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Confidential

MicroSD Card Reader



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1.0 Introduction

1.1 Description

The PS2800 is a single chip integrated USB 2.0 multimedia card reader controller that enables PC/DVD/Printer to read/write various type of SD cards. Flash media cards such as SD are widely used in digital camera, cell phone, PDA and MP3 player to store digital photos and compressed music.

1.2 Features

- Supports USB 2.0 specification and USB Device Class Definition for Mass Storage, Bulk-Transport V1.0

- Support SD compatible flash card

- Support SD 2.0 specification

- Work with default Mass Storage Class driver from Windows ME/2000/XP and

- Mac OS X; Windows 98/2000(SP1/SP2) and Mac OS 9 drivers are available from Alcor.

- Ping-pong FIFO implementation for concurrent bus operation

- Supports LED for bus activities indication

- Power switch integrated to reduce production BOM cost

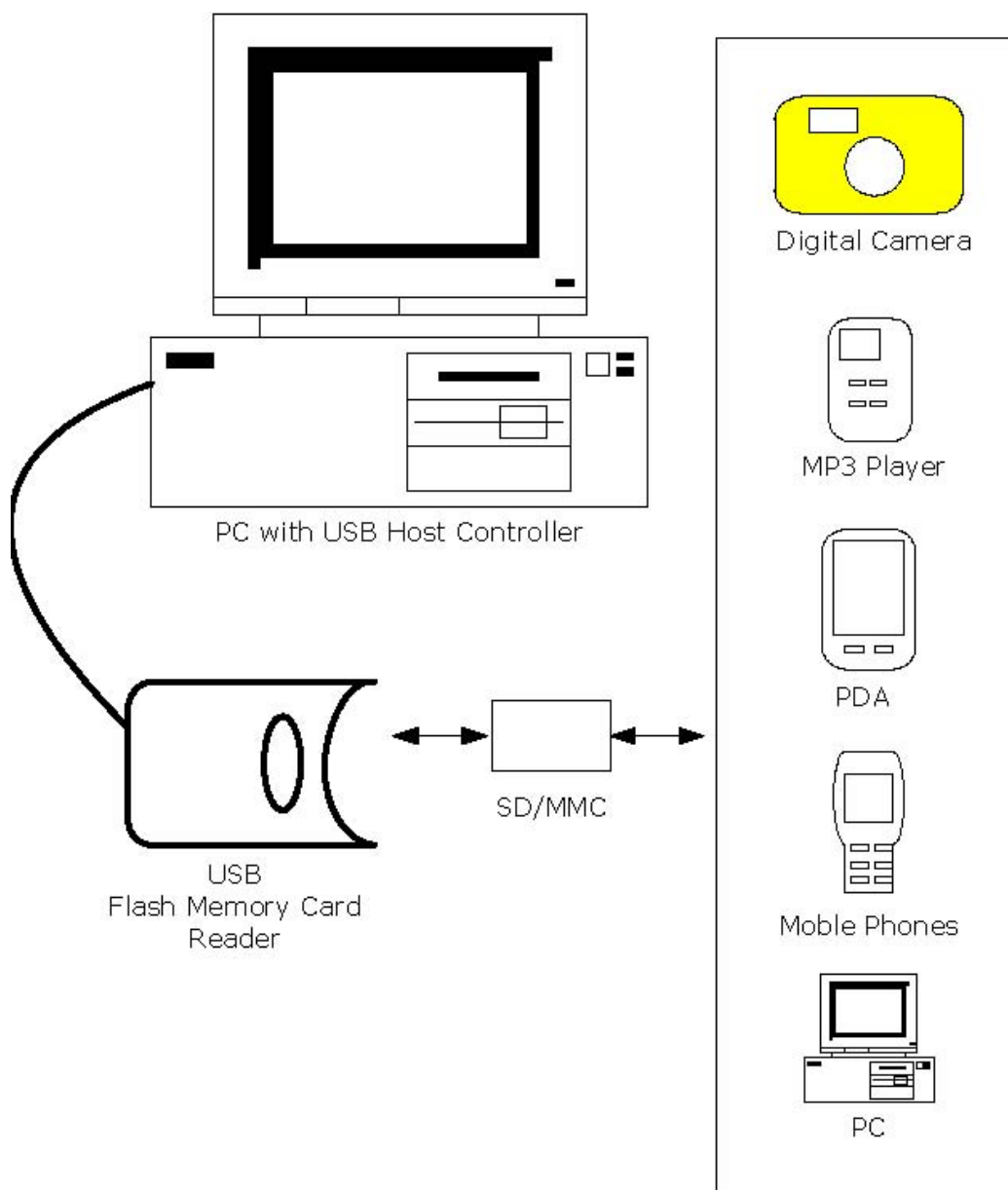
- Runs at 12MHz crystal

- 28pin-SSOP package

2.0 Application Block Diagram

Following application diagram demonstrates a typical card reader using the PS2800 chip. By connecting the card reader to a desktop or notebook PC through USB bus, the AU6332 becomes a bus-powered, high speed USB card reader, which can be used as a bridge for data transfer between Desktop PC and Notebook PC.

