



IDU3A-XXXGX
MicroSD Memory Card
4GB 、 8GB 、 16GB 、 32GB

ADATA Technology Corp.

Micro SD Memory Card

Datasheet

IDU3A-XXXGX

4GB 、 8GB 、 16GB 、 32GB

Version 6



IDU3A-XXXGX
MicroSD Memory Card
4GB、8GB、16GB、32GB

Key Features:

- **Capacity:** MLC 4GB~32GB
- **Form Factor:** Micro SD
- **Specification:**
 - Compliant with SD Revision 2.x/3.0
 - Support SD mode & SPI mode
 - S.M.A.R.T feature supported
 - ECC support up to 72bit
 - Gold Finger : 30u-inch Au plated
- **Performance**
 - Read: Up to 70MB/s
 - Write: Up to 30MB/s
- **Weight**
 - 0.25±0.01g
- **Power Consumption:**
 - Active: 0.5W_{-Max}
 - Idle: 0.01W_{-Typical}
- **Temperature:**
 - Operation :
Commerical : -25°C ~ 85°C
Industrial : -40°C ~ 85°C
 - Non-operation :
Commerical : -40°C ~ 85°C
Industrial : -50°C ~ 95°C
- **Humidity**
 - 0°C to 55°C / 5%~95% RH,
non-condensing
- **Reliability**
 - MTBF: 1,000,000 hours
 - Shock: 1500G/0.5ms
 - Vibration:20G Peak, 20~2000Hz
- **Data Retention**
 - After all of the available P/E cycles are consumed, NAND cells on SD retain data for 12 months.



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Revision History

<u>Revision No.</u>	<u>History</u>	<u>Draft Date</u>	<u>Remark</u>	<u>Editor</u>
0	Formal release	July. 18, 2013		Andy Lin
1	Add dimensions	July. 22, 2013		Andy Lin
2	Add Key feature	Feb. 05, 2014		Kelvin Wang
3	Update Model name	Jan.08.2015		Jerry Hong
4	Add Write/Read Current	April.17.2015		Jerry Hong
5	Add SPI mode & Update Power consumption	June.26.2015		Jerry Hong
6	Modify Endurance & Thickness description	September.20.2016		Jerry Hong



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1.0 Product Description

1.1 Product Overview

The ADATA IDU3A Micro SD Memory Card is to save every precious, tender, and romantic moment. You may purchase high resolution digital camera, digital camcorder, or other high-end devices. However, normal Secure Digital Cards (Micro SD Cards) on the market today may not let you capture these moments because of slow read/ write speed. Slow read/write speed may cause lag time between shots, resulting in missing the opportunity to record some of your finest memories. This ADATA Micro SD Memory Card, rated a UHS-1 performance card which means the card has a guaranteed read/write speed of at least 10MB/s, will reduce working time between shots. For those high-end digital devices users, ADATA SD Memory Card will ensure you capturing every perfect moment.

