

# Secure Digital Card

*SD Card 1.1*

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## **FEATURES:**

- **Fully compatible with SD Card standard specification:**
  - SD Memory Card Specifications, Part 1, Physical Layer Specification, Version 1.1
  - SD Memory Card Specifications, Part 2, File System Specification, Version 1.01
  - SD Memory Card Specifications, Part 3, Security Specification, version 1.01
  
- **Support SPI Mode**
- **Absolute maximum power supply: -0.3~4.0V**
- **Operation voltage: 2.7 ~ 3.6V**
- **Temperature Ranges: -25°C to 85°C for operating commercial**
- **Variable clock rate 0-50MHz**
- **Correction of memory field errors**
- **Card Removal during read operation will never harm the content**
- **Copyright Protection Mechanism – Complies with highest security of SDMI standard**
- **Built-in write protection features (permanent and temporary)**
- **Comfortable erase mechanism**
- **Support different Bus width: X1,X4**
- **Optimized flash memory management to maximize the data endurance and performance**
- **Support ECC function to detect and correct data errors automatically**
- **Low power consumption**
- **Physical Dimensions**
  - 24mm x 32mm x 2.1mm

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## PRODUCT DESCRIPTION

Apacer SD Memory Card is designed specifically for SD Card applications that put a premium on small form factor with lower power. All device and interface configuration data are (such as maximum frequency, card identification, etc.) stored on the card. For compatibility with existing controllers, the SD memory Card offers, in addition to the SD card interface, an alternate communication protocol that is based on the SPI standard.

The SD Memory Card includes an intelligent controller that manages interfaced protocols and data storage and retrieval as well as Error Correction Code (ECC) algorithms, defect handling and diagnostics, power management and Content Protection for Recordable Media related functions.

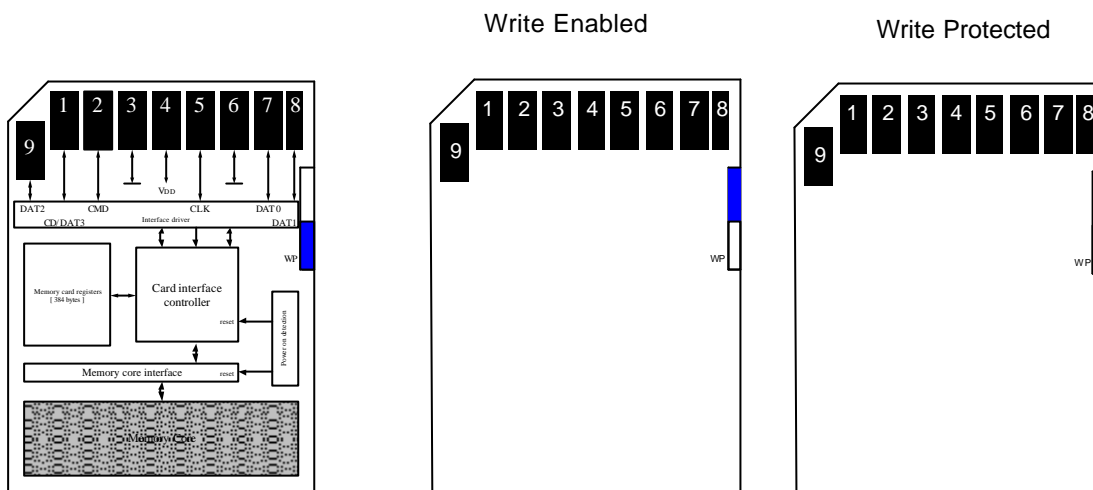
The SD Card is data storage Memory Card. It is integrated with controller & NAND type Flash memory with serial & random access capability. The device is designed for cameras, smart phones, digital recorders, MP3 players, PDAs, electronic toys, etc. The Apacer SD card meets SDA (SD card Association) Specifications. This document gives a general overview of the SD Memory Card architecture. A detailed description can be found in "SDA Specifications".

