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6. Physical Dimension

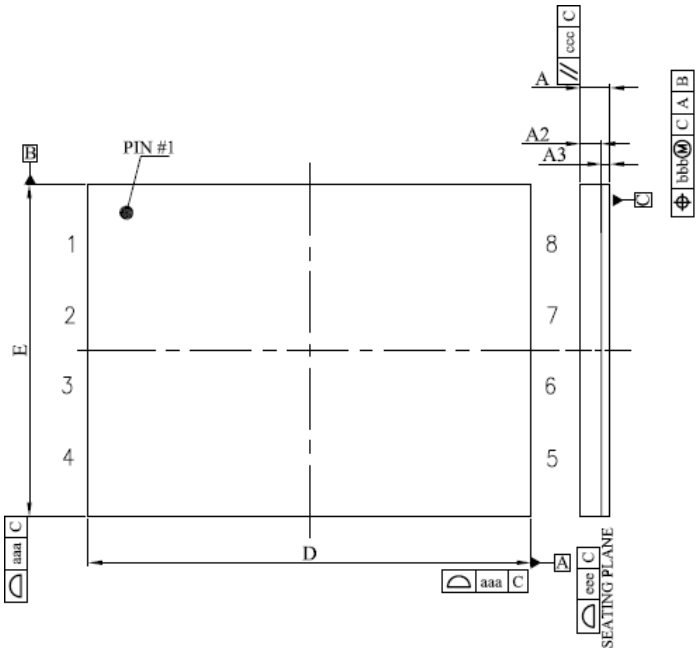


Figure 2:Top View and Side View

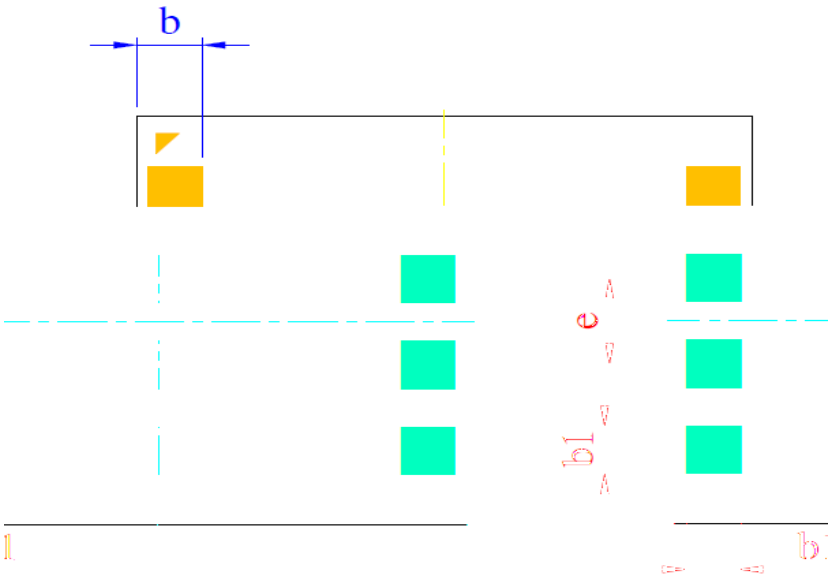


Figure 3: Bot ew

Item		Symbol	DIMENSION (mm)		
			MIN.	NOM.	MAX
Total height		A	0.75	0.80	0.85
Mold thickness		A2	0.60	0.62	0.63
SBT thickness		A3	0.15	0.18	0.21
Lead width		b	0.80	0.85	0.90
Lead width		b1	0.70	0.75	0.80
Package size	X	D	7.90	8.00	8.10
	Y	E	5.90	6.00	6.10
Lead pitch		e	1.27BSC		
Package profile of a surface		aaa	0.25		
Lead position		bbb	0.10		
Paralleliam		ccc	0.10		
Package profile of a surface		eee	0.08		