2.0 Features

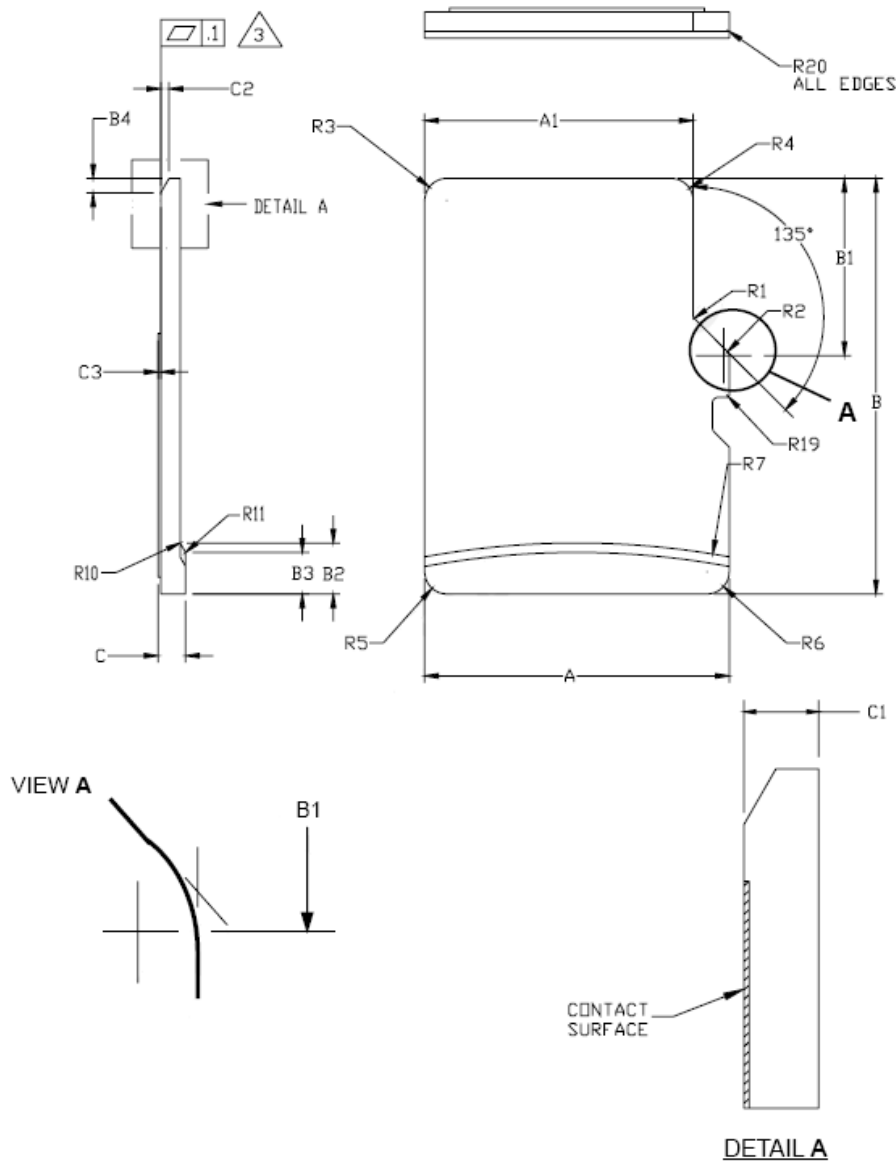
- Supports SD specification v2.x/ v3.0
- Capacity : 4GB / 8GB / 16GB / 32GB
- Applicable for dual host voltage (3.3V) & (1.8V)
- Support CPRM code
- Hardware BCH Error Correcting Code (ECC) engine, Configurable ECC up to 72-bit
- Compatible with all PC Card Services and Socket Services
- Support Error Correcting Code (ECC) function to detect and correct errors.
- Support In System Programming (ISP) function to load the firmware.
- Enhanced ESD design
- Ensured Manufacturing Facilities
- Support Wear Leverage function to maximize data endurance
- Electronic Specifications base on the SD PHYSICAL LAYER SPECIFICATION Ver.3.00
- Dimension/Weight base on the Standard Size microSD Memory Card Mechanical Specification Ver.1.00
- Reliability, Durability base on the SD PHYSICAL LAYER SPECIFICATION Ver.3.10 and Standard Size microSD Memory Card Mechanical Specification Ver.1.00

