SD NAND SPECIFICATION

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1. Overview

1.1 Product Description

Hanhai - tech SD NAND are highly i ntegrated flash memories with serial and random access capability. Can be use in the device which can support SD2.0 standard. It is accessible via a dedicated serial interface optimized for fast and reliable data transmission.

The purpose of product develo pment is to make memory chips based on SD interface more stable and use scenarios more abundant. Han hai - tech SD NAND can match more MCU H-13.3 (>014 Tw3.3 (e)- -0.001 Tc 4 52w 12)-16.a85006.3 (-1cm 0.6tf211.3

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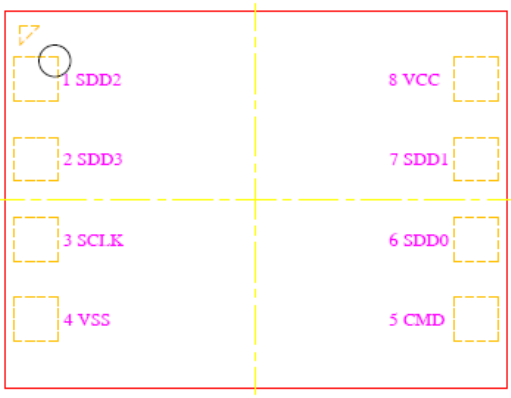


Figure 1:Top Vi ew

	SD Mode		SPI Mode	
Name	Tyte	Description	Tyte	Description
DAT2	I/O/PP	Data Line [Bit2]	RSV	Reserved
DAT3	I/O/PP	Data Line [Bit3]	I3	Chip select(neg true)
CLK	I	Clock	I	Clock
GND	S	Supply voltage ground	S	Supply voltage ground
VDD	S	Supply voltage	S	Supply voltage
DAT1	I/O/PP	Data Line [Bit1]	RSV	Reserved
DAT0	I/O/PP	Data Line [Bit0]	OPP	Data Out
CMD	PP	Command/Response	I	Data In

Table 1: Pin Assig nment

3. Product List

Product model	Capacity	Actual Size	Sequential R/W	Package
HHW 128GS 90I-D1	16GB	14550MB	25/ 26MB/S	9* 13 (mm) PSLC
HHW 512G S90C-D 1	64GB	63100MB	17/ 12MB/S	9* 13 (mm) TLC

Table 2: Product List

4. Current Consumption

Standby current: 250uA Maximum value

Standby current: 200 uA average value

Operating current: 95 mA Maximum value

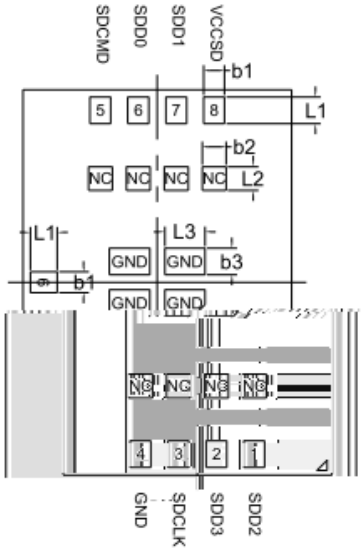
Operating current: 80 mA average value

5. Operational Environment

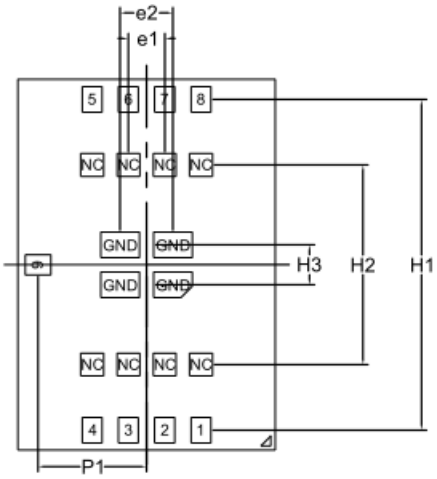
Parameter	Range	
Temperature	Operating	-25 ~85
	Non-Operating	-50 ~1 25
Humidity	Operati ng	25% to 85%, non -condensing
	Non-Operating	25% to 85%, non -condensing
Electrostatic Discharge (ESD)	IEC 61000 -4- 2 contact discharge: +/ - 2[kV] and +/ - 4[kV] 150[pF],330[Ohm] air discharge: up to +/ - 15[kV] 150[pF], 330[Ohm]	