Table 4: T-Flash Package: Dimension

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7. Recommended Schematic

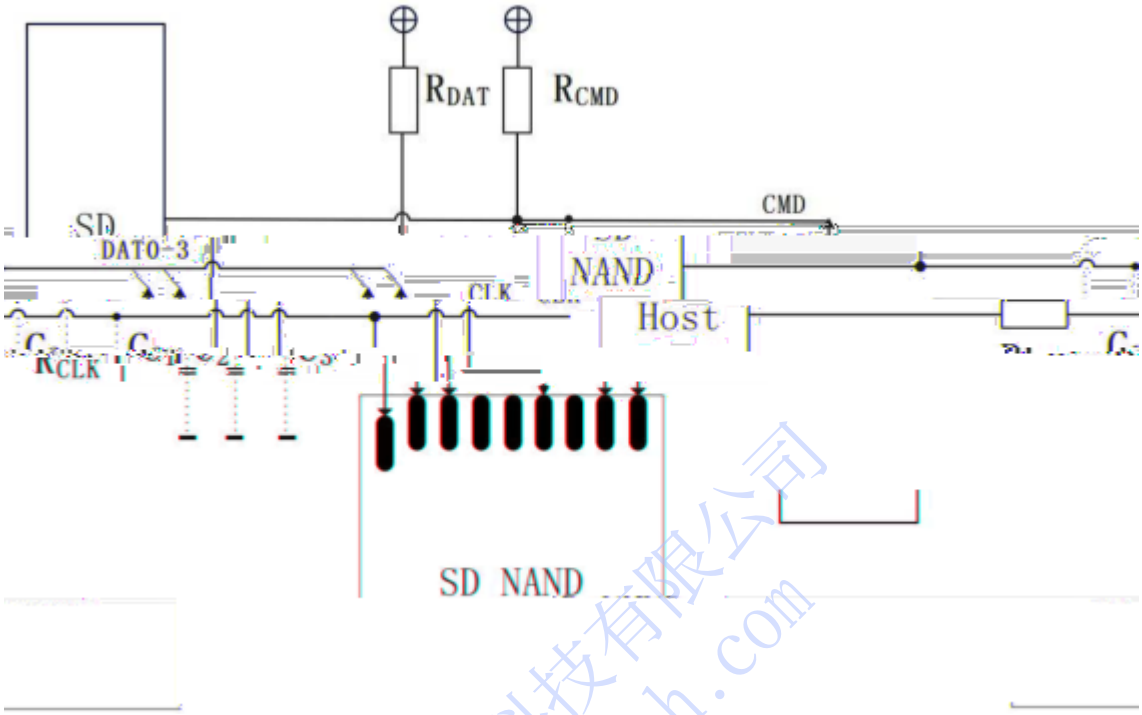


Figure 4: Recommended Schemati

Note:
Rdat and Rcmd (10K-100k) are pull-up resistors protecting the CMD and the DAT lines against bus floating when SDNAND is in a high-impedance mode.
The host shall pull-up all DAT0-3 lines by Rdat. even if the host uses the SDNAND as 1-bit mode only in SD mode. It is recommended to have 2.2uF capacitance on VCC
Rclk reference 0~120

8. Commands

Command Types
There are four kinds of commands defined to control the SD Memory Card:

• Broadcast commands (bc), no response - The broadcast feature is only if all the CMD lines are connected together in the host. If they are separated, then each card will accept it separately in its turn.

• Broadcast commands with response (bcr) response from all cards simultaneously - Since there is no Open Drain mode in SD Memory Card, this type

of command shall be used only if all the CMD lines are separated - the command will be accepted and responded by every card separately.

- Addressed (point-to-point) commands (ac) no data transfer on DAT

- Addressed (point-to-point) data transfer commands (adtc) data transfer on DAT

All commands and responses are sent over the CMD line of the SD Memory Card. The command transmission always starts with the left bit of the bit string corresponding to the command codeword.

Command Format

All commands have a fixed code length of 48 bits, needing a transmission time of 1.92 μs @ 25 MHzand 0.96 μs @ 50 MHz.

