

RoHS Compliant

## microSD Card 6.1

Professional PRA233/PRA212 Product Specifications

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Version 1.1

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## Specifications Overview:

- **Capacity**
  - 32, 64 GB
- **Performance<sup>1</sup>**
  - Sequential read: Up to 100 MB/sec
  - Sequential write: Up to 45 MB/sec
- **Flash Management**
  - Built-in advanced ECC algorithm
  - Global Wear Leveling
  - Flash Bad-Block Management
- **NAND Flash Type**
  - 3D TLC
- **Temperature Range**
  - Operating: -25°C to 85°C
  - Storage: -40°C to 85°C
- **Operating Voltage: 2.7V ~ 3.6V**
- **Physical Dimensions**
  - (L)15 x (W)11 x (H)1mm
- **Product Compatibility**
  - Supports SD System Specification Version 6.1
  - Supports SD and SPI modes
  - Supported form factor: microSDHC/SDXC
  - Supported speed class: U3, V30, A2
- **Bus Speed Mode:** Supports Class 10 with UHS-I U1<sup>2</sup>
  - DS: Default Speed up to 25MHz 3.3V signaling
  - HS: High Speed up to 50MHz 3.3V signaling
  - SDR12: SDR up to 25MHz 1.8V signaling
  - SDR25: SDR up to 50MHz 1.8V signaling
  - SDR50: SDR up to 100MHz 1.8V signaling
  - SDR104: SDR up to 208MHz 1.8V signaling
  - DDR50: DDR up to 50MHz 1.8V signaling
- **RoHS Compliant**

Notes:

1. Varies from capacities. The values for performances may vary depending on flash configurations or platform settings.
2. Minimum transfer speed over 10MB/s, ideal for 3D and Full HD videos. Timing in 1.8V signaling is different from that of 3.3V signaling. Operation mode selection command is compliant with SD 3.0, referring to SDA's Part 1, Physical Layer Specification, Ver 3.01 (Section 3.9)

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## 1. General Description

Apacer's PRA233/PRA212 microSD cards represent the next generation of mobile memory solutions. Compliant with SD System Specification version 6.1 and the latest UHS-I (Ultra High Speed – I) standard, these cards offer faster data transfer speeds and larger storage capacities, making them ideal for smartphones, tablets, and other devices with microSD slots. Their enhanced performance is particularly beneficial for handling high-definition multimedia files and apps where speed and capacity are critical.

Designed to meet the demands of powerful applications, high-resolution images, and UltraHD videos, the UHS-I standard is the latest advancement from the SD Association. In addition to delivering a significant speed boost, Apacer's PRA233/PRA212 cards are available in a variety of capacities, ensuring ample storage for valuable photos, videos, and essential apps.

## 2. Electrical Characteristics

### 2.1 Card Architecture

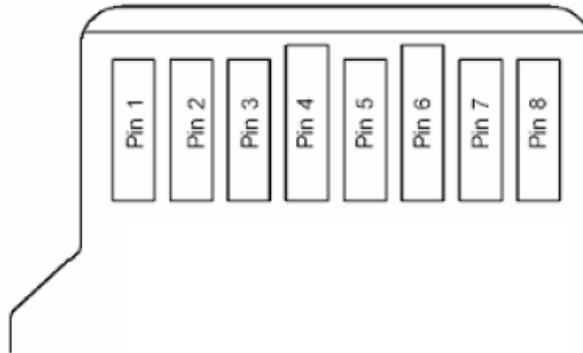


Figure 2-1 microSD Card Pin Assignment

### 2.2 Pin Assignment

Table 2-1 microSD Card Pin Assignment

Pin No.	SD Mode			SPI Mode		
	Name	Type	Description	Name	Type	Description
1	DAT2	I/O/PP	Data Line [bit 2]	RSV		Reserved
2	CD/DAT3 <sup>2</sup>	I/O/PP	Card Detect/ Data Line [bit 3]	CS	I	Chip Select
3	CMD	PP	Command/Response	DI	I	Data In
4	VDD	S	Supply voltage	VDD	S	Supply voltage
5	CLK	I	Clock	SCLK	I	Clock
6	VSS	S	Supply voltage ground	VSS	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		Reserved

