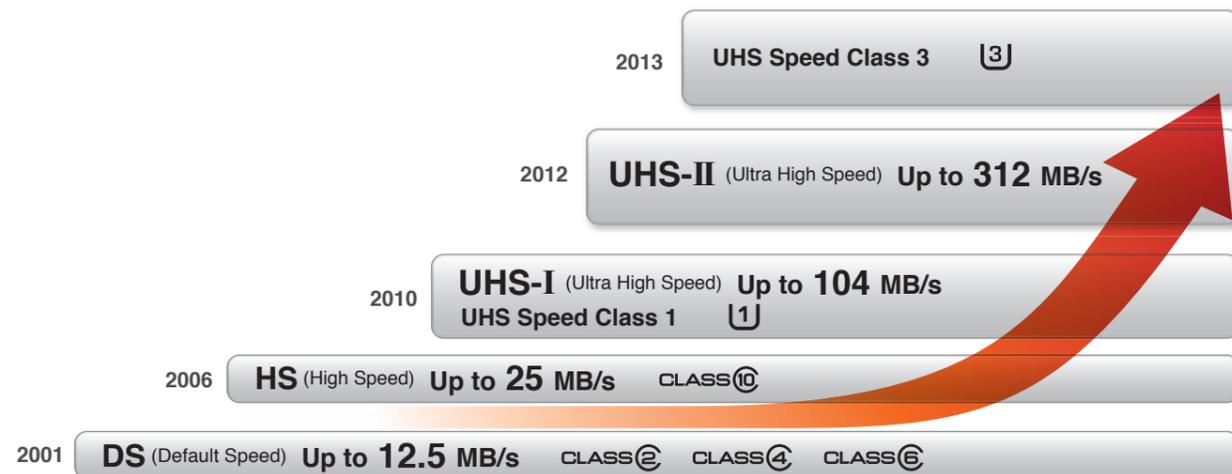




### Speed Specification of SD Memory Cards (Years indicate the year that the standard was established.)



Bus Interface Standard	Conventional	UHS-I			UHS-II	
		Mode	DDR50	SDR50	SDR104	FD156
Mode	HS					
Signal Amplitude	3.3 V	1.8 V			0.4 V	
Clock Frequency	50 MHz	50 MHz	100 MHz	208 MHz	52 MHz	
Logic Performance (Bus Speed)	25 MB/s	50 MB/s	50 MB/s	104 MB/s	156 MB/s	312 MB/s

### Product Precautions

- SDHC memory cards can be used with SDHC and SDXC host products. SDHC memory cards cannot be used with products that are solely compliant with SD memory cards.
- SDXC memory cards can be used only with SDXC host products. SDXC memory cards cannot be used with SD and SDHC host products. Check if the device has an SDXC logo, or refer to the device's instruction manual or other manufacturer's information
- \* Please note that using an SDXC Memory Card in a non-compatible computer or device may cause card compatibility problems or loss of data.
- The SD Memory Card is intended for ordinary use in for home or professional devices and embedded systems. Consult with Panasonic in advance about uses for applications that require a high degree of reliability (uses that may have a serious impact on human lives, such as in nuclear power or social infrastructure applications.)

Storage Business Division,  
AVC Networks Company, Panasonic Corporation

1-15, Matsuo-cho, Kadoma, Osaka, 571-8504, Japan

[http://panasonic.net/avc/sdcard/industrial\\_sd/](http://panasonic.net/avc/sdcard/industrial_sd/)

- The product colours shown in this printed material may vary from the actual colours.
- Specifications and designs are subject to change without notice.
- SDXC, SDHC, SD, and microSDHC Logos are trademarks of SD-3D, LLC.
- As of April 1st, 2014.



Panasonic provides specialised B-to-B support

## Industrial Grade SD Memory Card

Flexible Customisation

Global Support System

Made in Japan

Industrial SD Card

## Pursuit of High Reliability

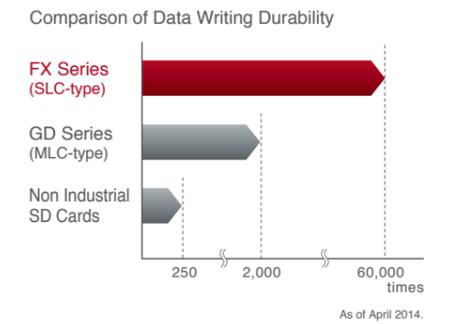
Panasonic provides Industrial SD Cards with customisation and technical support to meet specific customer needs. Reliable performance supports your business activities.

