SDHC 和 SDXC 卡(CCS-1)使用块单位地址(512 字节单位)。