Bit position	47	46	[45:40]	[39:8]	[7:1]	0
Width(bits)	1	1	6	32	7	1
Value	“0”	“1”	x	x	x	“1”
Description	Start bit	Transmission bit	Command index	Argument	CRC7	End bit

Card Command Class	0	1	2	3	4	5	6	7	8	9	10	11
description	basic	reserved	read	reserved	write	application specific	card.	I/O mode	switch	reserved		command
Mandatory	+											CMD0
Mandatory	+											CMD2
Mandatory	+											CMD3
Mandatory	+											CMD4
Optional									+			CMD5
Mandatory										+		CMD6[3]
								CMD7	Mandatory			+
								CMD8[3]	Mandatory			+
								CMD9	Mandatory			+
								CMD10	Mandatory			+
								CMD11[5]	Optional			+
								CMD12	Mandatory			+

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CMD56	Mandatory									+			
CMD57[2]	Optional											+	
ACMD6	Mandatory									+			
ACMD13	Mandatory									+			

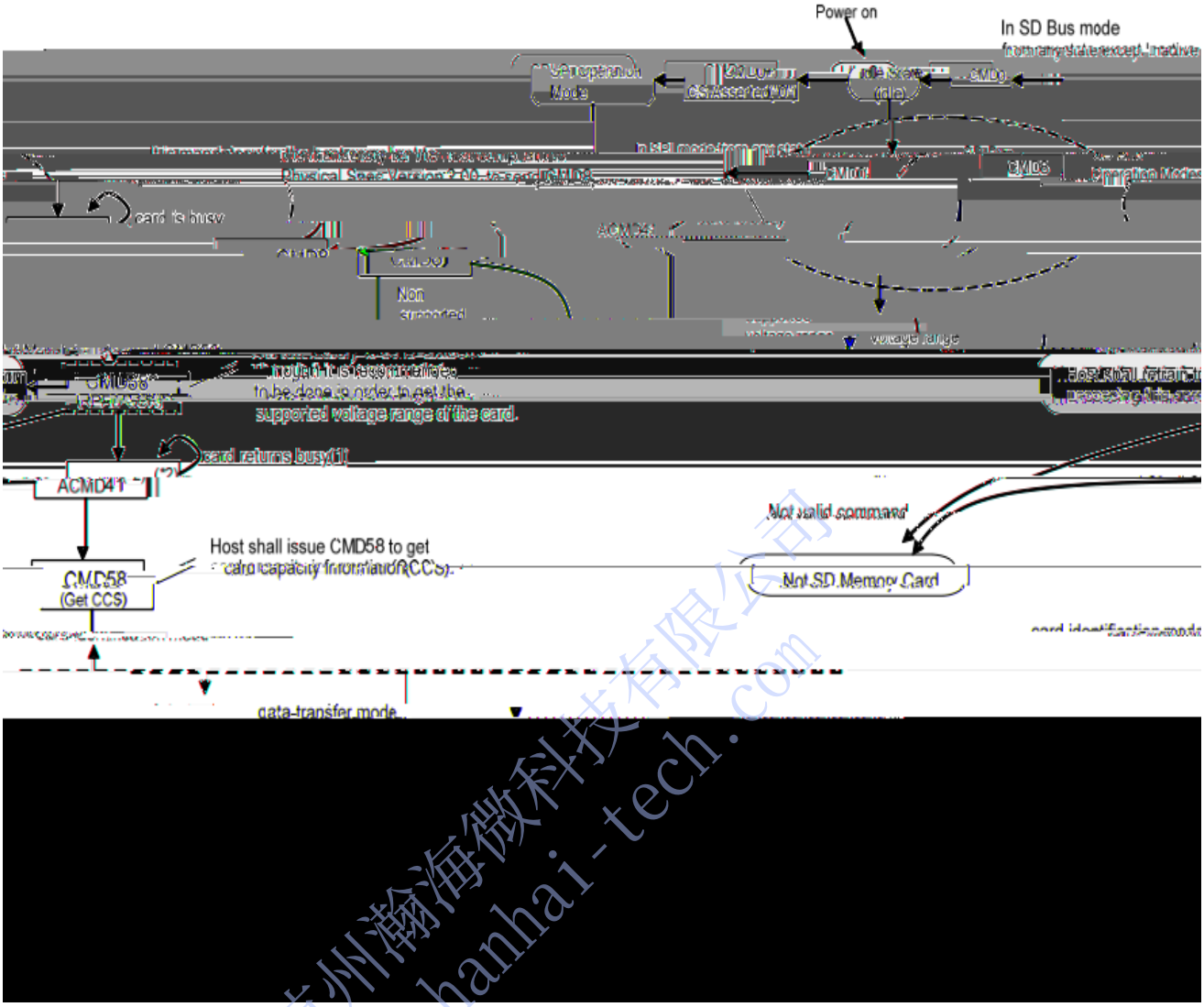
9. Write Performance

Below table shows the typical data management of the card when the host writes RUs of an AU. When the host writes to a fragmented AU, the card prepares a new AU by copying the used RUs and writing the new RUs.. The location A is at the start of the AU boundary and location B is at the end of the AU boundary. From A to B, the host shall write data to free RUs contiguously and skip used RUs (shall not

