

RoHS Compliant

Industrial Micro SD Card

Specifications

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Version 1.0



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FEATURES:

- **Fully compliant with SD Card Specifications 2.0**
- **Capacity range**
 - 1, 2 GB
- **Performance***
 - Sustained Read: Up to 19 MB/sec
 - Sustained Write: Up to 14 MB/sec
- **SD-protocol compatible**
- **Standard interface**
 - 8-pins SD interface
- **NAND Flash Type: SLC**
- **Operating voltage: 2.7V ~ 3.6V**
- **Physical dimension** : 15.0 mm(L) x 11.0 mm(W) x 1.0 mm(H)
- **Intelligent endurance design**
 - Built-in advanced ECC algorithm: 24bits/1KB
 - Wear-leveling algorithm
- **Temperature ranges**
 - Operating temperature: -40°C ~ +85°C
 - Storage temperature: -40°C ~ +85°C
- **Power consumption:**
 - Operating mode: 34 mA
 - Standby mode: 60 uA
- **Supports S.M.A.R.T.**
- **RoHS Compliant**

*Vary from capacities. Performance values presented here are typical and may vary depending on settings and platforms.

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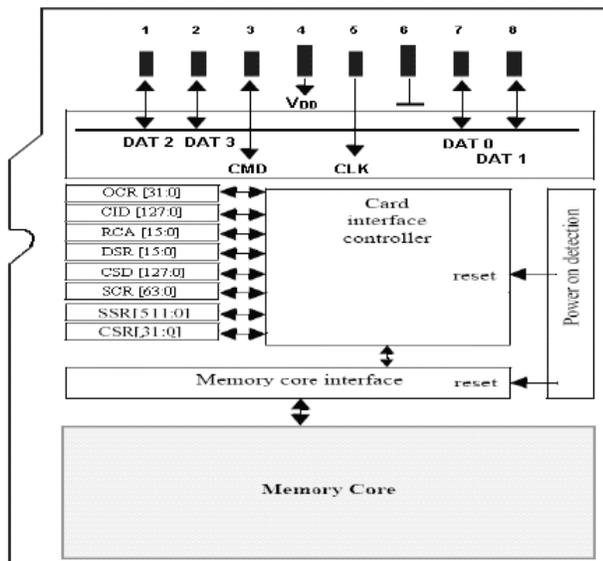
1. General Description

Micro SD card has been the favorable storage in both enterprise and consumer electronic devices for its compact size, relatively fast transfer speed and decent reliability. Apacer industrial micro SD card is capable of delivering optimal speed up to 19 MB/s. Reliability wise, the card can be put in operations with ambient temperatures ranging -40 to 85°C. Built with SLC NAND Flash, the card surpasses most of the typical of its kind in the market with regard in program/erase cycles.

The industrial SD card is compatible with SD Card 2.0 specification and delivers compatibility as well as reliability. The card is built in with hardware ECC engine that can detect and correct up to 24bits/1KB of transferring data. Moreover, this industrial card is designed with power smart mechanism that supports standby and sleep mode, making it an ideal portable storage when power supply is limited.

1.1 Product Function Block

The Micro SD contains a card controller and a memory core for the SD standard interface.



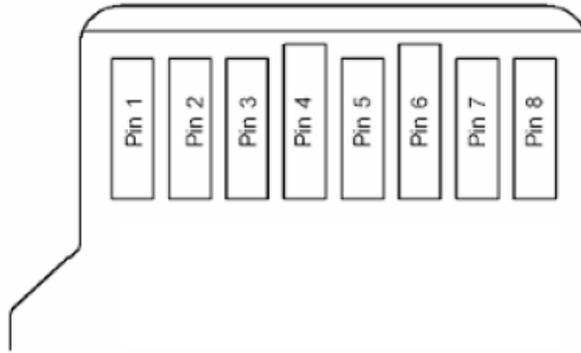
1.2 Functional description

The Micro SD device contains a high level, intelligent flash management that provides many capabilities including:

- Powerful ECC – correcting up to 24bits/1KB
- Wear-leveling

2. Product Characteristics

2.1 Card Architecture



2.2 Pin Assignment

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

2.3 Capacity Specification

Capacity	User Data Bytes	Usable Storage Space
1 GB	1,024,065,536	976 MB
2 GB	2,052,718,592	1.91 GB

Note: results may vary depending on settings and platforms. Please be noted that products are shipped with unformatted capacity. The number of user data bytes and usable storage space may vary from different host operating systems.