3.0 Mechanical Specification

3.1 Physical dimensions and Weight

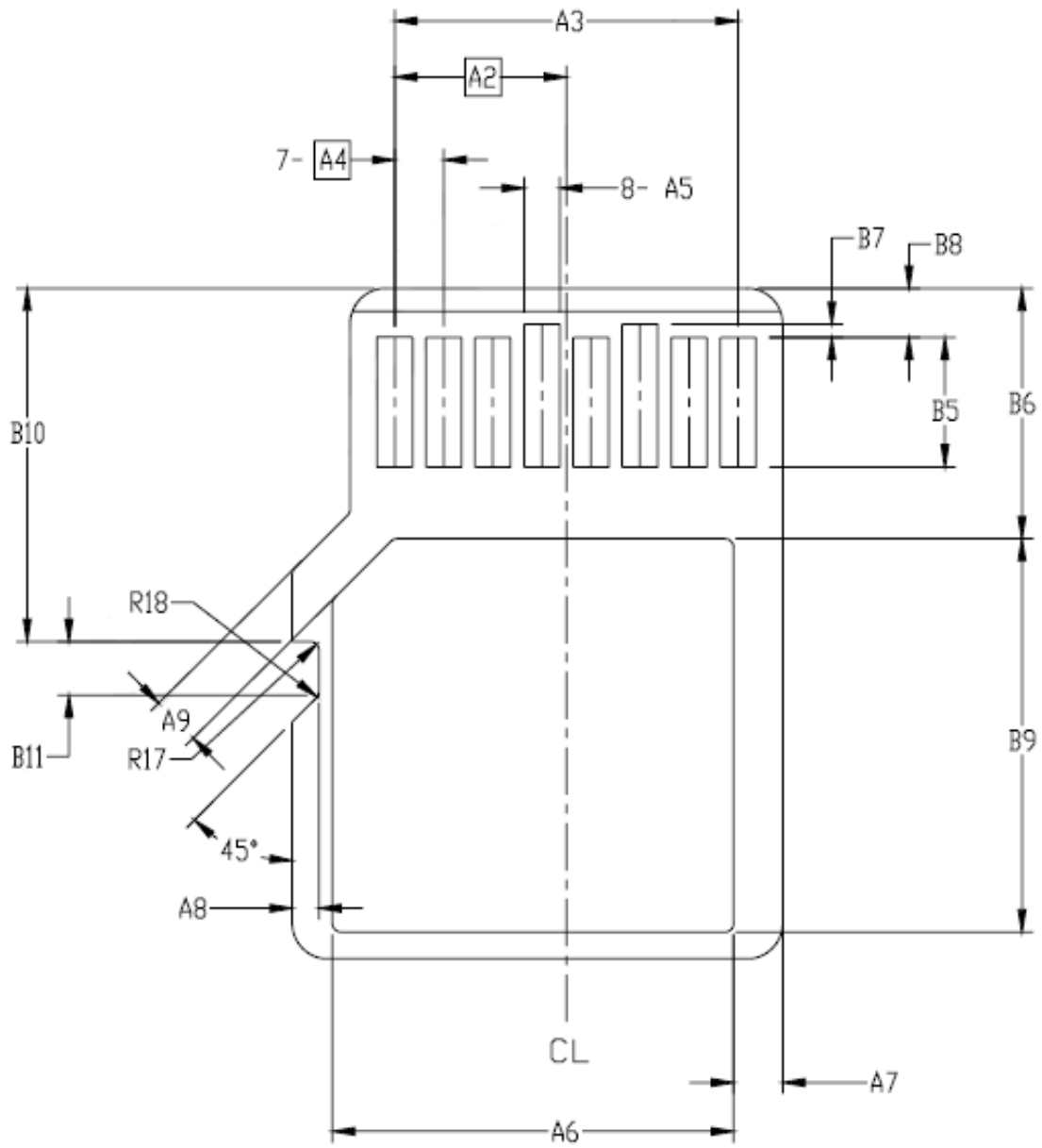
Parameter	Description
Weight:	0.25g
Length:	11±0.10mm
Width:	15±0.10 mm
Thickness: Including Lip	1.0mm±0.10mm

[Figure 3-1] Physical dimension





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MicroSD Memory Card
4GB · 8GB · 16GB · 32GB





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COMMON DIMENSIONS				
SYMBOL	MIN	NOM	MAX	NOTE
A	10.90	11.00	11.10	
A1	9.60	9.70	9.80	
A2		3.85		BASIC
A3	7.60	7.70	7.80	
A4		1.10		BASIC
A5	0.75	0.80	0.85	
A6			8.50	
A7	0.90			
A8	0.60	0.70	0.80	
A9	0.80			
B	14.90	15.00	15.10	
B1	6.30	6.40	6.50	
B2	1.64	1.84	2.04	
B3	1.30	1.50	1.70	
B4	0.42	0.52	0.62	
B5	2.80	2.90	3.00	
B6	5.50			
B7	0.20	0.30	0.40	
B8	1.00	1.10	1.20	
B9	-	-	9.00	
B10	7.80	7.90	8.00	
B11	1.10	1.20	1.30	
C	0.90	1.00	1.10	
C1	0.60	0.70	0.80	
C2	0.20	0.30	0.40	
C3	0.00		0.15	
D1	1.00			
D2	1.00			
D3	1.00			
R1	0.20	0.40	0.60	
R2	0.20	0.40	0.60	