(1) Read Performance of Stream Data

11. SPI Mode

The SPI mode consists of a secondary communication protocol that is offered by Flash-based SD Memory Cards. This mode is a subset of the SD Memory Card protocol, designed to communicate with a SPI channel, Tw 0.9672 (S) (I)-11(b0)47241 t

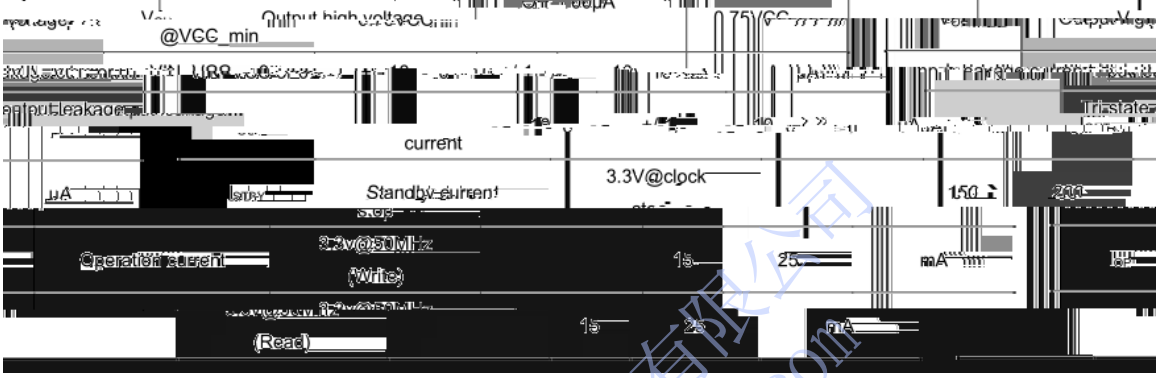


Card State Diagram (SPI mode)

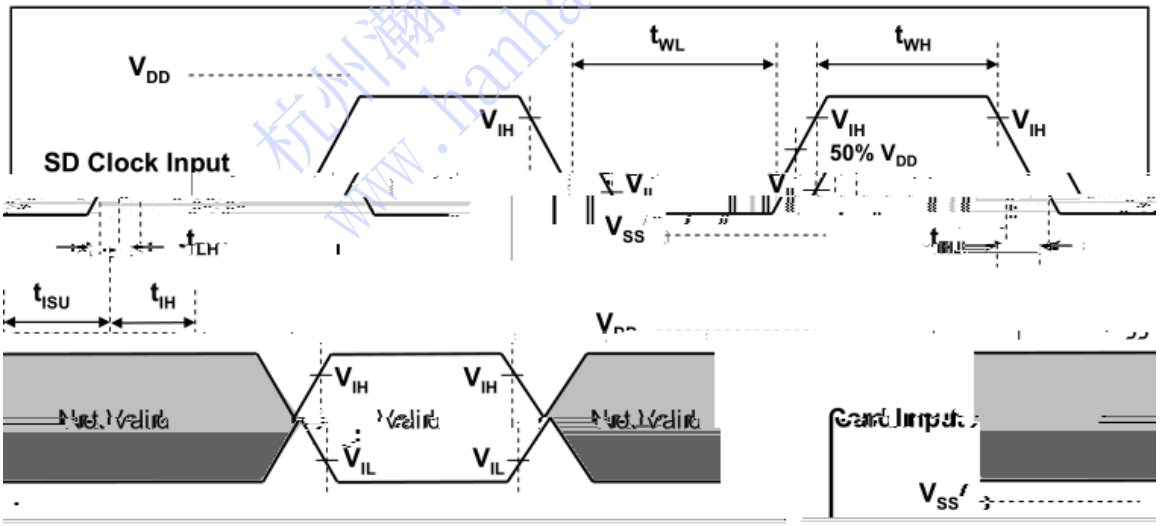
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13. DC Characteristics