2.1 Block Diagram



3.0 Pin Assignment

PS2800 is available in 28-pin SSOP package. Below diagram shows signal name of each pin and table in the following page describes each pin in detail.

SDDATA0 SDCLK GPON7 GND VDD DM DP REXT VD33 VS33P VSSA XI XO VDDA

Figure 3.1 Pin Assignment Diagram

1		28	SDDATA3
2		27	SDDATA2
3		26	SDWP
4		25	SDDATA1
5		24	SDCMD
6		23	SD_V33
7		22	VDD33C
8	Alcor Micro PS2800 28-PIN SSOP	21	SDCDN
9		20	VSSHM
10		19	VDDHM
11		18	V18
12		17	VDD3V
13		16	AVDD5V
14		15	AGND5V

Pin #	Pin Name	I/O	Description
	SDDATA0	I/O	SD Data0
	SDCLK	I/O	SD CLK
	GPON7	O	LED indicator for card operation
	GND	GND	GND
	VDD	I	1.8V Power Source for UTMI
	DM	I/O	USB DM
	DP	I/O	USB DP
	REXT	I	External 6K Resister to Ground
	VD33	I	3.3V Power Source for UTMI
	VS33P	GND	Ground
	VSSA	GND	Ground
	XI	I	12 MHz crystal input.
	XO	O	12 MHz crystal output.
	VDDA	I	1.8V Power Source for PLL
	AGND5V	GND	5V ground for regulator to 3.3V
	AVDD5V	I	5V power for regulator to 3.3V
	VDD3V	O	3.3V power from regulator 5V to 3.3V
	V18	O	1.8V Power Out for Core
	VDDHM	I	3.3V Power Source for IO pad
	VSSHM	GND	3.3V ground for IO pad
	SDCDN	I	SD CDN
	VDD33C	I	3.3V power for PMOS
	SD_V33	O	SD card power
	SDCMD	I/O	SD CMD
	SDDATA1	I/O	SD Data1
	SDWP	I	SD WP
	SDDATA2	I/O	SD Data2
	SDDATA3	I/O	SD Data3

5.0 Electrical Characteristics

5.1 Absolute Maximum Ratings

Table 5.1 Absolute Maximum Ratings

SYMBOL	PARAMETER	RATING	UNITS
V _{CC}	Power Supply	-0.3 to V _{CC} +0.3	V
V _{IN}	Input Voltage	-0.3 to 3.6	V
V _{OUT}	Output Voltage	-0.3 to V _{CC} +0.3	V
T _{STG}	Storage Temperature	-40 to 150	°C

5.2 Recommended Operating Conditions

Table 5.2 Recommended Operating Conditions

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
V _{CC}	Power Supply	3.0	3.3	3.6	V
V _{DD}	Digital Supply	1.62	1.8	1.98	V
V _{IN}	Input Voltage	0	3.3	3.6	V
T _{OPR}	Operating Temperature	0		85	°C

5.3 Leakage Current and Capacitance

Table 5.3 General DC Characteristics

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
I _{IN}	Input current	no pull-up or pull-down	-10	±1	10	μA
I _{OZ}	Tri-state leakage current		-10	±1	10	μA
C _{IN}	Input capacitance	Pad Limit		2.8		pF
C _{OUT}	Output capacitance	Pad Limit		2.8		pF
C _{BID}	Bi-directional buffer capacitance	Pad Limit		2.8		pF

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5.4 DC Electrical Characteristics of 3.3V I/O Cells

Table 5.4 DC Electrical Characteristics of 3.3V I/O Cells

SYMBOL	PARAMETER	CONDITIONS	Limits			UNIT
			MIN	TYP	MAX	
V _{cc}	Power supply	3.3V I/O	3.0	3.3	3.6	V
V _{il}	Input low voltage	LVTTL			0.8	V
V _{ih}	Input high voltage		2.0			V
V _{ol}	Output low voltage	I _{ol} = 2~16mA			0.4	V
V _{oh}	Output high voltage	I _{oh} = 2~16mA	2.4			V
R _{pu}	Input pull-up resistance		40	75	190	KΩ
R _{pd}	Input pull-down resistance		40	75	190	KΩ
I _{in}	Input leakage current	V _{in} = V _{cc} or 0	-10	±1	10	μA
I _{oz}	Tri-state output leakage current		-10	±1	10	μA