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R3	0.70	0.80	0.90	
R4	0.70	0.80	0.90	
R5	0.70	0.80	0.90	
R6	0.70	0.80	0.90	
R7	29.50	30.00	30.50	
R10		0.20		
R11		0.20		
R17	0.10	0.20	0.30	
R18	0.20	0.40	0.60	
R19	0.05		0.20	

4.0 Electronic Specification

4.1 Micro SD Memory Card Interface Connector

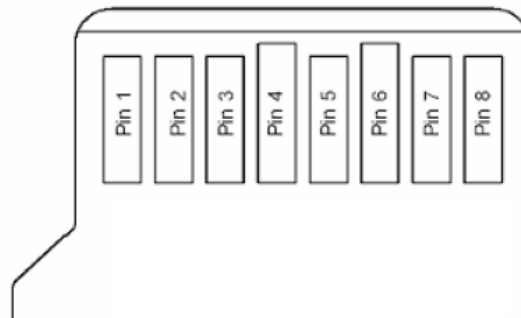


Figure 1: Contact Area

4.2 Pin Assignments and Pin Type

Pin #	SD Mode			SPI Mode		
	Name	Type ¹	Description	Name	Type ¹	Description
1	DAT2	I/O/PP	Data Line [Bit 2]	RSV	-	
2	CD/DAT3 ²	I/O/PP ³	Card Detect / Data Line [Bit 3]	CS	I ³	Chip Select (neg true)
3	CMD	I/O/PP	Command / Response	DI	I	Data In
4	VDD	S	Supply voltage	VDD	S	Supply voltage
5	CLK	I	Clock	SCLK	I	Clock
6	VSS2	S	Supply voltage ground	VSS2	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	-	

1) S : power supply; I : input; O : output using push-pull drivers; PP : I/O using push-pull drivers;

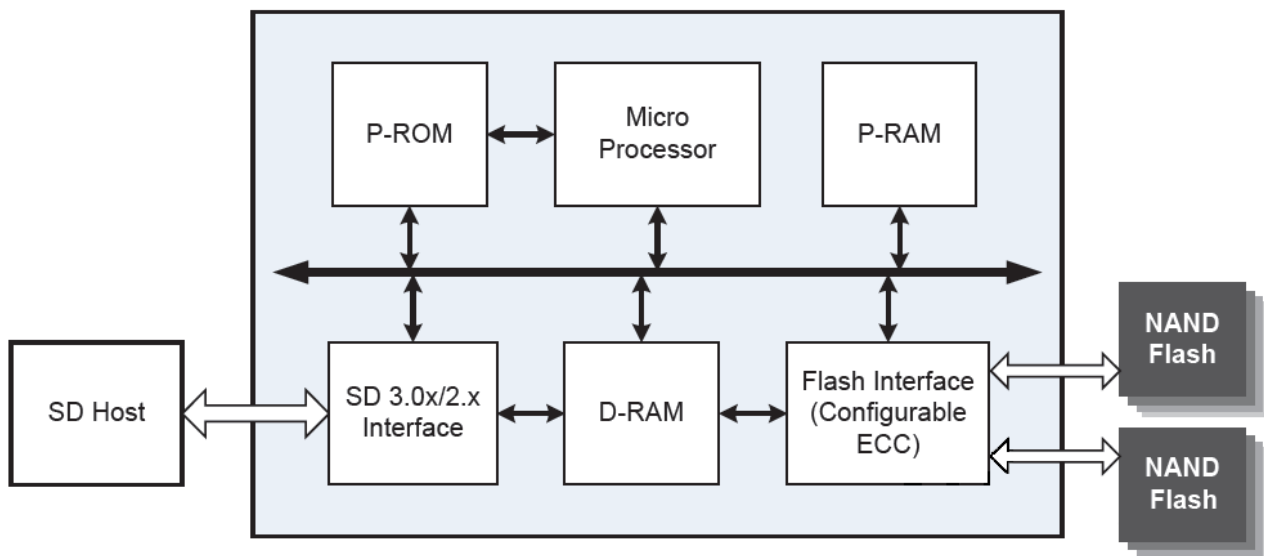
2) The extended DAT lines (DAT1~DAT3) are input on power up. They start to operate as DAT lines after SET_BUS_WIDTH command. The Host shall keep its own DAT1~DAT3 lines in input mode, as well, while they are not used.