Table 3: Operational Enviro nment

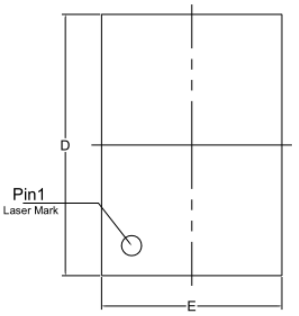
6. Physical Dimension



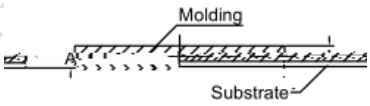
Bottom View



Bottom View



TOP View



Side View

SYMBOL	DIMENSION IN MM			DIMENSION IN MIL			
	Min.	Nor.	Max.	Min.	Nor.	Max.	
D	12.90	13.00	13.10	507.87	511.81	515.75	
E	8.90	9.00	9.10	350.39	354.33	358.27	
0.65	0.70	0.75	25.59	27.56	29.53		b1
0.75	0.80	0.85	29.53	31.50	33.46		b2
0.85	0.90	0.95	33.46	35.43	37.40		b3
0.85	0.90	0.95	33.46	35.43	37.40		L1
0.75	0.80	0.85	29.53	31.50	33.46		L2

7. Recommended Schematic

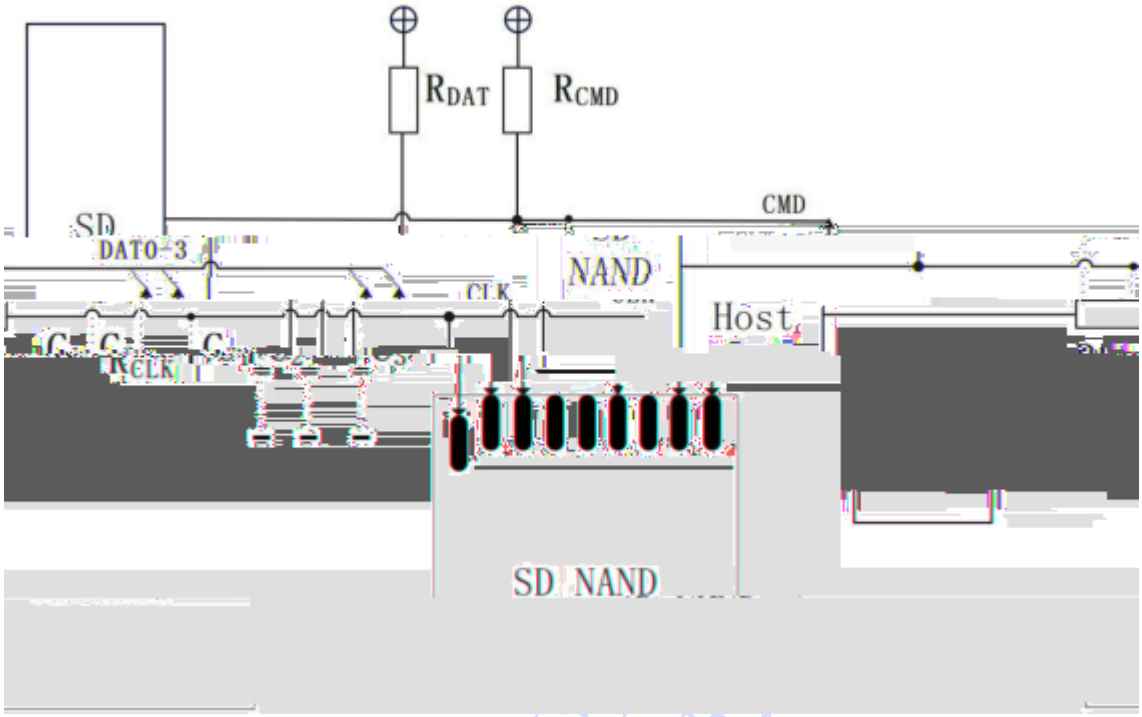


Figure 4: Recommended Schemati

Note:

Rdat and R cmd (10K - 100k Ω) are pu ll- up resistors protecting the CMD and the DAT lines against bus floating when SDNAND is in a high- impedance mode.