The SD Memory Card is a memory card that is specifically designed to meet the security, capacity, performance and environment requirements inherent in newly emerging audio and video consumer electronic devices. The SD Memory Card will include a copyright protection mechanism that complies with the security of the SDMI standard and will be faster and capable for higher Memory capacity. The SD Memory Card security system uses mutual authentication and a "new cipher algorithm" to protect from illegal usage of the card content. A none secured access to the user's own content is also available. The physical form factor, pin assignment and data transfer protocol are forward compatible with the Multimedia Card with some additions.

The SD Memory Card communication is based on an advanced 9pin interface (Clock, Command, 4xData and 3xPower lines) designed to operate in at maximum operating frequency of 50MHz of and low voltage range. The SD Memory Card host interface supports regular Multimedia Card operation as well. In other words, Multimedia Card forward compatibility was kept. Actually the main difference between SD Memory Card and Multimedia Card is the initialization process.

## 1.0 ELECTRICAL INTERFACE

### 1.1 Card Architecture



### 1.2 Pin Assignment

Pin	SD Mode		SPI Mode	
	Name	Description	Name	Description
1	CD/DAT3	Card detect/Data line[Bit 3]	CS	Chip select
2	CMD	Command/Response	DI	Data in
3	VSS1	Supply voltage ground	VSS	Supply voltage ground
4	VDD	Supply voltage	VDD	Supply voltage
5	CLK	Clock	SCLK	Clock
6	VSS2	Supply voltage ground	VSS2	Supply voltage ground
7	DAT0	Data line[Bit 0]	DO	Data out
8	DAT1	Data line[Bit 1]	Reserved	
9	DAT2	Data line[Bit 2]	Reserved	

## 2.0 ELECTRICAL SPECIFICATION

**Absolute Maximum Ratings** (Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the optional sections of this datasheet. Exposure to absolute maximum rating conditions for extended periods may affect reliability.)

SYMBOL	PARAMETER	RATING	UNITS
V <sub>CC</sub>	Power supply relative to VSS	2.5 to 4.0	V
T <sub>STG</sub>	Storage temperature	-40 to 85	°C
T <sub>OP</sub>	Operation temperature	-25 to 85	°C

### Recommended Operating Conditions

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
V <sub>CC</sub>	Power supply voltage	2.7	3.3	3.6	V
V <sub>SS</sub>	Power supply voltage	0	0	0	V
T <sub>J</sub>	Junction operation temperature	0	-	85	°C
T <sub>A</sub>	Recommended operating ambient temperature	0	-	85	°C