3) At power up this line has a 50K ohm pull up enabled in the card. This resistor serves two functions : Card Detection and

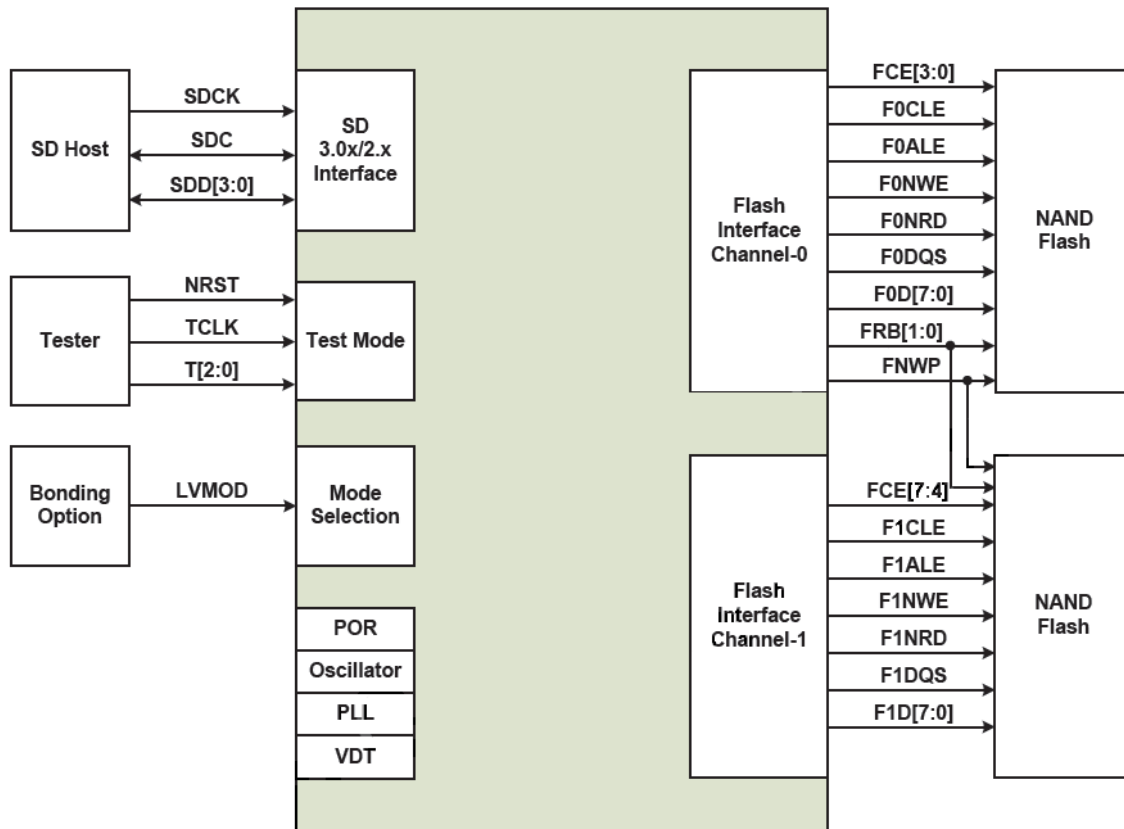


Mode Selection. For Mode Selection, the host can drive the line high or let it be pulled high to select SD mode. If the host wants to select SPI mode, it should drive the line low. For Card Detection, the host detects that the line is pulled high. This pull-up should be disconnected by the user, during regular data transfer. With SET_CLR_CARD_DETECT (ACMD42) command.

4.3 Function Block Diagram



The following figure is a typical application block diagram for the IDU3A.