The host shall pu ll- up all DAT 0- 3 lines by R dat . even if the host uses the SDNAND as 1 - bit mode onl y in SD mode. It is recommended t o have 2.2uF capacitance on VCC

Rclk reference 0~120 Ω

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 connect ed 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

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

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

9. Write Performance

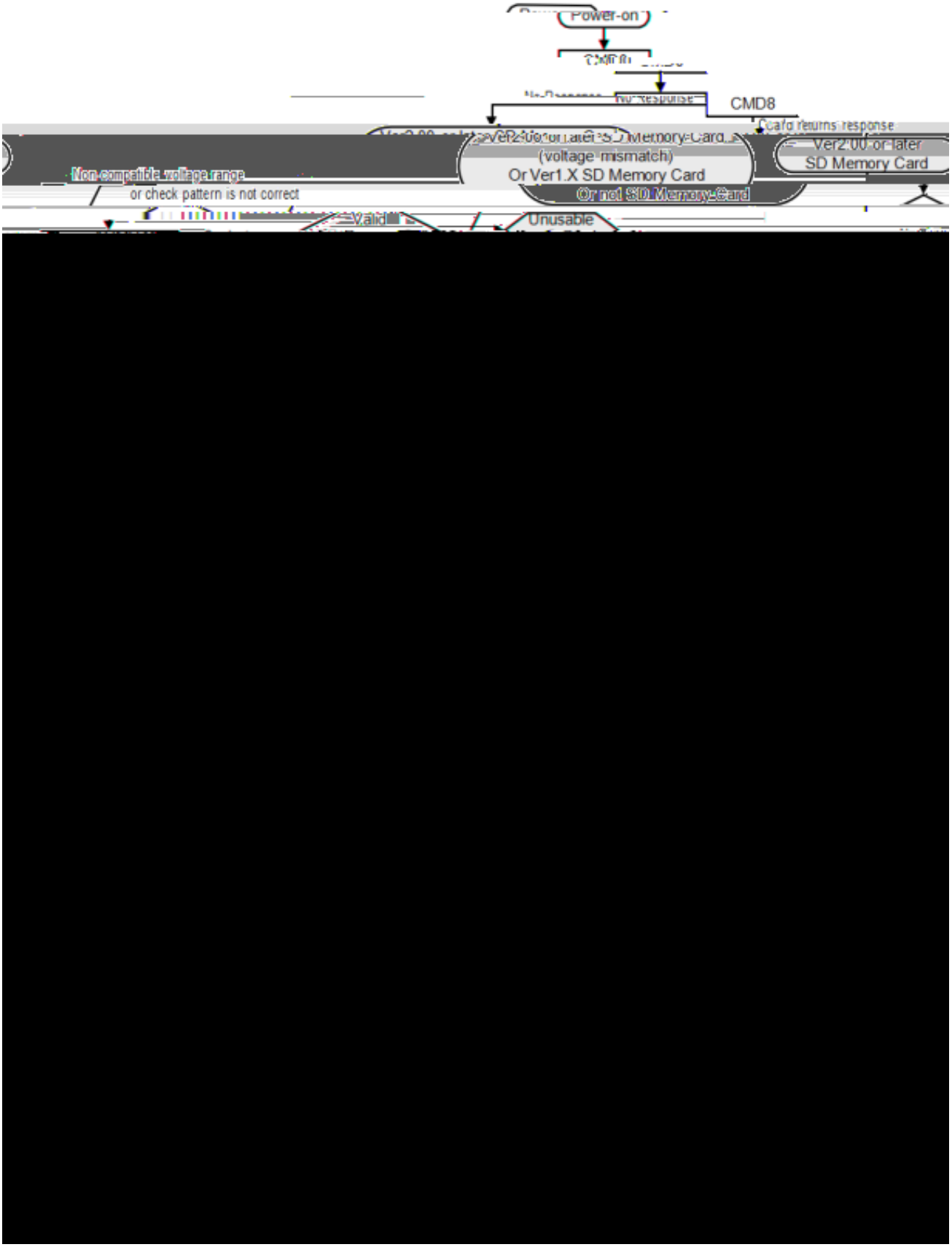
Below table shows the typical data management of the card when the host writes RUs of an AU. When the host writes to a fragmented AU, the card prepares a new AU by copying the used RUs and writing the new RUs.. The location A is at the start of the AU boundary and location B is at the end of the AU boundary. From A to B, the host shall write data to free RUs contiguously and skip used RUs (shall not skip any free RU). The c ard may indicate busy to the host, so the host can wait, during the time the card controller is writing and moving data. The total write time from A to B carl8 (h4 (y)31-2 4 (o)66.7 ()33u13 (r6.7 ()32 (ca.4 ((h4 (y)3.6 (d)15b.3)-6.A)29su)(()-1