2.4 Performance

Performances of the SD card are shown in the table below.

Modes	Capacity	1 GB	2 GB
	Sequential Read (MB/s)	19	19
Sequential Write (MB/s)	11	14	

Note: results may vary depending on settings and platforms.

2.5 Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Unit
V _{DD}	Supply Voltage	2.7	3.6	V
T _{storage}	Storage Temperature	-40	85	°C
T _a	Ambient Operating Temperature	-40	85	°C

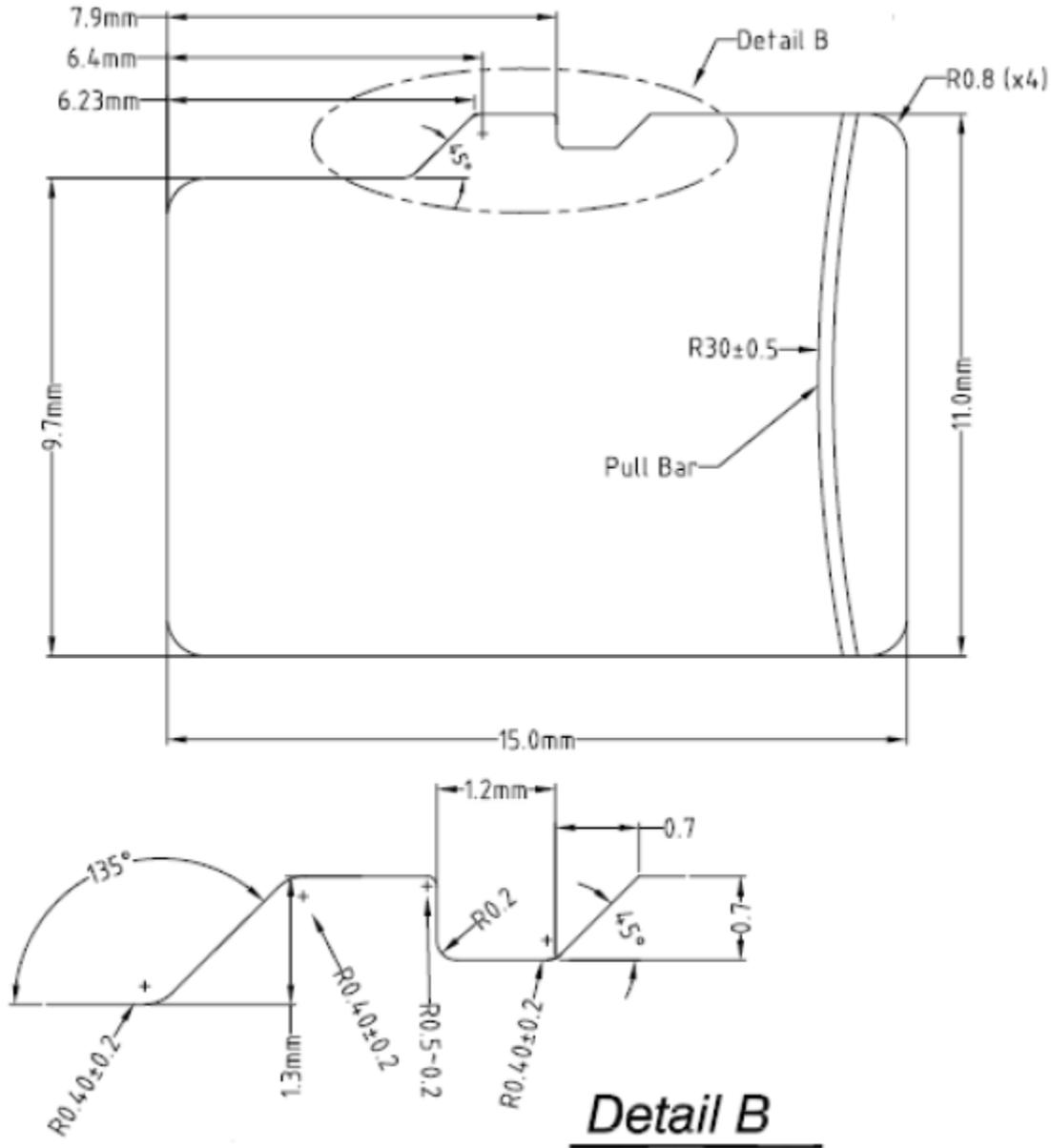
2.6 Power consumption (typical)