As equipment and devices become increasingly advanced in performance and functions, SD Memory Cards require larger capacity and higher speed performance. Since the release of its first SD Card in 2000, Panasonic has been a leader in its development. Today's Industrial SD Cards have achieved new levels of performance and reliability. We also offer customisation services to meet specific user needs, and a technical support system including failure analysis, thus delivering flexible SD card solutions to all.



### Using Industrial Grade NAND Flash Memory

We use high-quality industrial grade SLC- / MLC-type NAND flash memory. Compared to consumer grade TLC-type SD cards, the SLC-type cards boast approximately 240 times higher data writing durability, and MLC-type cards offer approximately 8 times higher durability. This enables reliable operation for an extended lifetime of SD cards.



### High Durability and Safety

Industrial SD Cards provide excellent durability under harsh environmental conditions in industrial applications. By using components with greater resistance to industrial temperatures, we have achieved operating capability from -40 to 85°C. Panasonic Industrial SD Cards also feature twice the physical strength of the SD Standard. A built-in fuse prevents the card from producing smoke or igniting in the event of an overcurrent or overheating.

Strength Test



### Flexible Customisation and Technical Support

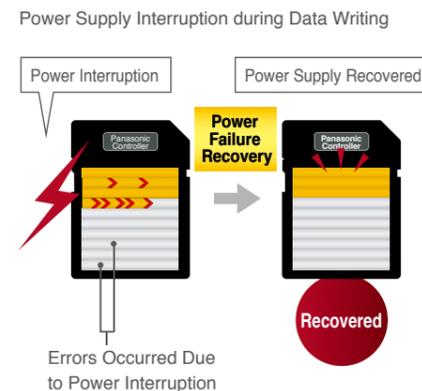
A Custom Quality Assurance System allows us to apply customised controller firmware and detailed traceability based on a unique serial number and control number for each card. As a result, we respond to individual customer cases and offer customisation to meet specific needs. If an error should occur during use, our technical support system is able to investigate and analyse the cause.



### Originally Designed High-performance Controller

An originally designed high-performance controller safely records data. Even if a power interruption should occur during data writing, a "Power Failure Recovery" minimises data damage. In addition, a "Double Bit Error Correction" improves data retention, and a "Static Wear Levelling" maximises lifetime of SD card.

See page 7 for more details ▶



### Panasonic Durability!

- Temperature Resistance
- Magnetic Resistance
- Durability against Insertion / Removal
- Electrostatic Resistance
- X-Ray Resistance
- Built-in Fuse
- Impact Resistance (bending / twisting)
- Water Resistance \* microSD only.

### Made in Japan

Panasonic Industrial SD Cards are manufactured in Japan, from design to actual production. A quality block assurance system performs automatic inspections in each manufacturing process, and a screening test conducts read/write tests for all memory areas in every product prior to shipment. This ensures that customers all over the world will receive SD cards with high quality. In addition, interoperability with a wide range of SD application products, of both Panasonic and other brands, is thoroughly verified at Panasonic System Verification Center.



# Panasonic SD Card Offers the High Reliability Demanded for Industrial Use

- SLC** Featuring SLC (Single Level Cell) NAND flash memory with superior data retention and reliability
- MLC** Featuring MLC (Multi Level Cell) NAND flash memory suitable for large-volume data recording with high reliability

**SLC** **FX Series** **High grade series with superb rewriting durability suitable for long-term data storage** **Made in Japan**

CLASS 6 UHS-I Compliant UHS Speed Class 1 CLASS 10

**Specifications**

Model	RP-SDFC51	RP-SDF02G	RP-SDF04G	RP-SDF08G	RP-SDF16G
Capacity*1	512 MB	2 GB	4 GB	8 GB	16 GB
Flash Memory Type	Single-Level Cell (SLC) NAND Flash Memory				
SD Physical Specification	Ver. 3.01 (No UHS-I Compliant)		Ver. 3.01 (UHS-I Compliant)		
Speed Class	Speed Class 6		Speed Class 10, UHS Speed Class 1		
Operating Temperature	-40 to +85 °C				
Controller	Designed by Panasonic				
Functions	Double Power Failure Recovery, Error Correction Code, Refresh Function, Static Wear Levelling, Intelligent Data Writing				
Write / Read Tests for All Memory Areas	Completed				
Size (H x W x D)	32.0 x 24.0 x 2.1 mm				

\*1: SD Card utilises a portion of the memory for copy protection and other purposes. Therefore the usable capacity will be less.

