

# TS128M~1GSD80

80x Secure Digital Card

## Description

Secure Digital Card is a compact, slim and high capacity storage media with copyright protection. Designed in advanced SD specification Ver.1.1, Transcend 80x SD card now reaches a new performance milestone. Based on 0.18um process controller and high quality SLC (Single-Level-Cell) NAND Flash chip, Transcend 80x SD card can provide high performance, low power consumption yet excellent reliability.

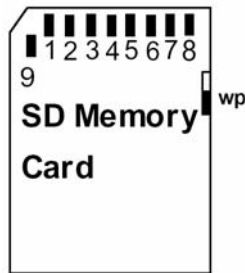
## Features

- ROHS compliant product
- Operating Voltage: 2.7 ~ 3.6V
- Operating Temperature: -25 ~ 85°C
- Insertion/removal durability: 10,000 cycles
- Fully compatible with SD card spec. v1.1
- Support SD command class 0,2,4,5,6,7,8
- Mechanical Write Protection Switch
- Forward compatibility to MultiMediaCard Version 2.11
- Supports Copy Protection for Recorded Media(CPRM) for music and other commercial media
- Form Factor: 24mm x 32mm x 2.1mm

## Placement



Front

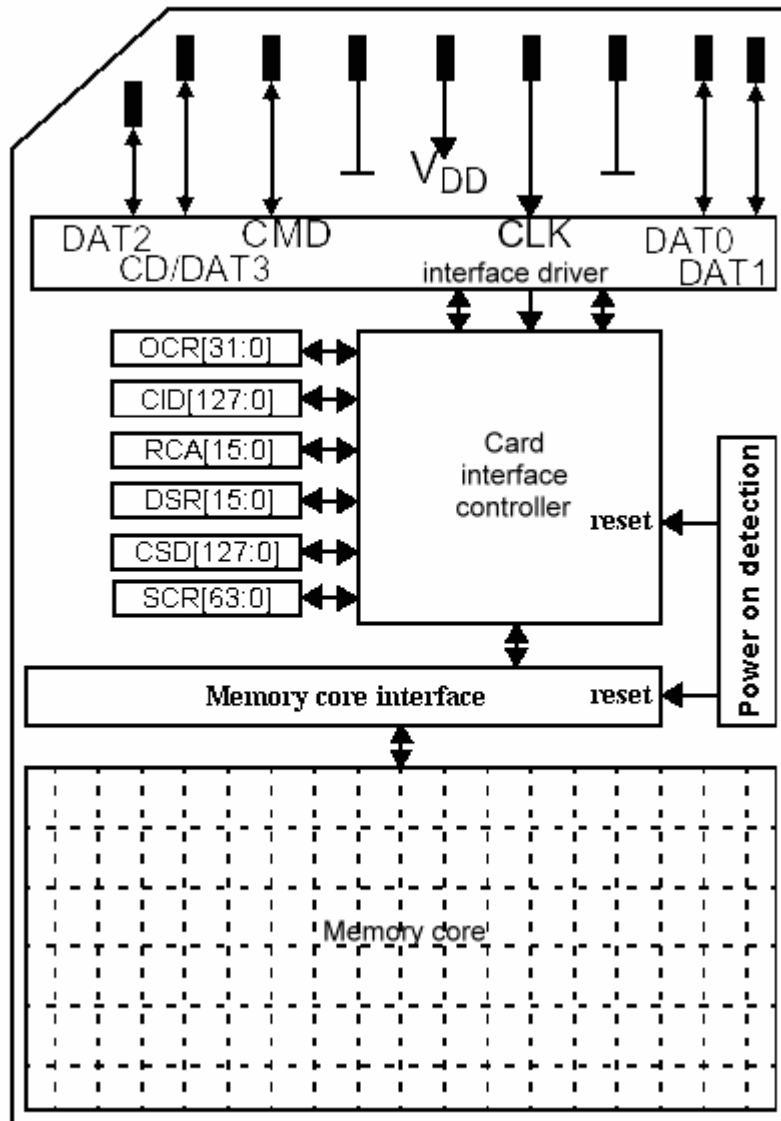


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## Pin Definition

Pin No.	SD Mode			SPI Mode		
	Name	Type	Description	Name	Type	Description
1	CD/DAT3	I/O/PP	Card Detect/Data Line [Bit3]	CS	I	Chip Select (neg true)
2	CMD	PP	Command/Response	DI	I	Data In
3	V <sub>SS1</sub>	S	Supply voltage ground	VSS	S	Supply voltage ground
4	V <sub>DD</sub>	S	Supply voltage	VDD	S	Supply voltage
5	CLK	I	Clock	SCLK	I	Clock
6	V <sub>SS2</sub>	S	Supply voltage ground	VSS2	S	Supply voltage ground
7	DAT0	I/O/PP	Data Line [Bit0]	DO	O/PP	Data Out
8	DAT1	I/O/PP	Data Line [Bit1]	RSV		
