杭州瀚海微科技有限公司
www.hanhai-tech.com

REVISION HISTORY

Revision	Description	Date
V1.1	First released	August, 2024

1. Product Introduction

1.1. Overview

The microSD Card is designed for demanding industrial applications. The microSD Card is compatible with SD 3.0 and provides excellent performance. The built-in auto ECC function can detect and correct errors during data transfer. Moreover, the Industrial microSD Card supports Ultra High Speed (UHS) interface transfer mode, provides high write/read data transfer rate, sudden Power-Fails protection, adaptive static wear-leveling, read/program disturb management, etc. It was designed to meet the high quality, high reliability, high performance, and versatile environmental requirements.

1.2. Product Features

- Interface: 8 pins microSD standard interface
- Compliant SD Card Specification 3.0
- Density support:
  - PSLC: 8-16GB
  - TLC : 32-128GB
- :
  - SD_Bus_Widths
  - ECC
-

www.hanhai-tech.com

●

2. microSD Card Interface Description

2.1 microSD Pin Assignment

Table 1: microSD Bus Mode Pin Definition

Pin #	Name	Type	microSD Description
1	DAT2	I/O	Data Line [Bit 2]
2	CD/DAT3	I/O	Card Detect / Data Line[Bit3]
3	CMD	PP	Command / Response
4	VDD	S	Supply Voltage
5	CLK	I	Clock
6	VSS	S	Supply Voltage Ground
7	DAT0	I/O	Data Line [Bit 0]
8	DAT1	I/O	Data Line [Bit 1]

Notes:

1) S: power supply; I: input; O: output using push-pull drivers; PP: I/O using push-pull drivers;
2) The extended DAT Lines (DAT1-DAT3) are input on power up. They start to operate as DAT

杭州瀚海微科技有限公司 www.hanhai-tech.com

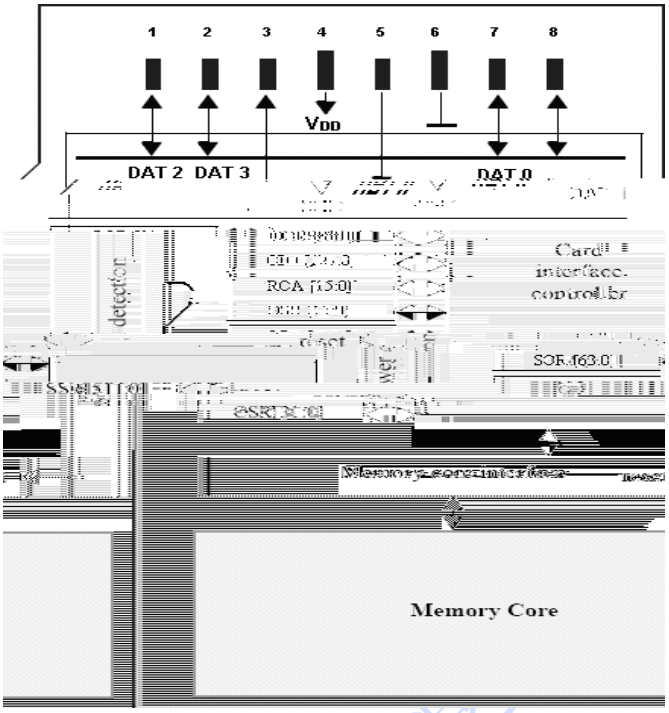


Figure 1: Functional Diagram

杭州瀚海微科技有限公司
www.hanhai-tech.com

3. Specifications

3.1. Performance

Min. Data Transfer Rate

- Read: 45MB/s; Write: 30MB/s

3.2. NAND Flash Memory

microSD Card (TLC) NAND Flash

3.3. Power Requirement

3.3.1. DC Input Voltage

- 2.7V to 3.6V

3.4. Operature Temperature Range

- -40°C to+85°C

3.5. Humidity

Relative Humidity: 5-95%, non-condensing

4. Electrical Specifications

4.1. General DC Characteristic

Table 3: Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Unit	Note
$T_{storage}$	Storage Temperature	-45	90	°C	-
Ta	Ambient Operating Temperature	0	85	°C	-
V_I	3.3V External Input Voltage	-0.3	3.6	V	-

ble 4: Power Consumption

Symbol	Parameter	Min.	Typ.	Max.	Unit
I_{Read}	Read Current at 3.3V	-	400	-	mA
I_{Write}	Write Current at 3.3V	-	400	-	mA
I_{STBY}	Standby Current at 3.3V	-	285	-	uA

