

ATP Industrial Grade SDHC Card Specification

Revision 1.0



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Revision History

Date	Version	Changes compared to previous issue
May. 30 th , 2007	1.0	- Base version

Card Images:**Capacities:**

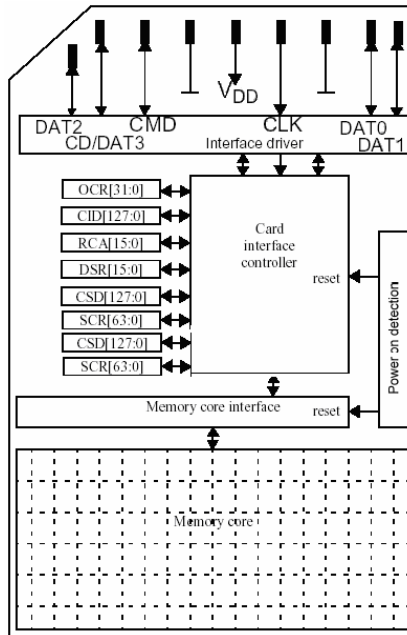
ATP P/N	CAPACITY
AF4GSDI	4GB
AF8GSDI	8GB

SDHC Card Pad Assignment:

Pin #	SD Interface			SPI Interface		
	Name	Type ¹	Description	Name	Type ¹	Description
1	CD/DAT3 ²	I/O/PP ³	Card Detect /Data Line (Bit 3)	CS	I ³	Chip Select (Active Low)
2	CMD	PP	Command/ Response	DI	I/PP	Data In
3	V _{SS1}	S	Supply Voltage Ground	V _{SS1}	S	Supply Voltage Ground
4	V _{DD}	S	Supply Voltage	V _{DD}	S	Supply Voltage
5	CLK	I	Clock	SCLK	I	Clock
6	V _{SS2}	S	Supply Voltage Ground	V _{SS2}	S	Supply Voltage Ground
7	DAT0	I/O/PP	Data Line (Bit 0)	DO	O/PP	Data Out
8	DAT1	I/O/PP	Data Line (Bit 1)	RSV		
9	DAT2	I/O/PP	Data Line (Bit 2)	RSV		

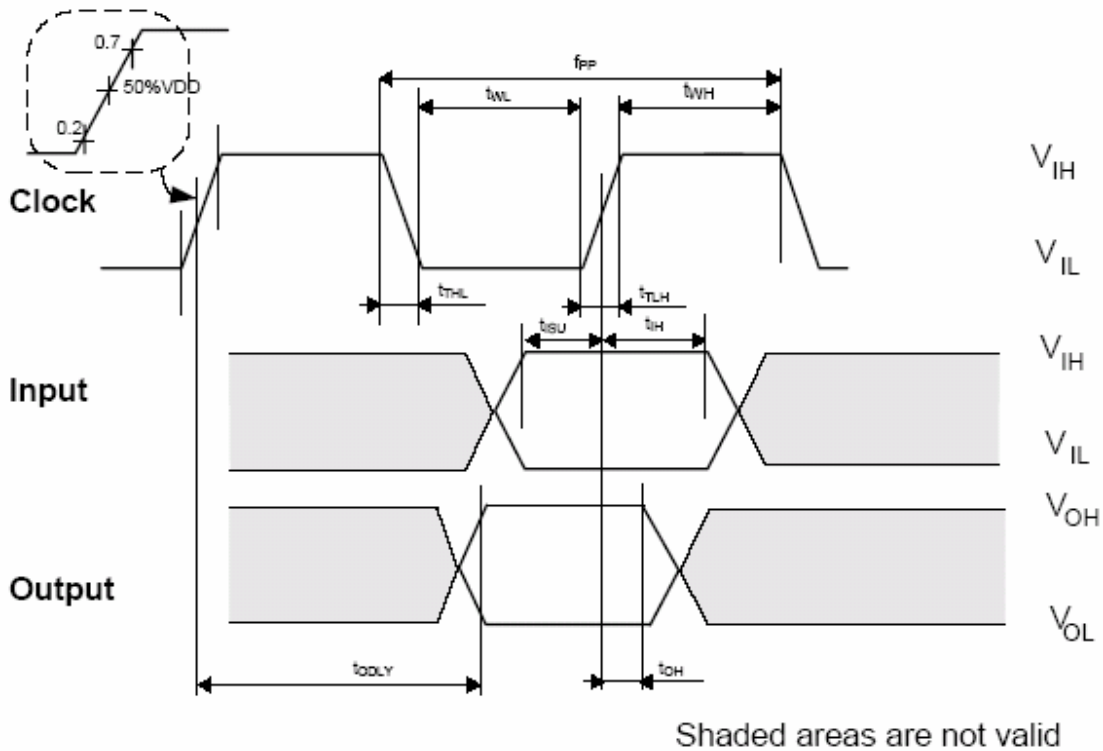
- 1) S:power supply; I: input; O; output using push-pull drivers; PP: I/O using push-pull drivers.
- 2) The extended DAT Lines (Dat1-DAT3) are input on power up. They start to operate as DAT lines after SET_BUS_WIDTH command. The Host shall keep its own DAT1-DAT3 lines in input mode, as well, while they are not used. It is defined so, in order to keep compatibility to MultiMediaCards.
- 3) After power up this has a 50KOhm pull up enabled in the card. This resistor serves two functions Card detection and Mode Selection. For Mode Selection, the host can drive the line high or let it be pulled high to select SD mode. If the host wants to select SPI mode it should drive the line low. For Card detection, the host detects that the line is pulled high. The pull-up should be disconnected by user, during regular data transfer, with SET_CLR_CARD_DETECT (ACMD42) command.