9	DAT2	I/O/PP	Data Line [Bit2]	RSV		

## Architecture



### Bus Operating Conditions

#### • General

Parameter	Symbol	Min.	Max.	Unit	Remark
Peak voltage on all lines		-0.3	VDD+0.3	V	
All Inputs					
Input Leakage Current		-10	10	μA	
All Outputs					
Output Leakage Current		-10	10	μA	

#### • Power Supply Voltage

Parameter	Symbol	Min.	Max.	Unit	Remark
Supply voltage	V <sub>DD</sub>	2.0	3.6	V	CMD0, 15,55,ACMD41 commands
Supply voltage specified in OCR register		2.7	3.6	V	Except CMD0, 15,55, ACMD41 commands
Supply voltage differentials (V <sub>SS1</sub> , V <sub>SS2</sub> )		-0.3	0.3	V	
Power up time			250	ms	From 0v to V <sub>DD</sub> Min.

#### • Bus Signal Line Load

The total capacitance C<sub>L</sub> the CLK line of the SD Memory Card bus is the sum of the bus master capacitance C<sub>HOST</sub>, the bus capacitance C<sub>BUS</sub> itself and the capacitance C<sub>CARD</sub> of each card connected to this line:

$$C_L = C_{HOST} + C_{BUS} + N \cdot C_{CARD}$$

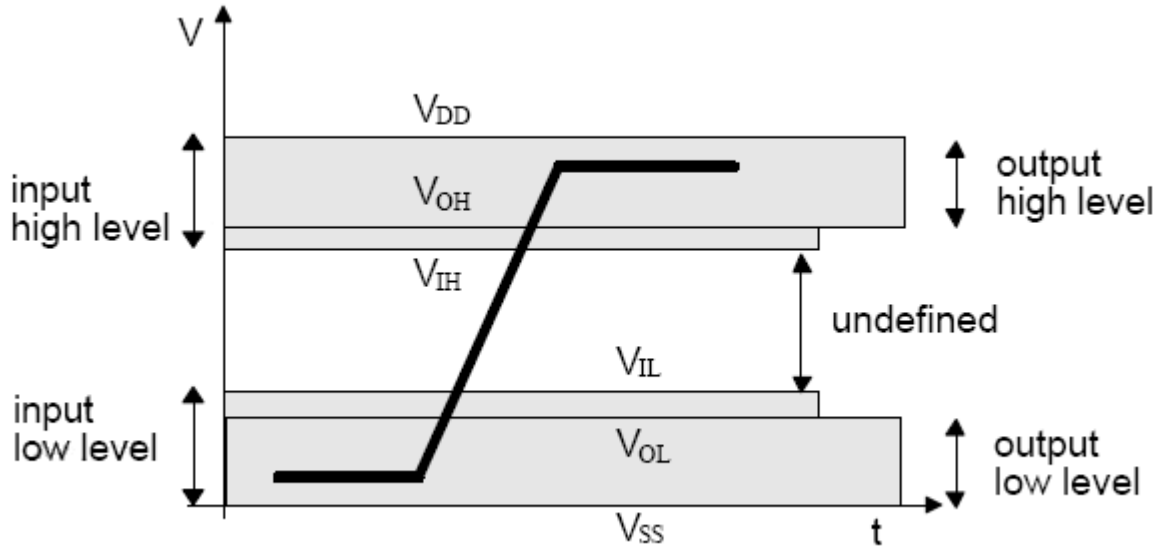
Parameter	Symbol	Min.	Max.	Unit	Remark
Bus signal line capacitance	C <sub>L</sub>		100	pF	f <sub>PP</sub> ≤ 20 MHz, 7 cards
Single card capacitance	C <sub>CARD</sub>		10	pF	
Maximum signal line inductance			16	nH	f <sub>PP</sub> ≤ 20 MHz
Pull-up resistance inside card (pin1)	R <sub>DAT3</sub>	10	90	kΩ	May be used for card detection

Note that the total capacitance of CMD and DAT lines will be consist of C<sub>HOST</sub>, C<sub>BUS</sub> and one C<sub>CARD</sub> only since they are connected separately to the SD Memory Card host.