4.2. Bus Operation Conditions for 3.3V Signaling

杭州翰海微科技有限公司 www.hanhai-tech.com

4.2.1 Threshold Level for High Voltage Range

Table 5: Threshold Level for High Voltage

Parameter	Symbol	Min	Max	Unit	Remark
Supply Voltage	V_{DD}	2.7	3.6	V	
Output High Voltage	V_{OH}	0.75* V_{DD}		V	I_{OH}=2mA $V_{DD\ min}$
Output Low Voltage	V_{OL}		0.125* V_{DD}	V	I_{OL}=2mA $V_{DD\ min}$

杭州瀚海微科技有限公司
www.hanhai-tech.com

4.2.3 Bus Signal Line Load

Table 7: Bus Operating Conditions - Signal Line's Load

Parameter	Symbol	Min	Max	Unit

杭州瀚海微科技有限公司
www.hanhai-tech.com

4.2.5 Bus Timing (Default)

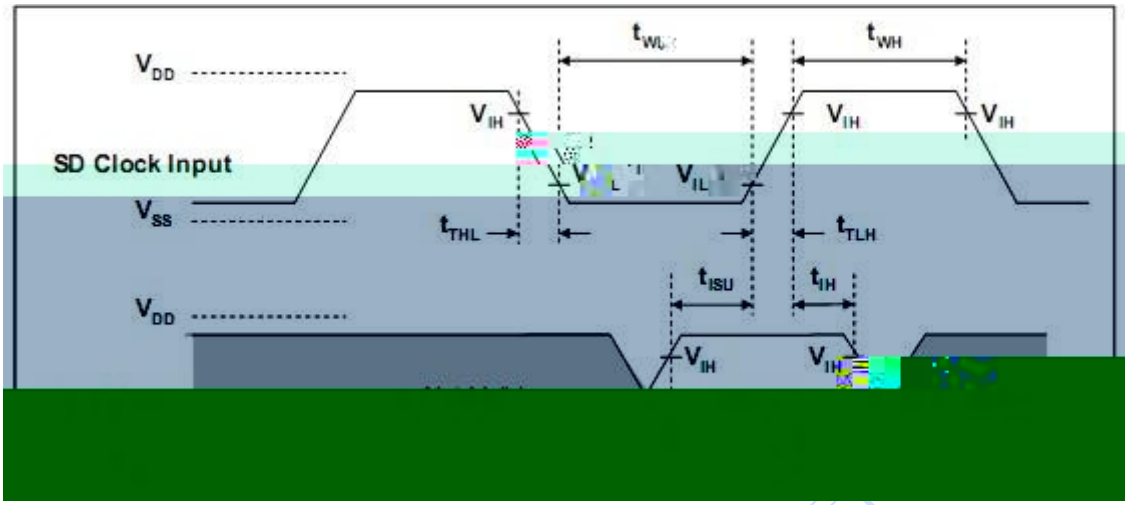


Figure 3: Card input Timing (Default Speed Card)

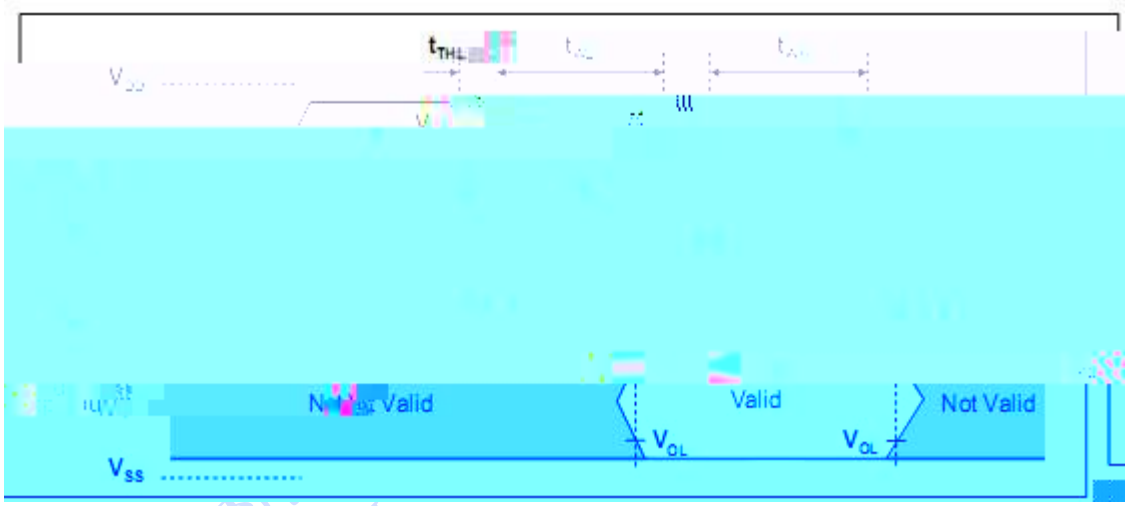


Figure 4: Card Output Timing (Default Speed Mode) Table 8: Bus Timing-Parameters Values (Default Speed)