Functional Block Diagram:



Bus Operating Conditions:

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Supply voltage	V_{DD}	2.7	3.3	3.6	V	
Operating Current	I_{CC}	-	50	-	mA	
Standby Current	I_{SB}	-	200	-	μA	
Input Leakage Current	I_{LI}	-10	-	10	μA	
Output Leakage Current	I_{LO}	-10	-	10	μA	
Input High Voltage	V_{IH}	$0.625 \times V_{DD}$	-	$V_{DD} + 0.3$	V	
Input Low Voltage	V_{IL}	$V_{SS} - 0.3$	-	$0.25 \times V_{DD}$	V	
Output High Voltage	V_{OH}	$0.75 \times V_{DD}$	-	-	V	
Output Low Voltage	V_{OL}	-	-	$0.125 \times V_{DD}$	V	



High Speed Mode Bus Timing:

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	50	MHz	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Clock low time	t_{WL}	7	-	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Clock high time	t_{WH}	7	-	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Clock rise time	t_{TLH}	-	3	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Clock fall time	t_{THL}	-	3	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Inputs CMD, DAT (referenced to CLK)					
Input set-up time	t_{ISU}	6	-	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Input hold time	t_{IH}	2	-	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Outputs CMD, DAT (referenced to CLK)					
Output Delay time during Data Transfer Mode	t_{ODLY}	-	14	ns	$C_L \leq 40 \text{ pF}(1 \text{ card})$

Default Bus Timing(Backward Compatible):

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	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Clock frequency Identification Mode	f_{OD}	0	400	KHz	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Clock low time	t_{WL}	10	-	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Clock high time	t_{WH}	10	-	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Clock rise time	t_{TLH}	-	10	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Clock fall time	t_{THL}	-	10	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Inputs CMD, DAT (referenced to CLK)					
Input set-up time	t_{ISU}	5	-	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Input hold time	t_{IH}	5	-	ns	$C_{card} \leq 10 \text{ pF}(1 \text{ card})$
Outputs CMD, DAT (referenced to CLK)					
Output Delay time during Data Transfer Mode	t_{ODLY}	-	14	ns	$C_L \leq 40 \text{ pF}(1 \text{ card})$

Environment Specifications:

Type		Standard
Temperature	Operating	-40°C to 85°C
	Non-Operating	-40°C to 85°C
Humidity	Operating	8% to 95%, noncondensing
	Non-Operating	8% to 95%, noncondensing
Vibration	Operating	15G peak-to-peak Max.
	Non-Operating	15G peak-to-peak Max.
Shock	Operating	1,000G Max.
	Non-Operating	1,000G Max.
Altitude	Operating	80,000 feet Max.
	Non-Operating	80,000 feet Max.

Reliability:

Type	Measurement
Number of insertions	10,000 minimum
Data Retention	10 years
Endurance	>2,000,000 cycles (program/erase, in normal applications)
MTBF (@ 25°C)	>2,000,000 hours

Electrical Characteristics:

Type	Measurement
Card supported Voltage	2.7~3.6V
Card supported Frequency	0~50 MHz
Data Bus Width Supported	1 or 4 bits

Performance:

Type	Measurement
SD Speed Class	Class 6
Data Transfer Rate	up to 22.5MByte/s (150X)

Extra Features:

Type	Measurement
Water Proof	Yes
Dust Proof	Yes
ESD Proof	Yes
RoHS Compliant	Yes

Physical Dimension Specifications (Units in MM):

Type	Measurement
Length	32.0mm +/- 0.10mm
Width	24.0mm +/- 0.10mm
Thickness	2.1mm +/- 0.15mm
Weight	2.0g Max.

Mechanical FORM FACTOR (Units in MM):