Parameter	Symbol	Min.	Max.	Unit	Remark
Pull-up resistance	R <sub>CMD</sub> , R <sub>DAT</sub>	10	100	kΩ	To prevent bus floating
Bus signal line capacitance	C <sub>L</sub>		250	pF	f <sub>PP</sub> ≤ 5 MHz, 21 cards

## • Bus Signal Levels

As the bus can be supplied with a variable supply voltage, all signal levels are related to the supply voltage.



To meet the requirements of the JEDEC specification JESD8-1A, the card input and output voltages shall be within the following specified ranges for any  $V_{DD}$  of the allowed voltage range:

Parameter	Symbol	Min.	Max.	Unit	Remark
Output HIGH voltage	$V_{OH}$	$0.75 * V_{DD}$		V	$I_{OH} = -100 \mu A @ V_{DD} \text{ min}$
Output LOW voltage	$V_{OL}$		$0.125 * V_{DD}$	V	$I_{OL} = -100 \mu A @ V_{DD} \text{ min}$
Input HIGH voltage	$V_{IH}$	$0.625 * V_{DD}$	$V_{DD} + 0.3$	V	
Input LOW voltage	$V_{IL}$	$V_{SS} - 0.3$	$0.25 * V_{DD}$	V	

• Bus Timing (Default)