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

### 3. Product Specifications

Table 3-1 Product Specifications

Item	Specifications				
Interface	microSD Specification Version 6.1				
Interface Speed	<ul style="list-style-type: none"> <li>■ UHS-I U3 (Indicates Speed Class 3 on UHS-I Interface)</li> <li>■ V30 (Indicates minimum write speed of 30MB/s)</li> <li>■ A2 (Indicates the Application Performance Class 2)</li> <li>■ Class 10 (Indicates SD Speed Class when used with a device that does not support UHS Interface)</li> </ul>				
Capacity <sup>1</sup>	32, 64 GB				
Performance <sup>2</sup>		32 GB	64 GB		
	Sequential Read (MB/s)	100	95		
	Sequential Write (MB/s)	30	45		
Form Factor	microSDHC/SDXC				
Operating Voltage	2.7V to 3.6V				
Dimensions	(L)15 x (W)11 x (H)1mm				
Temperature	Operating	-25°C to 85°C			
	Storage	-40°C to 85°C			
Humidity	Operating	RH=93% under 25°C non-condensing			
	Storage	RH=93% under 40°C non-condensing			
Durability	Minimum 10,000 insertion/removal cycles				
Warranty	3-year limited warranty				
Certifications	RoHS, CE, FCC, VCCI, RCM				

Notes:

1. Unformatted. Theoretically, 1GB=1,000,000,000 Bytes. Under operating systems, the capacity might appear to be less than the theoretical capacity because the calculation in OS is based on 1 GB = 1024 MB / 1MB =1024KB and a minority of the capacity is reserved for maintenance purposes.
2. Performance results may vary from flash configurations or host system settings.

## 4. Flash Management

### 4.1 Error Correction/Detection

Flash memory cells will deteriorate with use, which might generate random bit errors in the stored data. Thus, the microSD card applies the BCH ECC Algorithm, which can detect and correct errors occurring during the read process, ensure data has been read correctly, as well as protect data from corruption.

### 4.2 Global Wear Leveling

NAND Flash devices can only undergo a limited number of program/erase cycles, and in most cases, the flash media are not used evenly. If some area get updated more frequently than others, the lifetime of the device would be reduced significantly. Thus, Global Wear Leveling technique is applied to extend the lifespan of NAND Flash by evenly distributing writes and erase cycles across the media.

Apacer provides Global Wear Leveling algorithm, which can efficiently spread out the flash usage through the whole flash media area. Moreover, by implementing Global Wear Leveling algorithm, the life expectancy of the NAND Flash is greatly improved.

### 4.3 Bad Block Management

Bad blocks are blocks that include one or more invalid bits, and their reliability is not guaranteed. Blocks that are identified and marked as bad by the manufacturer are referred to as “Initial Bad Blocks”. Bad blocks that are developed during the lifespan of the flash are named “Later Bad Blocks”. Apacer implements an efficient bad block management algorithm to detect the factory-produced bad blocks and manages any bad blocks that appear with use. This practice further prevents data being stored into bad blocks and improves the data reliability.