Read at 3.3V (mA)	Write at 3.3V (mA)	Stand By (uA)
34	33	60

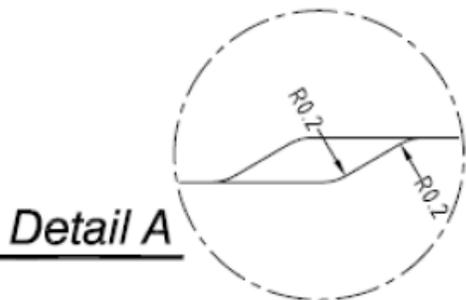
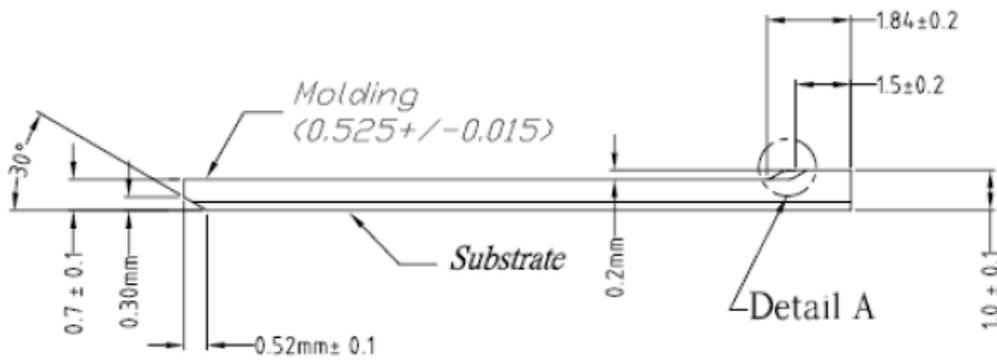
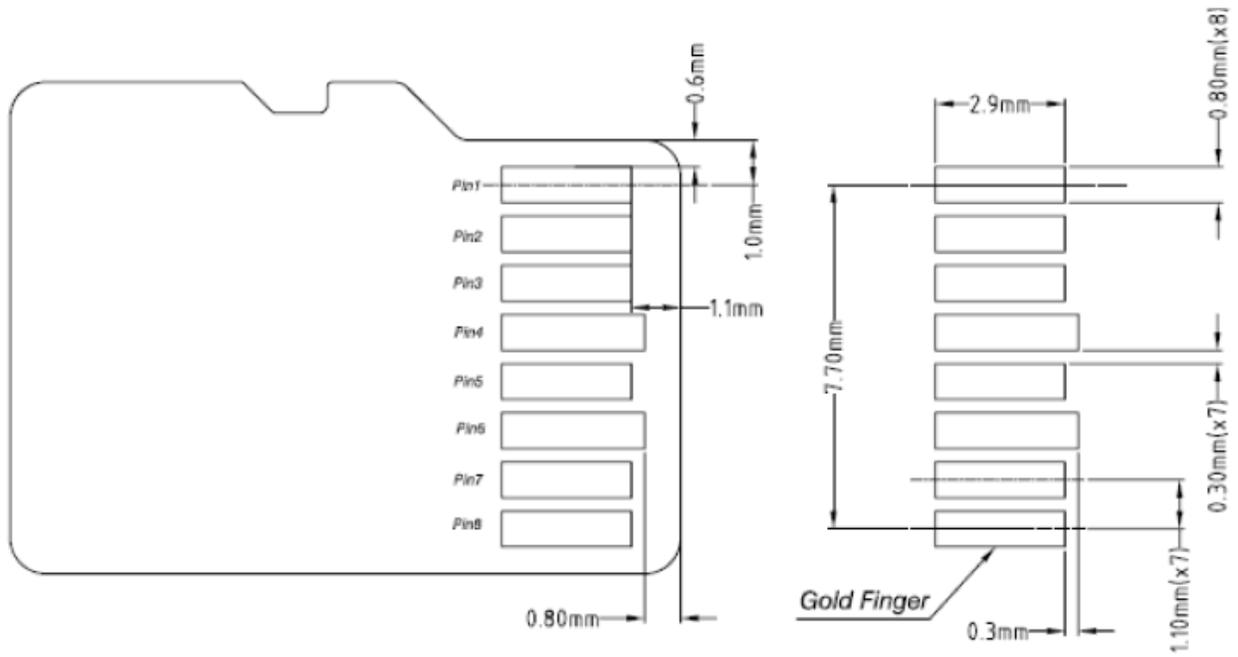
*Power consumption may differ from host system configurations.