4.4 SD Bus

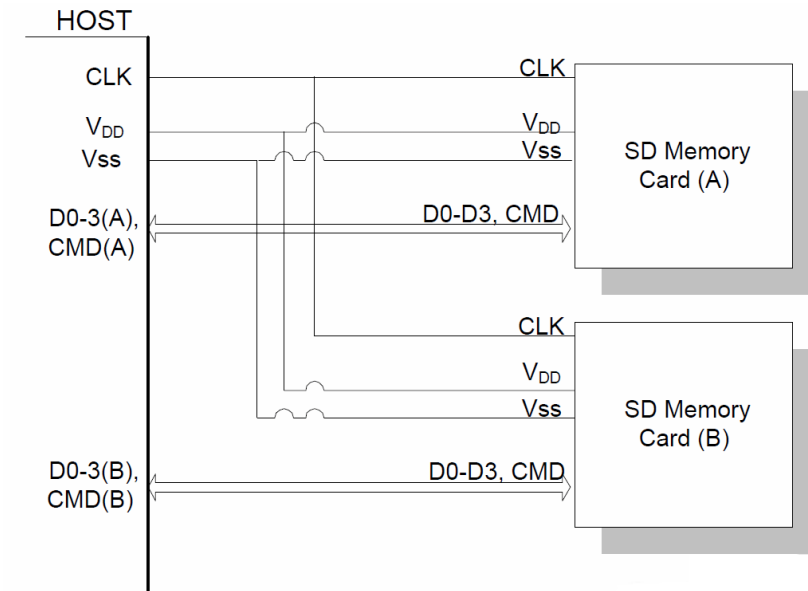
In default speed, the SD Memory Card bus has a single master (application); multiple slaves (cards), synchronous star topology (refer to following Figure). In high speed and UHS-I, the SD Memory Card bus has a single master (application) single slave (card), synchronous point to point topology. Clock, power and ground signals are common to all cards. Command (CMD) and data (DAT0 - DAT3) signals are dedicated to each card providing continuous point to point connection to all the cards.

During initialization process commands are sent to each card individually, allowing the application to detect the cards and assign logical addresses to the physical slots. Data is always sent (received) to (from) each card individually. However, in order to simplify the handling of the card stack, after the initialization process, all commands may be sent concurrently to all cards. Addressing information is provided in the command packet.

SD bus allows dynamic configuration of the number of data lines. After power up, by default, the SD Memory Card will use only DAT 0 for data transfer. After initialization the



host can change the bus width (number of active data lines). This feature allows easy tradeoff between HW cost and system performance. **Note that while DAT1 to DAT3 are not in use, the related Host's DAT lines should be in tri-state (input mode).**



- CLK :** Host to card clock signal.
- CMD:** Bidirectional Command/Response signal
- DAT0 – DAT3 :** 4 Bidirectional data signals.
- V_{DD}, V_{SS} :** Power and ground signals.

4.5 SPI Bus

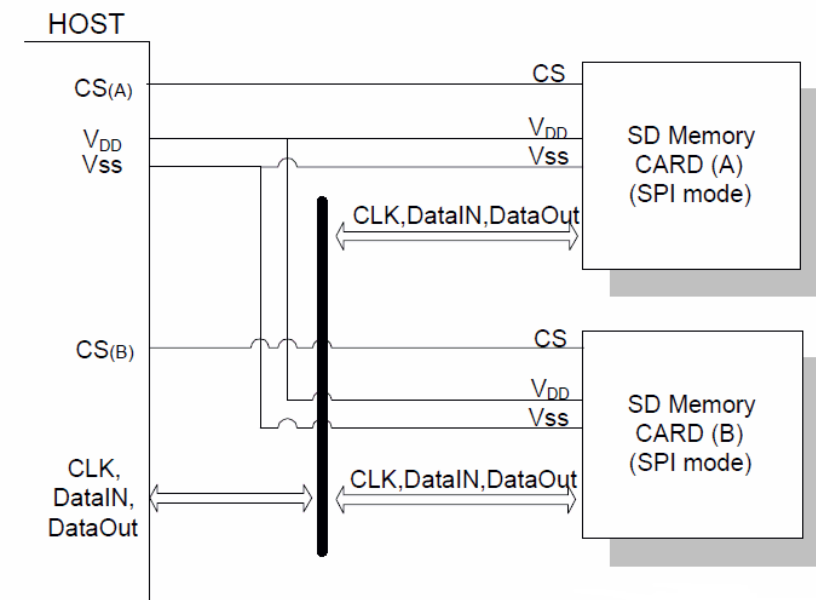
The SPI compatible communication mode of the SD Memory Card is designed to communicate with a SPI channel, commonly found in various microcontrollers in the market. The interface is selected during the first reset command after power up and cannot be changed as long as the part is powered on. The SPI standard defines the physical link only, and not the complete data transfer protocol. The SD Memory Card SPI implementation uses the same command set of the SD mode. From the application point of view, the advantage of the SPI mode is the capability of using an off-the-shelf host, hence reducing the design-in effort to minimum. The disadvantage is the loss of performance, relatively to the SD mode which enables the wide bus option.