5.5 USB Transceiver Characteristics

Table 5.5 Electrical characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
AVCC	Analog supply Voltage		3.0	3.3	3.6	V
VCC	Digital supply Voltage		1.62	1.8	1.98	V
I _{CC}	Operating supply current	High speed operating at 480 MHz			73	mA
I _{CC(susp)}	Suspend supply current	In suspend mode, current with 1.5k Ω pull-up resistor on pin RPU disconnected			120	μ A

Table 5.6 Static characteristic : Digital pin

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Input levels						
V _{IL}	Low-level input voltage				0.8	V
V _{IH}	High-level input voltage		2.0			V
Output levels						
V _{OL}	Low-level output voltage				0.2	V
V _{OH}	High-level output voltage		VCC-0.2			V

AVCC=3.0V ~ 3.6V ; VCC=1.62V ~ 1.98V ; Temp=0 $^{\circ}$ C ~ 85 $^{\circ}$ C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
USB2.0 Transceiver (HS)						
Input Levels (differential receiver)						
V_{HSDIFF}	High speed differential input sensitivity	$ V_{I(DP)} - V_{I(DM)} $ measured at the connection as application circuit	300			mV
V_{HSCM}	High speed data signaling common mode voltage range		-50		500	mV
V_{HSSQ}	High speed squelch detection threshold	Squelch detected			100	mV
		No squelch detected	150			mV
V_{HSDSC}	High speed disconnection detection threshold	Disconnection detected	625			mV
		Disconnection not detected			525	mV
Output Levels						
V_{HSOI}	High speed idle level output voltage(differential)		-10		10	mV
V_{HSOL}	High speed low level output voltage(differential)		-10		10	mV
V_{HSOH}	High speed high level output voltage(differential)		-360		400	mV
V_{CHIRPJ}	Chirp-J output voltage (differential)		700		1100	mV
V_{CHIRPK}	Chirp-K output voltage (differential)		-900		-500	mV
Resistance						
R_{DRV}	Driver output impedance	Equivalent resistance used as internal chip only	3	6	9	Ω
		Overall resistance including external resistor	40.5	45	49.5	
Termination						
V_{TERM}	Termination voltage for pull-up resistor on pin RPU		3.0		3.6	V
USB1.1 Transceiver (FS/LS)						
Input Levels (differential receiver)						
V_{DI}	Differential input sensitivity	$ V_{I(DP)} - V_{I(DM)} $	0.2			V
V_{CM}	Differential common mode voltage		0.8		2.5	V
Input Levels (single-ended receivers)						

AVCC=3.0V~3.6V ; VCC=1.62V~1.98V ; Temp=0°C~85°C Table 5.8 Dynamic characteristic : Analog I/O
pins (DP/DM)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Driver Characteristics						
High-Speed Mode						
t _{HSR}	High-speed differential rise time		500			ps
t _{HSF}	High-speed differential fall time		500			ps
Full-Speed Mode						
t _{FR}	Rise time	CL=50pF ; 10 to 90 % of V _{OH} -V _{OL} ;	4		20	ns
t _{FF}	Fall time	CL=50pF ; 90 to 10 % of V _{OH} -V _{OL} ;	4		20	ns
t _{FRMA}	Differential rise/fall time matching (t _{FR} / t _{FF})	Excluding the first transition from idle mode	90		110	%
V _{CRS}	Output signal crossover voltage	Excluding the first transition from idle mode	1.3		2.0	V
Low-Speed Mode						
t _{LR}	Rise time	CL=200pF-600pF ; 10 to 90% of V _{OH} -V _{OL} ;	75		300	ns
t _{LF}	Fall time	CL=200pF-600pF ; 90 to 10% of V _{OH} -V _{OL} ;	75		300	ns
t _{LRMA}	Differential rise/fall time matching (t _{LR} / t _{LF})	Excluding the first transition from idle mode	80		125	%
V _{CRS}	Output signal crossover voltage	Excluding the first transition from idle mode	1.3		2.0	V
V _{OH}	High-level output voltage		2.8		3.6	V

5.6 Power Switch Feature

PS2800 integrates a 3.3V to 2.5V voltage regulator and power switches to save the MOS chips for controlling flash card power.

Card Power Output Current Range

For SD/MMC MAX: 100mA

Card power output voltage range SD/MMC: $3.3V \pm 0.3V$

- PS2800 will turn off all of Card Power in suspend mode

Figure 5.1 Card Detect Power-on Timing