## 5. Physical Characteristics

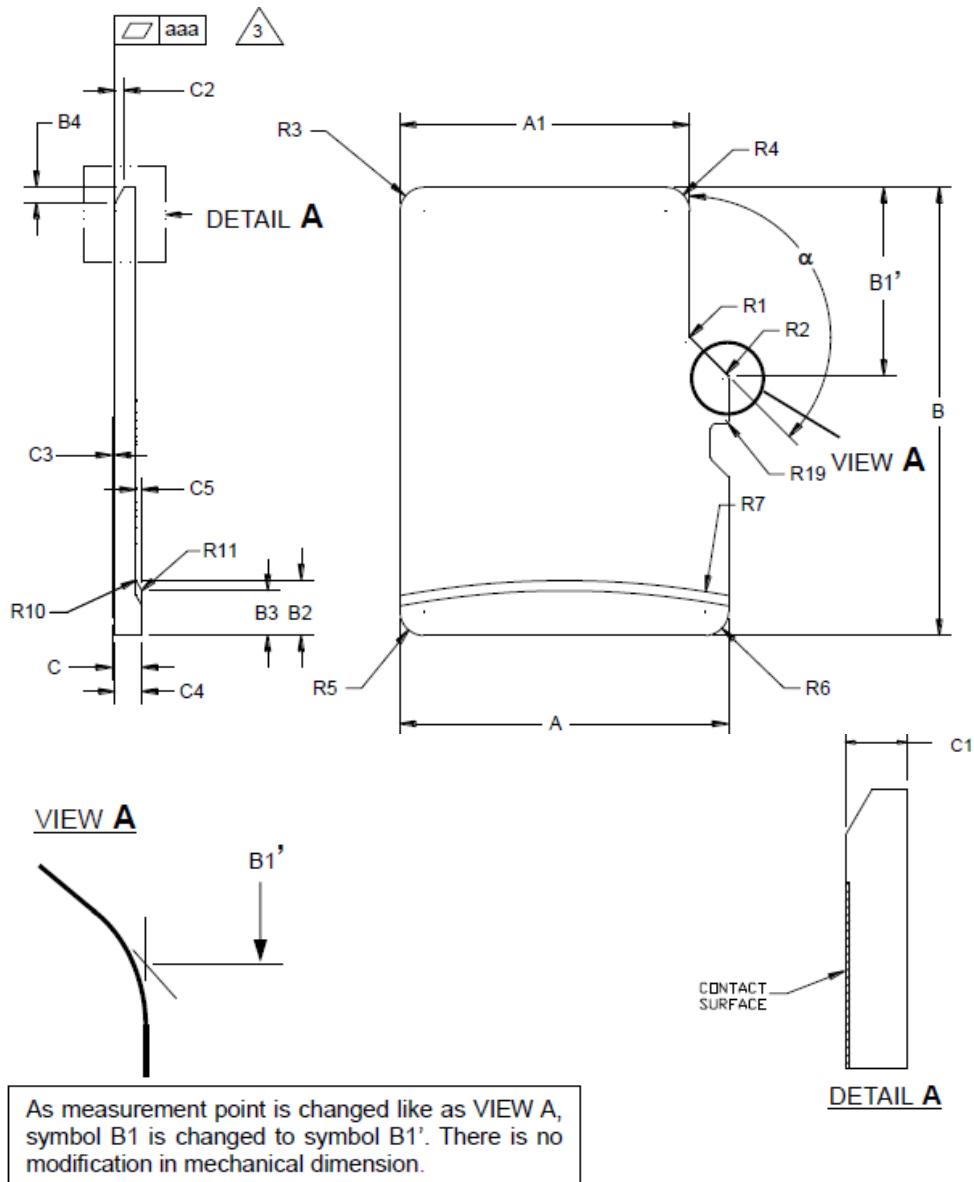


Figure 5-1 Bottom View

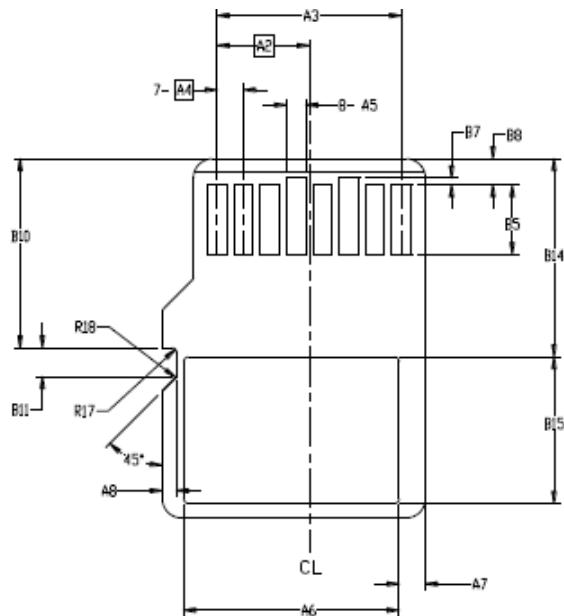


Figure 5-2 Type A Top View

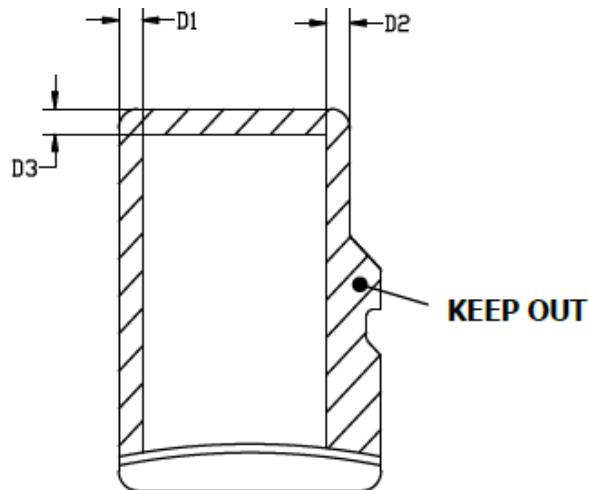


Figure 5-3 Keep-out Area

SYMBOL	COMMON DIMENSION			NOTE
	MIN	NOM	MAX	
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	-	-	
A10	1.35	1.40	1.45	
A11	6.50	6.60	6.70	
A12	0.50	0.55	0.60	
A13	0.40	0.45	0.50	
A14	0.05	-	-	
A15	5.71	5.81	5.91	
A16	6.47	6.57	6.67	
A17	6.62	6.72	6.82	
A18	7.38	7.48	7.58	
A19	7.75	7.85	7.95	
A20	8.55	8.65	8.75	
A21	0.90	-	-	
A22	-	-	8.50	
B	14.90	15.00	15.10	
B1'	6.13	6.23	6.33	
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	
B12	3.60	3.70	3.80	
B13	2.80	2.90	3.00	
B14	8.20	-	-	
B15	-	-	6.20	
B16	5.80	5.90	6.00	
B17	0.20	0.30	0.40	
B18	7.80	8.80	8.90	
B19	8.70	8.80	8.90	
B20	-	3.20	-	
B21	1.90	2.00	2.10	
B22	9.00	-	-	
B23	0.10	-	-	
			REF	

Notes:

1. DIMENSIONING and TOLERANCING per ASME Y14.5M-1994.
2. Dimensions are in millimeters.
3. COPLANARITY is additive to C1 MAX thickness.
4. All edges shall not be sharp as tested per UL1439 "Test for Sharpness of Edges on Equipment."
5. Refer to Appendix E about test method of warpage.
6. As measurement point is changed, symbol B1 is changed to symbol B1'.
7. C4 and C5 are added from Version 4.00.

C	-	1.00	1.10	
C1	0.60	0.70	0.80	
C2	0.20	0.30	0.40	
C3	0.00	-	0.15	
C4	0.80	-	1.10	
C5	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	
R3	0.70	0.80	0.90	
R4	0.70	0.80	0.90	
R5	0.60	0.80	0.90	
R6	0.60	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	
R20	▲	-	0.15	
α	133°	135°	137°	
aaa	-	-	0.10	

Figure 5-4 microSD Package Dimensions

## 6. Product Ordering Information

The following table lists the available models of the Apacer PRA233/PRA212 series which are 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.

Model Name	Capacity	Part Number
PRA233	32GB	AP32GPJM1B12-BA134
PRA212	64GB	AP64GPJM1A08-BA134

## Revision History

Revision	Description	Date
1.0	Initial release	12/6/2024
1.1	- Added model name to the document - Added 32GB support	1/2/2025

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