Symbol	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IL}	Input low voltage		VSS-0.3		0.25VCC	V
V_{IH}	Input high voltage		0.625VCC		VCC+0.3	V
V_{OL}	Output low voltage	IOL=100μA @VCC_min			0.125VCC	V

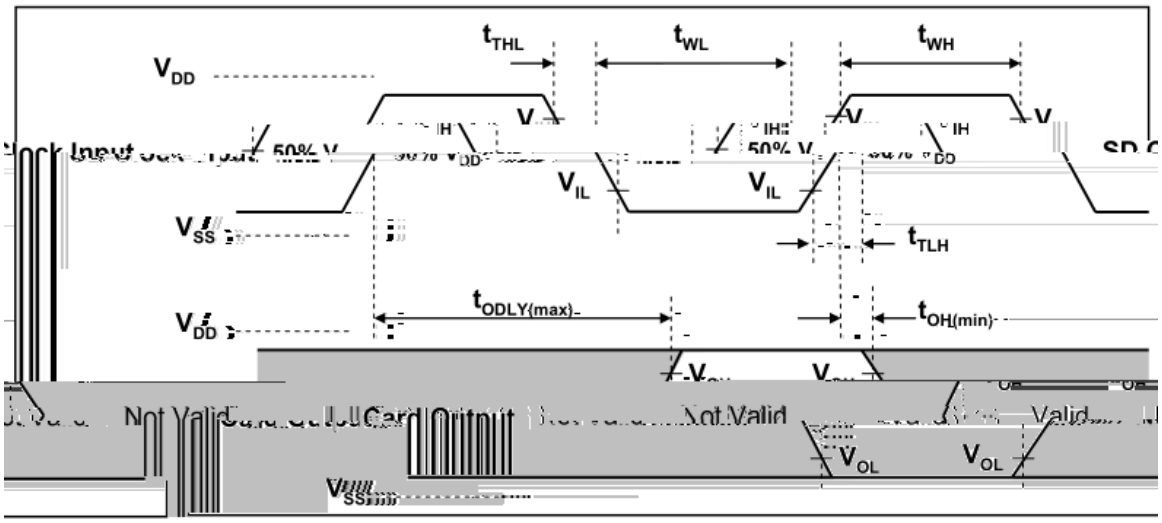


14. Bus Timing (High-Speed Mode)



Card Input Timing (High Speed Card)

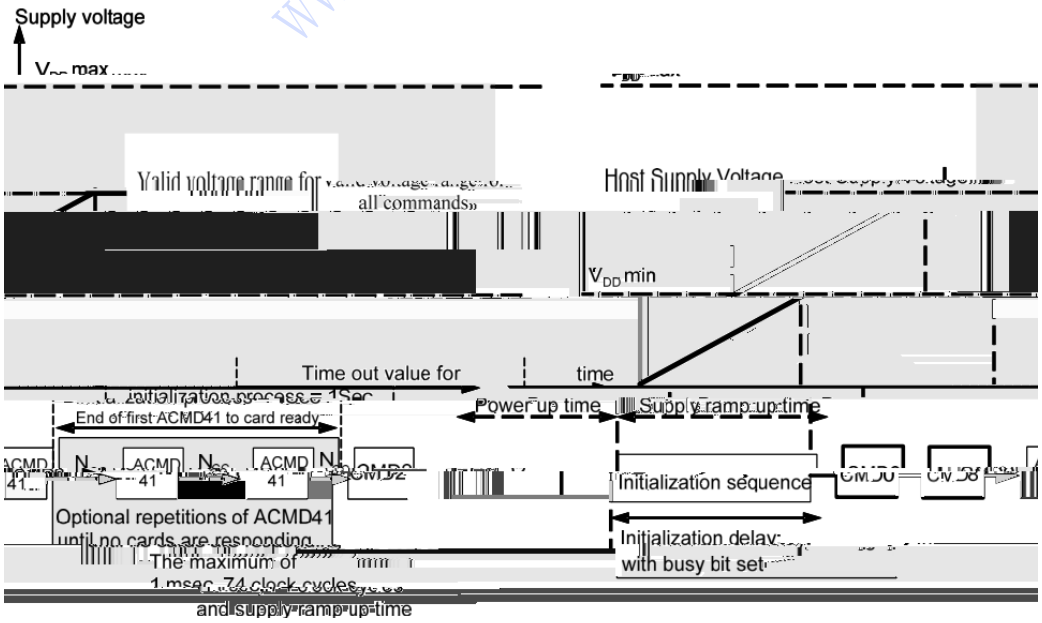
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Card Output Timing (High Speed Mode)

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15. Power Up



Power-up Diagram

'Power up time' is defined as voltage rising time from 0 volt to Vop min (refer to 6.6) and depends on application parameters such as the maximum number of SD Cards, the bus length and the characteristic of the power supply unit.