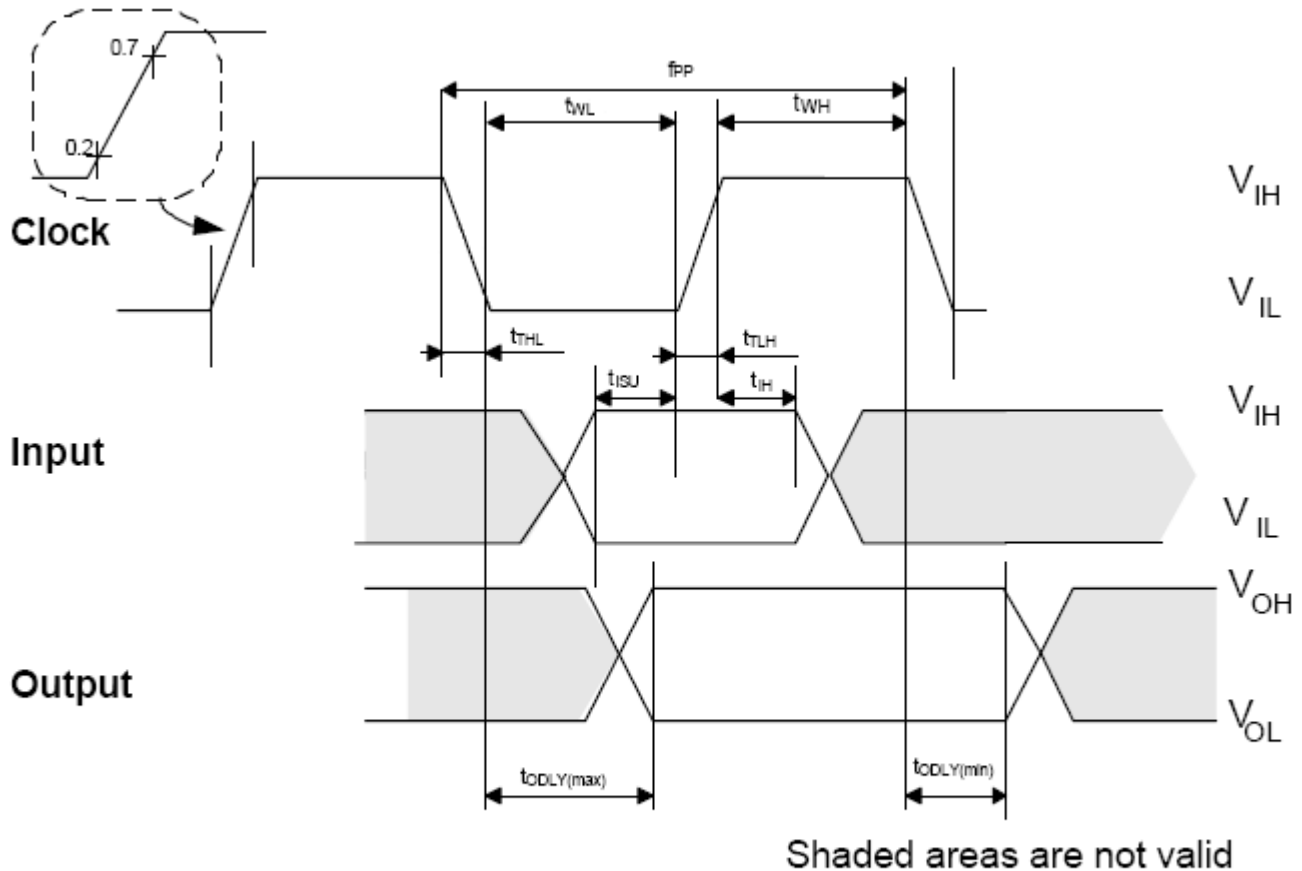


Figure 47: Timing diagram data input/output referenced to clock (Default)

Parameter	Symbol	Min	Max.	Unit	Remark
Clock CLK (All values are referred to min ( $V_{IH}$ ) and max ( $V_{IL}$ ))					
Clock frequency Data Transfer Mode	$f_{PP}$	0	25	MHz	$C_L \leq 100$ pF, (7 cards)
Clock frequency Identification Mode (The low freq. is required for MultiMediaCard compatibility.)	$f_{OD}$	0	400	KHz	$C_L \leq 250$ pF, (21 cards)
Clock low time	$t_{WL}$	10		ns	$C_L \leq 100$ pF, (7 cards)
		50		ns	$C_L \leq 250$ pF, (21 cards)
Clock high time	$t_{WH}$	10		ns	$C_L \leq 100$ pF, (7 cards)
		50		ns	$C_L \leq 250$ pF, (21 cards)
Clock rise time	$t_{TLH}$		10	ns	$C_L \leq 100$ pF, (7 cards)

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			50	ns	$C_L \leq 250$ pF, (21 cards)
Clock fall time	$t_{THL}$		10	ns	$C_L \leq 100$ pF, (7 cards)
			50	ns	$C_L \leq 250$ pF, (21 cards)
Inputs CMD, DAT (referenced to CLK)					
Input set-up time	$t_{ISU}$	5		ns	$C_L \leq 25$ pF, (1 cards)
Input hold time	$t_{IH}$	5		ns	$C_L \leq 25$ pF, (1 cards)
Outputs CMD, DAT (referenced to CLK)					
Output Delay time during Data Transfer Mode	$t_{ODLY}$	0	14	ns	$C_L \leq 25$ pF, (1 cards)
Output Delay time during Identification Mode	$t_{ODLY}$	0	50	ns	$C_L \leq 25$ pF, (1 cards)

• Bus Timing (High Speed Mode)