**MLC** **JD Series** **Industry's first\*1 bit-error-free SD card\*2 with RAID technology** **Made in Japan**

**RAID Technology**

UHS-II Compliant UHS Speed Class 1 CLASS 10

**Specifications**

Model	RP-SDJD32	RP-SDJD64
Capacity*3	32 GB	64 GB
Flash Memory Type	Multi-Level Cell (MLC) NAND Flash Memory	
SD Physical Specification	Ver. 4.10 (UHS-II Compliant)	
Speed Class	UHS Speed Class 1	Speed Class 10, UHS Speed Class 1
Operating Temperature	-40 to +85 °C	
Controller	Designed by Panasonic	
Functions	RAID Technology, Power Failure Recovery, Error Correction Code, Refresh Function, Static Wear Levelling, Intelligent Data Writing	
Write / Read Tests for All Memory Areas	Completed	
Size (H x W x D)	32.0 x 24.0 x 2.1 mm	

\*1 For Industrial SD Cards. As of April 1st, 2014.

\*2 All bit error correction cannot be guaranteed.

\*3 SD Card utilises a portion of the memory for copy protection and other purposes. Therefore the usable capacity will be less.

**MLC** **GD Series** **Ideal for recording large-volume image data** **Made in Japan**

UHS-I Compliant UHS Speed Class 1 CLASS 10

**Specifications**

Model	RP-SDGD04	RP-SDGD08	RP-SDGD16	RP-SDGD32	RP-SDGD64
Capacity*1	4 GB	8 GB	16 GB	32 GB	64 GB
Flash Memory Type	Multi-Level Cell (MLC) NAND Flash Memory				
SD Physical Specification	Ver. 3.01 (UHS-I Compliant)				
Speed Class	Speed Class 10, UHS Speed Class 1				
Operating Temperature	-40 to +85 °C				
Controller	Designed by Panasonic				
Functions	Power Failure Recovery, Error Correction Code, Refresh Function, Static Wear Levelling, Intelligent Data Writing				
Write / Read Tests for All Memory Areas	Completed				
Size (H x W x D)	32.0 x 24.0 x 2.1 mm				

\*1: SD Card utilises a portion of the memory for copy protection and other purposes. Therefore the usable capacity will be less.

**MLC** **P Series** **Basic series suitable for various industrial equipment** **Made in Japan**

CLASS 4

**Specifications**

Model	RP-SDPC04	RP-SDPC08	RP-SDPC16
Capacity*1	4 GB	8 GB	16 GB
Flash Memory Type	Multi-Level Cell (MLC) NAND Flash Memory		
SD Physical Specification	Ver. 3.01 (No UHS-I Compliant)		
Speed Class	Speed Class 4		
Operating Temperature	-40 to +85 °C		
Controller	Designed by Panasonic		
Functions	Power Failure Recovery*2, Error Correction Code, Refresh Function, Static Wear Levelling, Intelligent Data Writing		
Write / Read Tests for All Memory Areas	Completed		
Size (H x W x D)	32.0 x 24.0 x 2.1 mm		

\*1: SD Card utilises a portion of the memory for copy protection and other purposes. Therefore the usable capacity will be less.

\*2: Customisable.