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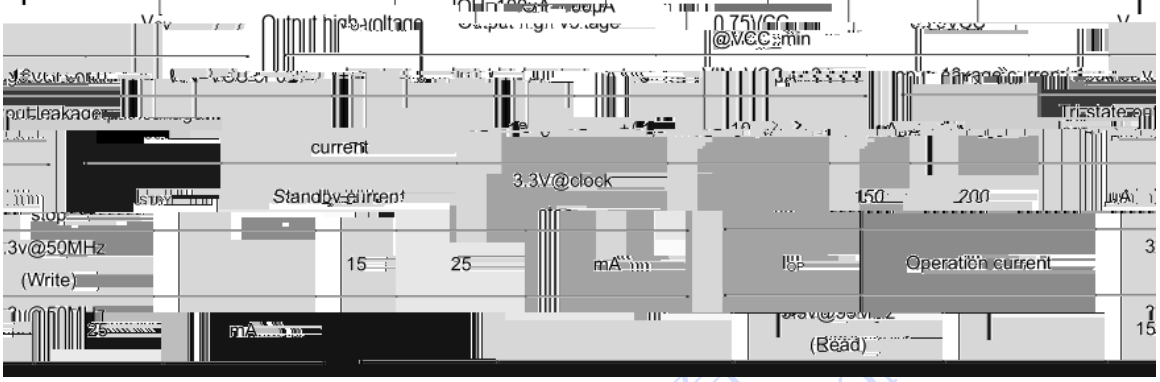
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12. SD Mode

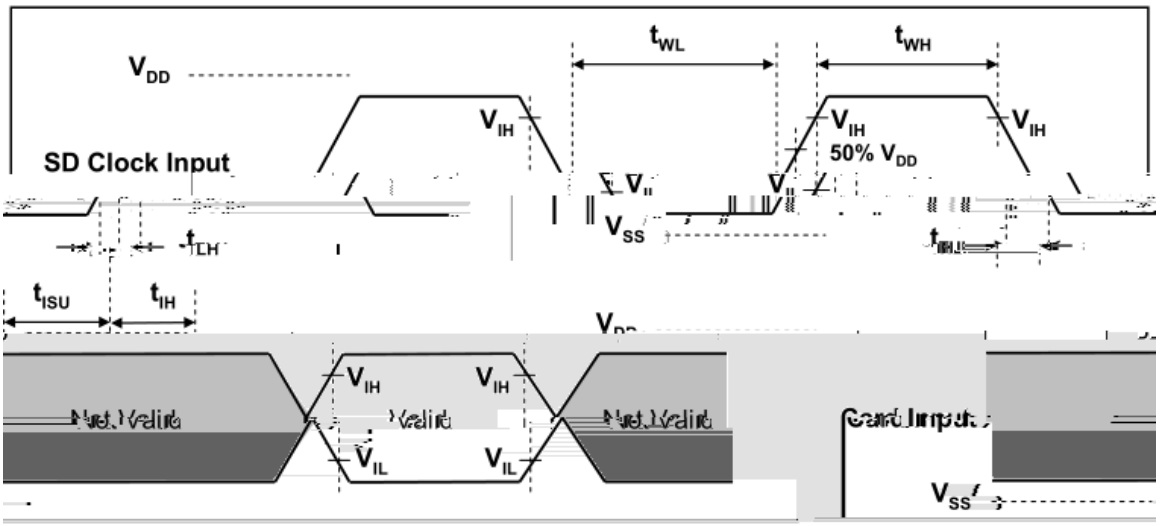

Power-on
CMD8
Card returns response
Ver2.00 or later SD Memory Card
(voltage mismatch)
Or Ver1.X SD Memory Card
Or not SD Memory Card
Non-compatible voltage range
or check pattern is not correct
Unusable