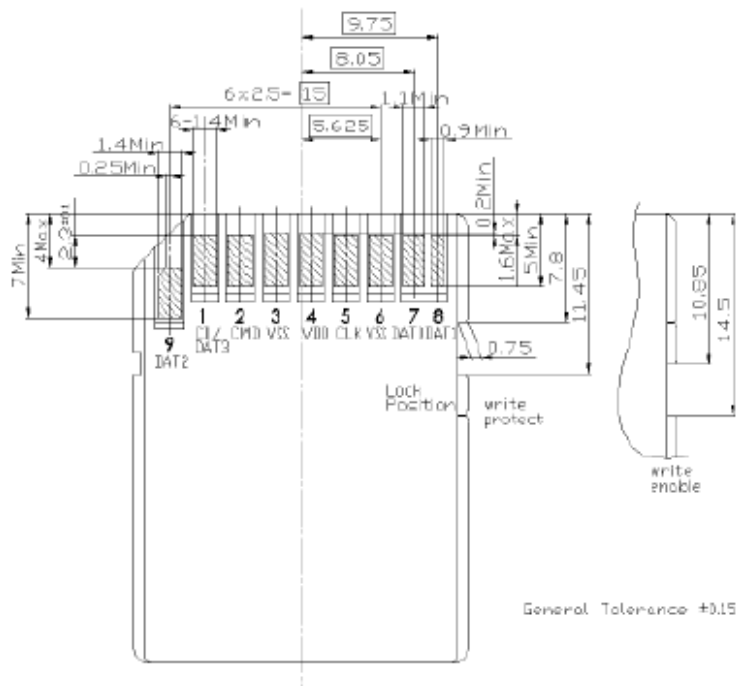
## 3.0 ENVIRONMENTAL SPECIFICATION

Item	Specification
Temperature	Operation: -25 ~ 85 Storage: -40 ~ 85 Junction temperature : max. 90 for 5 minutes
Moisture & Corrosion	Operation: 25 / 95% rel. humidity Storage: 40 / 93% rel. humidity Salt water spray: 3% NaCl@35 / 24hrs acc. MIL STD 1009
Bending	10N
Torque	+/- 2.5 degree
Drop test	1.5m free fall
ESD at contact pad	+/- 4 KV
ESD at card body	+/- 8 KV
Min. moving force of WP	40 gf (write protect switch; WP)
WP switch cycles	Min. 1000 cycles (@slide force 0.4N to 5N)

## 4.0 PHYSICAL DIMENSIONS

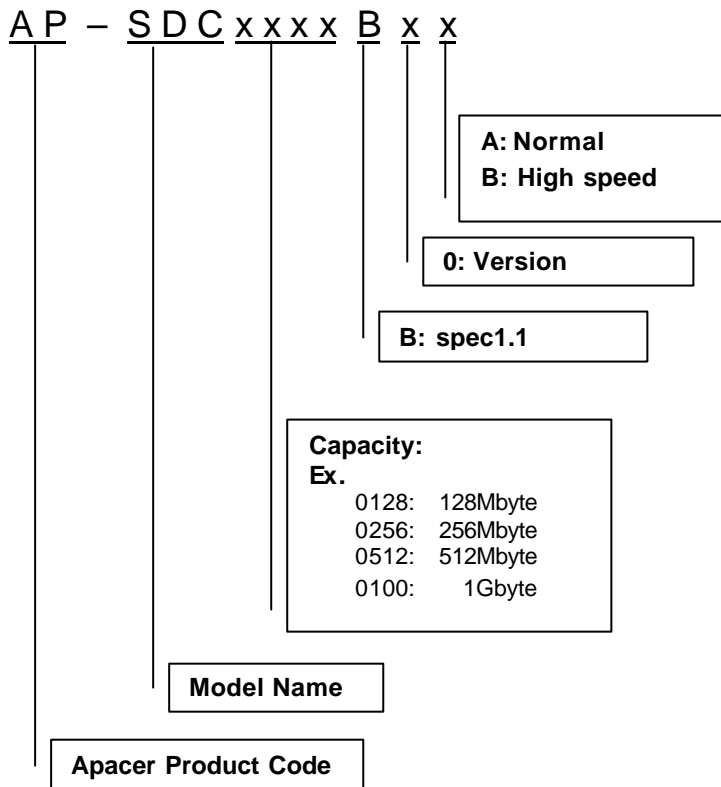
PHYSICAL MECHANICAL OUTLINE:

Dimensions Card Package	24mmx32mm Min. 23.9mmx31.9mm Max.24.1mmx32.1mm
Thickness	2.1mm +/- 0.1mm
Surface	Plain (except contact area)
Edges	Smooth edges





## 5.0 PRODUCT INFORMATION



### 5.1 Valid Combinations

Capacity	P/N (Normal)	P/N (High Speed)
64MB	AP-SDC0064B0A	
128MB	AP-SDC0128B0A	AP-SDC0128B0B
256MB	AP-SDC0256B0A	AP-SDC0256B0B
512MB	AP-SDC0512B0A	AP-SDC0512B0B
1GB	AP-SDC0100B0A	AP-SDC0100B0B
2GB	AP-SDC0200B0A	AP-SDC0200B0B

**Note:** Valid combinations are those products in mass production or will be in mass production. Consult your Apacer sales representative to confirm availability of valid combinations and to determine availability of new combinations.

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## REVISION HISTORY

Revision	Date	History	Remark
1.0	05/10/2005	Release	