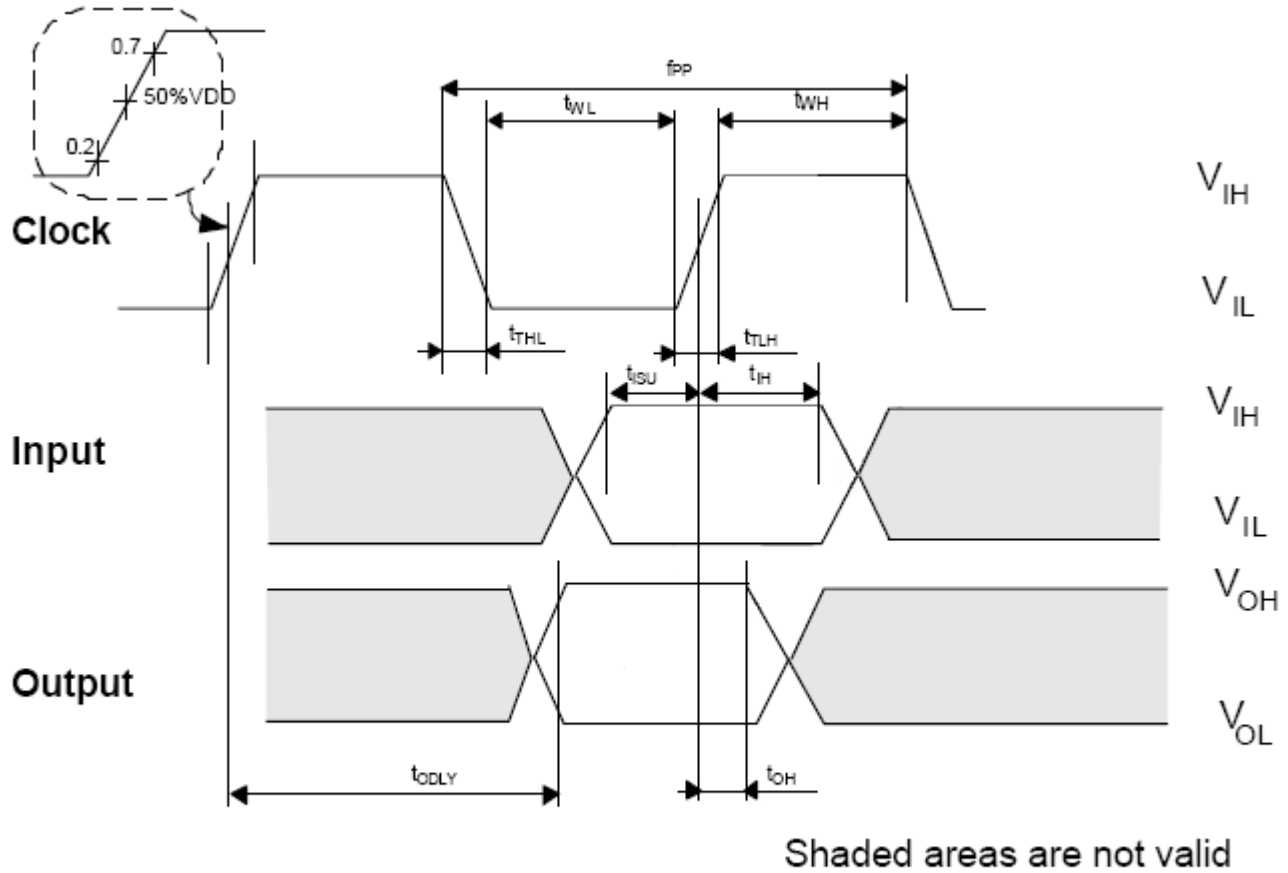


Figure 48: Timing diagram data input/output referenced to clock (High-Speed)

Parameter	Symbol	Min	Max.	Unit	Remark
Clock CLK (All values are referred to min (V <sub>IH</sub> ) and max (V <sub>IL</sub> ))					
Clock frequency Data Transfer Mode	f <sub>PP</sub>	0	50	MHz	
Clock low time	t <sub>WL</sub>	7		ns	
Clock high time	t <sub>WH</sub>	7		ns	
Clock rise time	t <sub>TLH</sub>		3	ns	
Clock fall time	t <sub>THL</sub>		3	ns	
Inputs CMD, DAT (referenced to CLK)					
Input set-up time	t <sub>ISU</sub>	6		ns	
Input hold time	t <sub>IH</sub>	2		ns	
Outputs CMD, DAT (referenced to CLK)					

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Output Delay time during Data Transfer Mode	t <sub>ODLY</sub>		14	ns	
Output Hold time	t <sub>OH</sub>	2.5		ns	
Total System capacitance for each line	C <sub>L</sub>		40	pF	

## Reliability and Durability

Temperature	Operation: -25°C / 85°C (Target spec)
Moisture and corrosion	Operation: 25°C / 95% rel. humidity Storage: 40°C / 93% rel. hum./500h Salt Water Spray: 3% NaCl/35C; 24h acc. MIL STD Method 1009
Durability	10.000 mating cycles
Bending	10N
Torque	0.15N.m or +/-2.5 deg
Drop test	1.5m free fall
UV light exposure	UV: 254nm, 15Ws/cm <sup>2</sup> according to ISO 7816-1
Visual inspection Shape and form	No warpage; no mold skin; complete form; no cavities surface smoothness <= -0.1 mm/cm <sup>2</sup> within contour; no cracks; no pollution (fat, oil dust, etc.)
Minimum moving force of WP witch	40gf (Ensures that the WP switch will not slide while it is inserted to the connector.)
WP Switch cycles	minimum 1000 Cycles(@Slide force 0.4N to 5N)

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