13. DC Characteristics

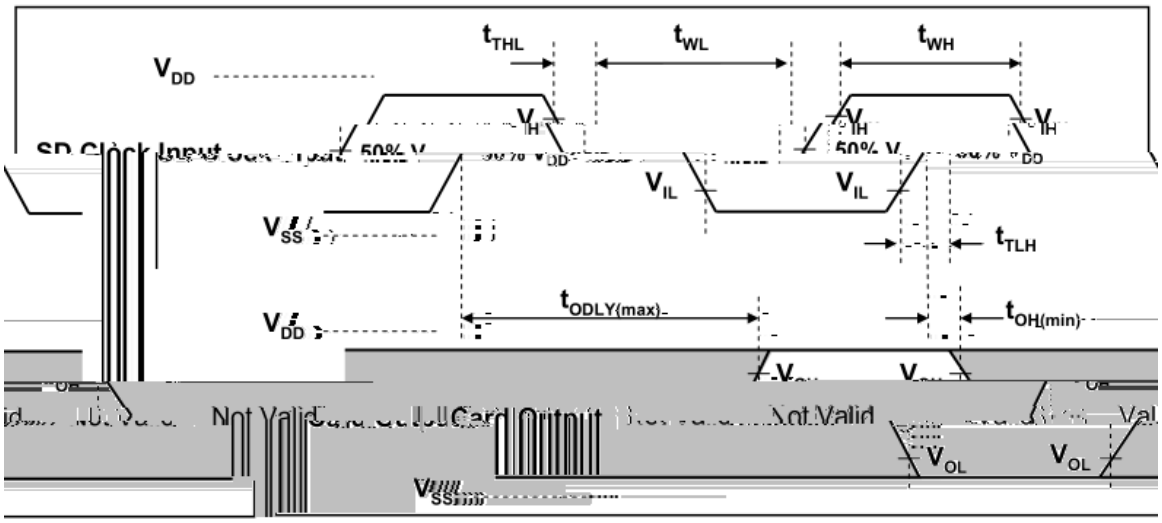
Symbol	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IL}	Input low voltage		VSS-0.3		0.25VCC	V
V_{IH}	Input high voltage		0.625VCC		VCC+0.3	V
V_{OL}	Output low voltage	IOL=100μA @VCC_min			0.125VCC	V



14. Bus Timing (High - Speed Mode)

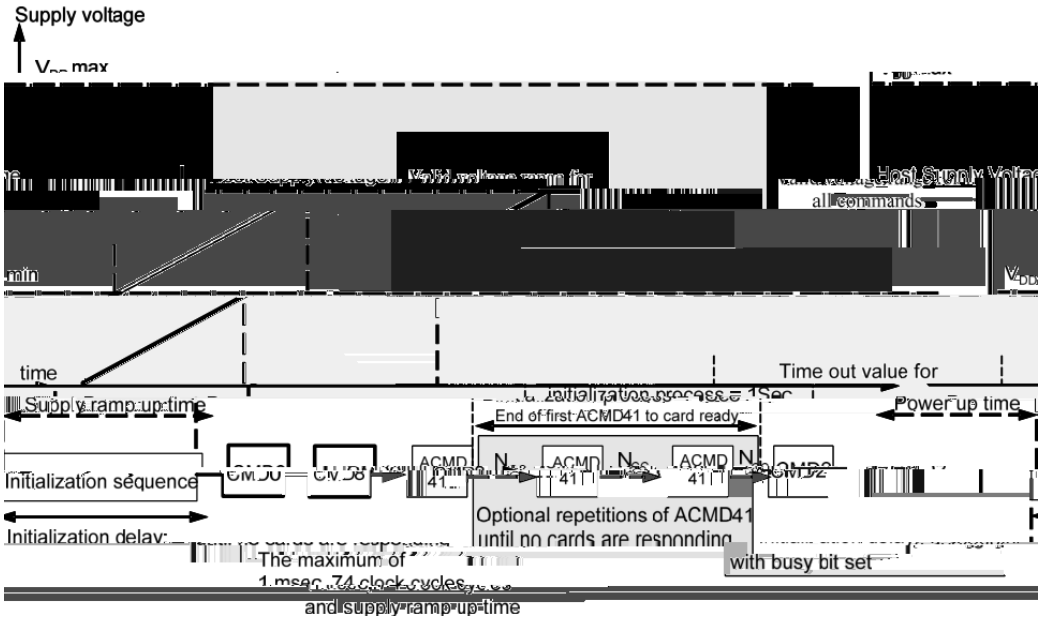


Card Input Timing (High Speed Card)



Card Output Timing (High Speed Mode)

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 SPl 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 SPl host, CMDO shall be the first command to send the card

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