'Supply ramp up time' provides the time that the power is built up to the operating level (Host Suppl Voltage) and the time to wait until the SD card can accept the first command.

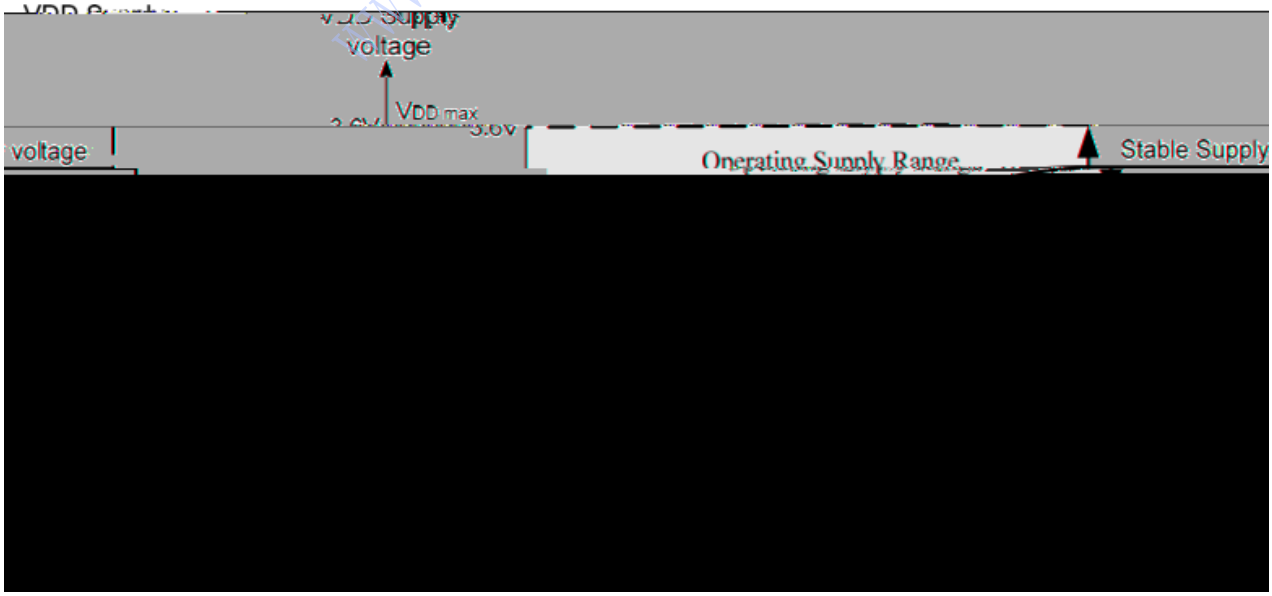
The host shall supply power to the card so that the voltage is reached to Vdd min within 250ms and start to supply at least 74 SD clocks to the SD card with keeping CMD line to high. In case of SPI mode, CS shall be held to high during 74 clock cycles.

After power up (including hot insertion, i.e. inserting a card when the bus is operating) the SD Card enters the idle state. In case of SD host, CMDO is not necessary. In case of SPI host, CMDO shall be the first command to send the card to SPI mode.

CMD8 is newly added in the Physical Layer Specification Version 2.00 to support multiple voltage ranges and used to check whether the card supports supplied voltage. The version 2.00 or later host shall issue CMD8 and verify voltage before card initialization. The host that does not support CMD8 shall supply high voltage range.

ACMD41 is a synchronization command used to negotiate the operation voltage range and to poll the cards until they are out of their power-up seauence, In case the host system connects multiple cards the host shall check that all cards satisfy the supplied voltage. Otherwise, the host should select one of the cards and initialize.

Power Up Time



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