**MLC** **KC Series** **microSD series with power failure recovery suitable for embedded use** **Made in Japan**

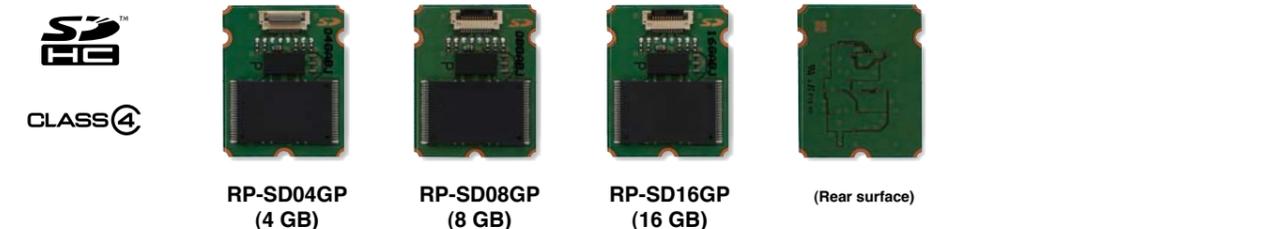
UHS-I Compliant CLASS 6

**Specifications**

Model	RP-SMKC04	RP-SMKC08	RP-SMKC16
Capacity*1	4 GB	8 GB	16 GB
Flash Memory Type	Multi-Level Cell (MLC) NAND Flash Memory		
SD Physical Specification	Ver. 3.01 (UHS-I Compliant)		
Speed Class	Speed Class 2 (No UHS Speed Class Compliant)		
Operating Temperature	-40 to +85 °C		
Controller	Designed by Panasonic		
Functions	Double Power Failure Recovery, Error Correction Code, Refresh Function, Static Wear Levelling, Intelligent Data Writing		
Write / Read Tests for All Memory Areas	Completed		
Size (H x W x D)	15.0 x 11.0 x 1.1 mm		

\*1: SD Card utilises a portion of the memory for copy protection and other purposes. Therefore the usable capacity will be less.

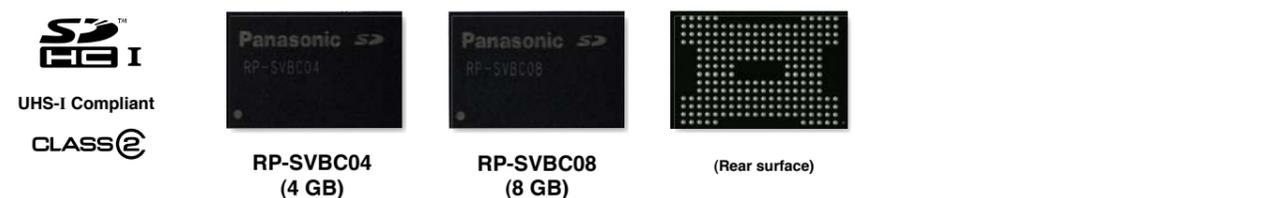
**MLC eSD (Flexible Connection Type)** Flexible connection type suitable as replacements for internal NAND flash memory **Made in Japan**



Model		RP-SD04GP	RP-SD08GP	RP-SD16GP
Capacity*1		4 GB	8 GB	16 GB
Flash Memory	Type	Multi-Level Cell (MLC) NAND Flash Memory		
SD Physical Specification		Ver. 3.01 (No UHS-I Compliant)		
Speed Class		Speed Class 4		
Operating Temperature		-40 to +85 °C		
Controller		Designed by Panasonic		
Functions		Power Failure Recovery, Error Correction Code, Refresh Function, Static Wear Levelling, Intelligent Data Writing		
Write / Read Tests for All Memory Areas		Completed		
Size (H x W x D)		30.0 x 24.0 x 2.0 mm (MAX)		

\*1: eSD Memory utilises a portion of the memory for copy protection and other purposes. Therefore the usable capacity will be less.

**MLC eSD (Semiconductor Mounting Type)** Semiconductor mounting type suitable as replacements for internal NAND flash memory **Made in Japan**



Model		RP-SVBC04	RP-SVBC08
Capacity*1		4 GB	8 GB
Flash Memory	Type	Multi-Level Cell (MLC) NAND Flash Memory	
SD Physical Specification		Ver. 3.01 (UHS-I Compliant)	
Speed Class		Speed Class 2 (No UHS Speed Class Compliant)	
Operating Temperature		-40 to +85 °C	
Controller		Designed by Panasonic	
Functions		Double Power Failure Recovery, Error Correction Code, Refresh Function, Static Wear Levelling, Intelligent Data Writing	
Write / Read Tests for All Memory Areas		Completed	
Size (H x W x D)		12.0 x 18.0 x 1.4 mm (MAX)	

\*1: eSD Memory utilises a portion of the memory for copy protection and other purposes. Therefore the usable capacity will be less.

Environmental Specifications (Common to all models)				
Temperature	(Operating)	-40 to +85 °C	Vibration	15 Gp-p
	(Non-operating)	-40 to +85 °C (1,000 h)	Shock	1,000 G
Humidity	5 to 95 % (No condensation)		RoHS Directive Compatibility	

- Panasonic industrial SD card has a unique Panasonic function that reports data such as bad blocks and writing cycles.
- A special B to B support system also allows Panasonic to offer consultation concerning customisation upon customer request.

## Superior Panasonic Controller Technology

### Power Failure Recovery

● **Protects the system and data\* in the card from sudden power interruption**  
 Unique Panasonic Algorithms "Power Failure Recovery" automatically restores the system in the SD card when a sudden power interruption occurs during data writing, and prevents troubles such as card recognition error. In case with "Double Power Failure Recovery", it also protects not only the system but also the data written in SD card to minimize data damage.