The SD Memory Card SPI interface is compatible with SPI hosts available on the market. As any other SPI device the SD Memory Card SPI channel consists of the following four signals:



- CS :** Host to card Chip Select signal.
- CLK :** Host to card clock signal.
- DataIn :** Host to card data signal.
- DataOut :** Card to host data signal.

Another SPI common characteristic is byte transfers, which is implemented in the card as well. All data tokens are multiples of byte (8 bit) and always byte aligned to the CS signal.



The card identification and address method are replaced by a hardware Chip Select (CS) signal. There are no broadcast commands. For every command, a card (slave) is selected by asserting (active low) the CS signal.

The CS signal shall be continuously active for the duration of SPI transaction (command, response and data). The only exception occurs during card programming, when the host can de-assert the CS signal without affecting the programming process.

The SPI interface uses the 7 out of the SD 9 signals (DAT1 and DAT2 are not used, DAT3 is the CS signal) of the SD bus.



5.0 Product Specifications

5.1 System Interface and Configuration

- Motherboard : ASUS P5K3 DELUXE
- CPU : Intel i7-2600 3.40GHZ
- RAM : ADATA 8GB DDRIII 1600MHZ x1
- OS : Window XP SP3 / Windows 7
- Software : HDBENCH3.0
- interface:USB3.0 Card reader
- Samples : Each Capacity

5.2 System Performance

The ADATA Micro SD Memory Card meets the performance requirements listed in below table. The performance was measured on a computer system with following setup:

IDU3A	Windows 7	
	Read (Minimum)	Write (Minimum)
4GB	35 MB/s	10 MB/s
8GB	50 MB/s	10 MB/s
16GB	70 MB/s	20 MB/s
32GB	70 MB/s	30 MB/s

Actual performance may vary depending on use conditions and environment

5.3 Drive Capacity

Windows 7	Capacity	User Area(FAT32)	Total Sectors
4GB	3.75GB	4,029,677,568	7,886,848
8GB	7.51GB	8,068,792,320	15,775,744
16GB	15GB	16,147,021,824	31,553,536
32GB	30GB	32,299,286,528	63,141,888



5.4 Supply Voltage

Item	Requirements
Allowable voltage	3.3V \pm 5%
Allowable noise/ripple	100mV p-p or less

5.5 System Power Consumption

Power	Typical
Active	< 0.50 W
Idle/Standby/Sleep	< 0.001 W

5.6 System Reliability

MTBF	1,000,000 hrs
Endurance	3,000 P/E cycles

5.7 Environmental Specifications

Feature	Operator	Non-Operator
Temperature (For Commercial)	-25°C to 85°C	-40°C to 85°C
Temperature (For Industrial)	-40°C to 85°C	-50°C to 95°C
Humidity	0°C to 55°C / 5%~95% RH, non-condensing	
Vibration	20G(20~2000Hz)	
Shock	1500G/0.5ms	

*Note: Depends on Flash memory specifications.