Parameter	Symbol	Min.	Max	Unit	Remark
Clock CLK All values are referred to min V_{IH} and max V_{IL}					
Clock frequency data transfer					

Input hold time	t_{TH}	5		ns	C_{CARD} ≤ 10pF (1 card)
Outputs CMD, DAT (referenced to CLK)					
Output Delay time during Data Transfer Mode					

杭州瀚海微科技有限公司
www.hanhai-tech.com

Table 9 : Bus Timing – Parameters Values(High Speed)

Parameter	Symbol	Min.	Max	Unit	Remark
Clock CLK All values are referred to min V_{IH} and max V_{IL}					
Clock frequency data transfer	fpp	0	50	MHz	$C_{CARD} \leq 10pF$ (1 card)

杭州瀚海微科技有限公司
www.hanhai-tech.com

4.3.3.3 Card Output Timing

4.3.3.3.1 Output Timing of Fixed Data Window (SDR12, SDR25 and SDR50)

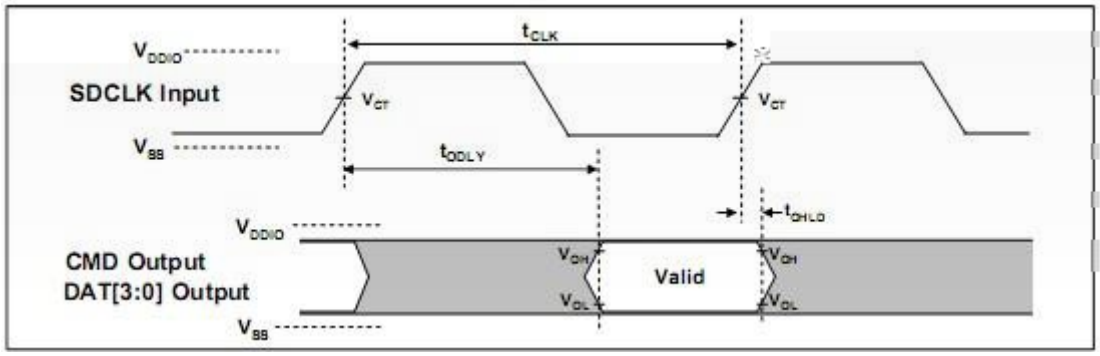


Figure 9: Output Timing of Fixed Date

Window Table 14: Output Timing of Fixed Data Window

Symbol	Min	Max	Unit	Remark
t_{ODLY}	-	7.5	ns	t_{CLK} ≥10.0ns, CL=30pF, using driver Type B, for SDR50.
t_{ODLY}		14	ns	t_{CLK} ≥20.0ns, CL=40pF, using driver Type B, for SDR25 and SDR12.
t_{OH}	1.5	-	ns	Hold time at the t_{ODLY} (min.). CL=15pF

4.3.3.3.2 Output Timing of Variable Window (SDR104)

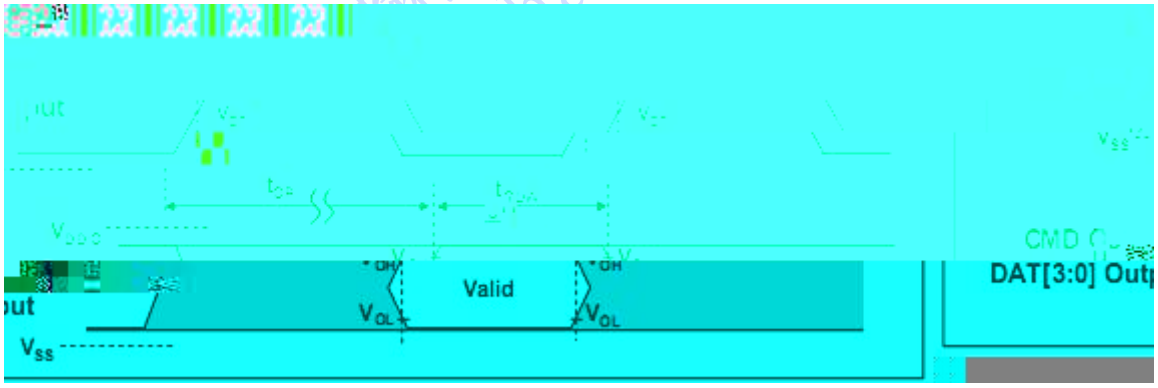


Figure 10: Output Timing of Variable Data

Window Table 15: Output Timing of Variable Data Window

Symbol	Min	Max	Unit	Remark
t_{OP}	-	2	UI	Card Output Phase
t_{OP}	-350	+1550	ps	Delay variation due to temperature change after tuning
t_{ODW}	0.60	-	UI	t_{ODW} = 2.88ns at 208MHz

5. Mechanical Dimensions

杭州瀚海微科技有限公司
www.hanhai-tech.com