\*"Double Power Failure Recovery" model only

### Powerful Double Bit Error Correction

● **Withstanding Repeated Reading Operations**  
 Automatically refreshes the bit errors that accumulate over time, before they exceed the threshold. (Accumulated bit errors are detected from read data.)

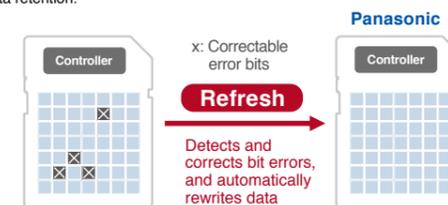
\* This function does not guarantee permanent data retention.

#### (1) Error Correction Code (ECC)

High error correction performance provides long-term data retention.

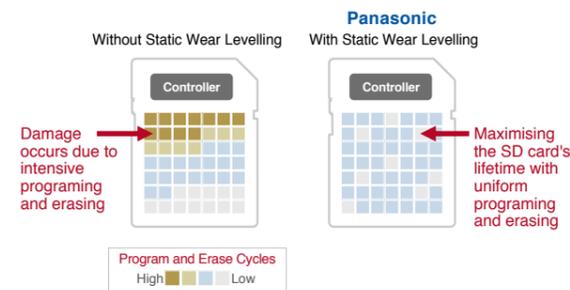
#### (2) Auto Refresh

Automatically detects and corrects bit errors to offer dramatically improved data retention.



### Static Wear Levelling

● **Maximising SD Card Life**  
 Static Wear Levelling controls written data, including fixed data. Various use cases eliminate intensive data writing and maximise the lifetime of the SD card.



### Power Supply / Voltage Detection

● **Prevents erratic operation and erroneous data writing**  
 Even when used with a power supply with unstable voltage, the Power Supply / Voltage Detection Circuit instantaneously detects a voltage drop below the operation guarantee line during data writing. It pauses the operation before an error occurs, preventing erratic operation and erroneous data writing.

## Safe, Stable and Durable Performance Even Under Harsh Operating Conditions

<b>Temperature Resistance</b> Operation is assured even under harsh temperature conditions.	<b>Electrostatic Resistance</b> IEC 61000-4-2 compliance: Clears Electrostatic Discharge Immunity Tests of 150-pF energy storage capacitance, 15-kV aerial discharge, and 330-Ω discharge resistance.	<b>Impact Resistance</b> Bending load resistance: 20 N (Newton) min. (SD standard: 10 N) Twisting torque resistance*: 0.3 N-m (Newton meter) min. (SD standard: 0.15 N-m) * For a full size SD card only.	<b>Magnetic Resistance</b> Operable after being set onto a 1,000-gauss DC magnetic field for approx. 1 minute.
<b>X-Ray Resistance</b> ISO 7816-1 compliance: Operable after 0.1 Gy (gray) of X-ray irradiation.	<b>Water Resistance</b> JIS IPX7 compliance: Operable after submerging the product in water (tap water, 1-m depth) for 30 minutes. * microSD only.	<b>Durability against insertion / Removal</b> Tested for 10,000 cycles of card insertion/removal using a card reader.	<b>Built-in Fuse</b> The internal card fuse protects against excess current and abnormal heating.

### Applications by Model

	Data Protection*					Card Endurance							
	Power Failure Recovery	Double Bit Error Correction	Static Wear Levelling	Power Supply / Voltage Detection	Intelligent Data Writing	Temperature Resistance	Electrostatic Resistance	Impact Resistance	Magnetic Resistance	X-Ray Resistance	Water Resistance	Durability against Insertion / Removal	Fuse
FX Series	● Double	●	●	●	●	-40°C to +85°C	●	●	●	●	—	●	●
JD Series	●	●	●	●	●		●	●	●	●	—	●	●
GD Series	●	●	●	●	●		●	●	●	●	—	●	●
P Series	●*	●	●	●	●		●	●	●	●	—	●	●
microSD/ KC Series	● Double	●	●	●	●		●	●	●	●	●	●	●
eSD (Flexible connection)	●	●	●	●	●		●	●	●	●	—	—	—
eSD (Semiconductor mounting)	● Double	●	●	●	●		●	●	●	●	—	—	—

\*Based on Panasonic test results. Protection may not be possible in certain usage environments. The data stored inside a card cannot be guaranteed.  
 \*Customisable.