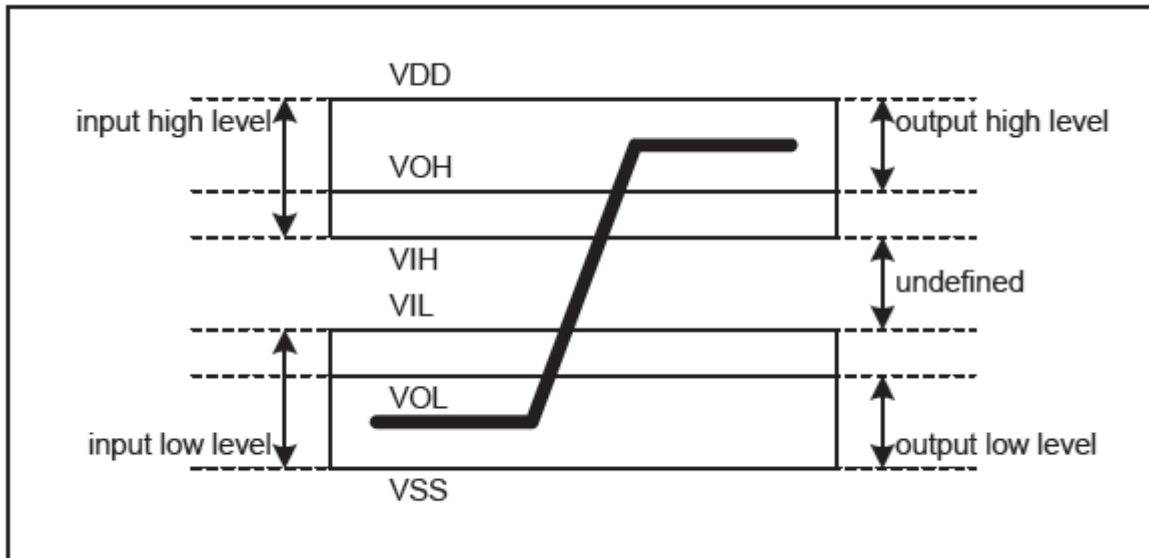
5.8 General DC Characteristics

Parameter	Symbol	Min	Max	Unit	Notes
Supply Voltage	VDD	2.7	3.6	V	
Output High Voltage	VOH	0.75*VDD		V	IOH=-100uA VDD min
Output Low Voltage	VOL		0.125*VDD	V	IOL = 100uA VDD min
Input High Voltage	VIH	0.625*VDD	VDD+0.3	V	
Input Low Voltage	VIL	VSS-0.3	0.25 *VDD	V	
Power Up Time			250	ms	From 0V to VDD min
Operating Current	ICC		200	mA	IVCCF = 0mA (High speed mode)
Stand-by Current	ISB		100	uA	
Input Leakage Current	ILI		±10	uA	VIN = 0 to VDDH

5.9 Bus Signal Line Loading

Parameter	Symbol	Min	Max	Unit	Notes
Pull up resistance for SDC line	R _{CMD}	10	100	K Ohm	To prevent bus floating
Pull up resistance for SDD line	R _{DAT}	10	100	K Ohm	To prevent bus floating
capacitance for each signal Pin	C _L		40	pF	
Pull-up resistance inside card (pin 1)	R _{DAT3}	10	90	K Ohm	May be used for card detection

5.10 Bus Signal Level



DC Characteristics of I/O Interface

Parameter	Symbol	Min	Max	Unit	Notes
Output High voltage	VOH	2.4		V	V _{DD} = 3.3V
Input Low voltage	VOL		0.4	V	V _{DD} = 3.3V
Input High voltage	VIH	2.0	3.6	V	V _{DD} = 3.3V
Output Low voltage	VIL	-0.3	0.8	V	V _{DD} = 3.3V

Write/Read Current

Capacity	Read (mA)	Write (mA)
4GB	80	80
8GB	130	110
16GB	130	150
32GB	130	160



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6.0 Ordering Information

6.1 Model Name

I D U 3 A - XXXX X

OP. Temperature:

- M : MLC, Normal, -25~85°C
- T : MLC, Wide, -40~+85°C

Capacity:

- 004G : 4GB
- 008G : 8GB
- 016G : 16GB
- 032G : 32GB

Project Name

Form Factor:

- C : SD Card
- U : Micro SD Card

Interface:

- D : SD card

Application:





- I : Industrial



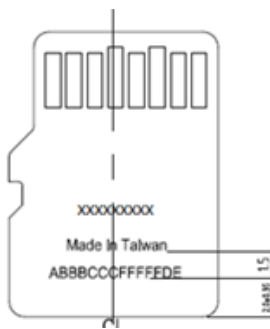
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6.2 Packing

1.) Front label

Capacity	4GB	8GB	16GB	32GB
IDU3A				

2.) Back printing



Printing content: (a) Model name: (Ex: IDU3A-032GM)

(b) Made In Taiwan

(c) Work Order Number

3.) Packing: 1200pcs in one IC box; 6 IC Box in one carton, total are 7200pcs/carton.