3. Physical Characteristics

Top View

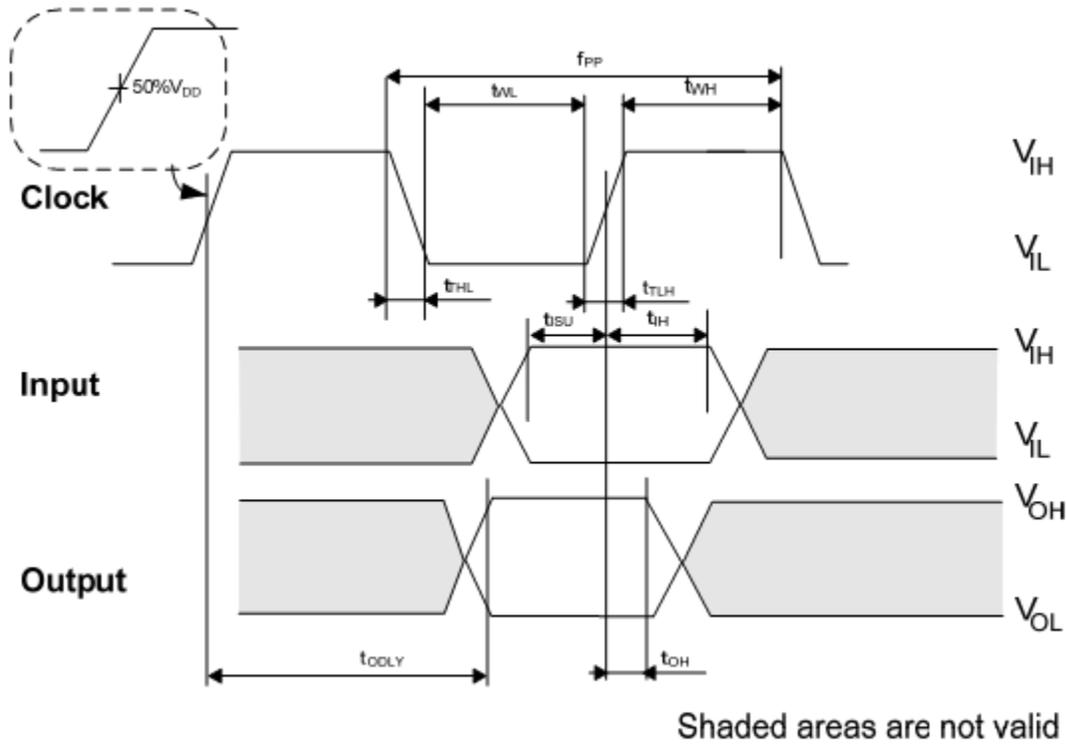


Bottom View



4. Electrical Characteristics

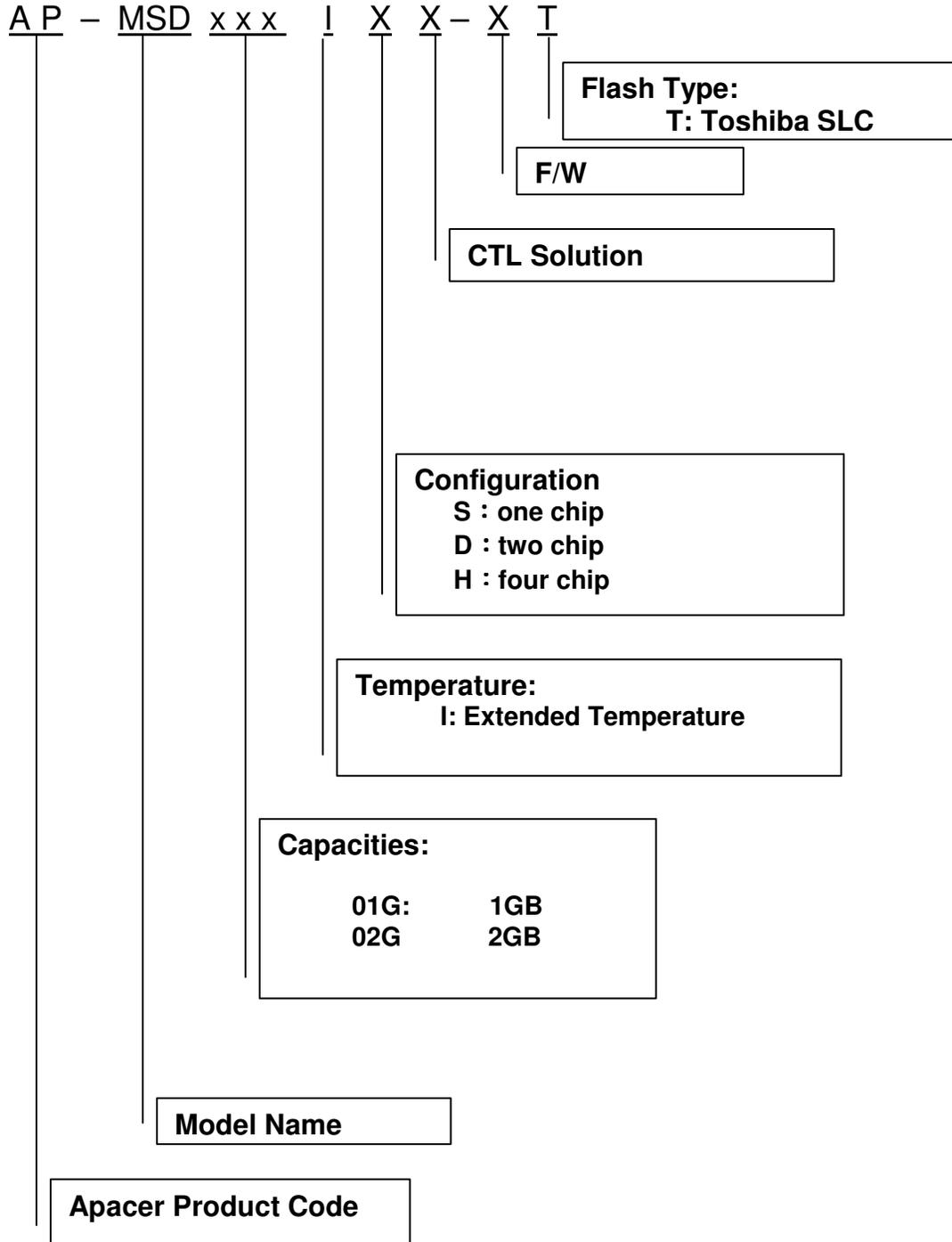
Bus Timing (High Speed Mode)



Parameter	Symbol	Min	Max	Unit	Remark
Input SDCK					
Clock frequency data transfer mode	f_{PP}	0	50	MHz	$C_{CARD} \leq 10\text{pF}$ (1 card)
Clock low time / Clock high time	t_{WL} / t_{WH}	7		ns	$C_{CARD} \leq 10\text{pF}$ (1 card)
Clock rise time / Clock fall time	t_{TLH} / t_{THL}		3	ns	$C_{CARD} \leq 10\text{pF}$ (1 card)
Input SDD/SDC, reference to SDCK					
Input set-up time	t_{ISU}	6		ns	$C_{CARD} \leq 10\text{pF}$ (1 card)
Input hold time	t_{IH}	2		ns	$C_{CARD} \leq 10\text{pF}$ (1 card)
Output SDD/SDC, reference to SDCK					
Output delay time during Data Transfer Mode	t_{ODLY}		14	ns	$C_L \leq 40\text{pF}$ (1 card)
Output hold time	t_{OH}	2.5		ns	$C_L \geq 15\text{pF}$ (1 card)
Total system capacitance for each time	C_L		40	pF	

5. Product Ordering Information

5.1 Product Code Designations



5.2 Valid Combinations

<i>Capacity</i>	<i>AP/N</i>
1GB	AP-MSD01GISI-T
2GB	AP-MSD02GIDI-T

Note:

- Valid combinations list out the available models for mass production.
- Products are normally shipped in unformatted capacities unless required otherwise.
- For customization request, please consult with Apacer sales representatives.

Revision History

Revision	Description	Date
0.1	Preliminary	06/06/2012
1.0	Official release	06/12/2012

Global Presence

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Industrial Micro SD Card
AP-MSDxxxIXX-XT



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