Panasonic

IC Memory Cards
## Catalog '98/99

PDF File Technical Handbook

NOTICE TO READERS

It is the responsibility of each user to ensure that each battery application system is adequately designed safe and compatible with all conditions encountered during use, and in conformance with existing standards and requirements. Any circuits contained herein are illustrative only and each user must ensure that each circuit is safe and otherwise completely appropriate for the desired application.

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Matsushita Battery Industrial Co., Ltd.

August 1998

FEATURES OF PANASONIC PC CARDS:

PC CARDS

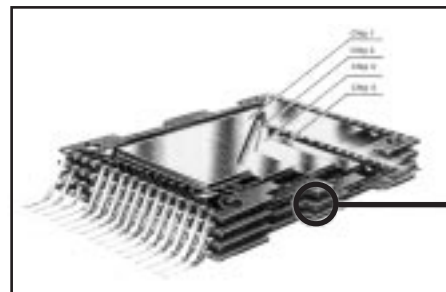### Ready for the Mass Storage demands of the next generation of products!
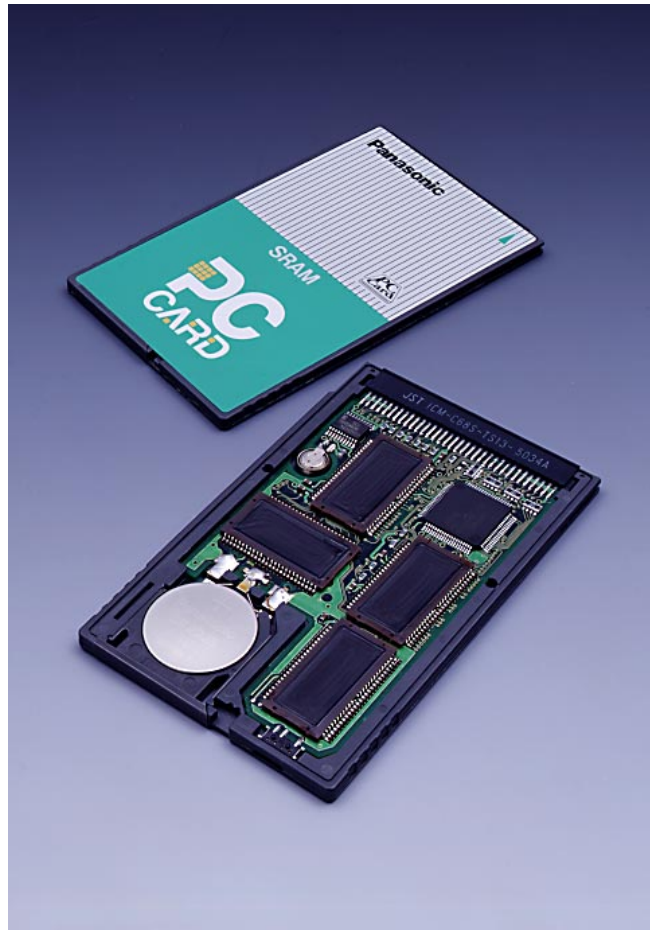
The use of MB (Multi-Layer Bonding) technology means that the memory size of the PC card can be expanded. (MB technology permits a mounting density 4 times that of conventional SOP mounting and twice that of TSOP mounting)

*SOP = Small Outline Package TSOP = Thin Small Outline Package
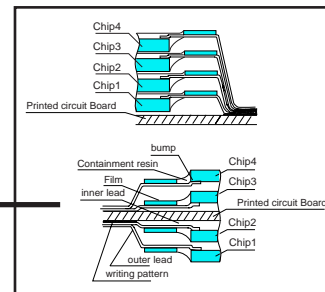
MB technology

This system achieves more than double the mounting density of conventional methods by using the TAB system to bond the memory chips to the film carrier and then stacking them on the printed Circuit board.

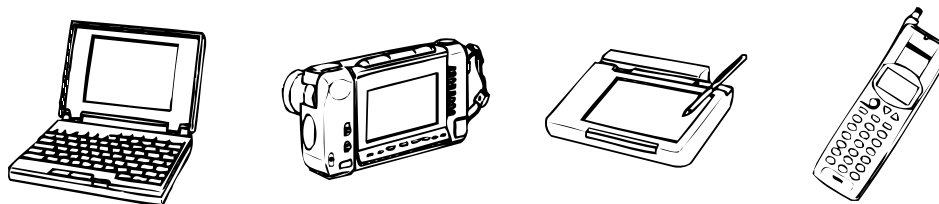MB technology: structure of a stack of chips (1) structure of a stack of chips (2)

SMALL GENERAL-PURPOSE MEMORY CARDS

Applications

- **Notebook PCs**
- **Palmtop PCs**
- **Handy terminals**
- **PDAs**
- **Digital still cameras**
- **Cellular Phones**

SmallPC card

Features

1. Recognized as a small sized card standard by JEIDA and PCMCIA.
2. Electrically compatible with full size PC cards. (68 pin)
3. Operates with either a 16 bit PC card interface (Memory interface, I/O Interface) or customized interface (ZV port).

4. Over 50% smaller than standard full size PC card, (SPC type I dimension : 45.0x42.8x3.3,SPC type II dimension : 45.0x42.8x5.0)
5. Grounding clips are equipped for noise reduction and EMI protection.
6. Can be used in a standard PC card slot when used with an adapter.
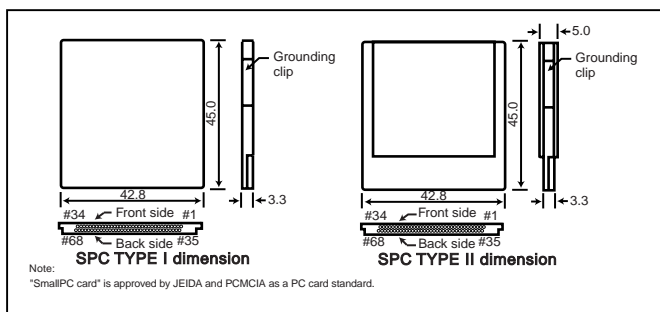
SmallATA Series

Features

1. Complies with PC card ATA standards.
2. Supports IDE mode.
3. 80M Bytes will be available from September 1998.
4. Operates with single voltage either 3.3V or 5V.
5. Low power consumption. (Table 1)

6. High speed read /write operation. (Table 2)
7. High environmental reliability against vibration and shock. (Table 3)
8. 1-million read/write cycle time.
9. Built-in ECC

Specification Table

Part No.	Memory capacity (bytes)	Number of Cylinders	Number of Heads	Number of Sectors/Tracks	Number of Sector	Dimension mm (inch)	Number of pins
BN-S004AC-S	4,096,000	125	4	16	8,000	SPC TYPE I 45.0x42.8x3.3 (1.77x1.69x0.13)	68
BN-S008AC-S	8,192,000	250	4	16	16,000		
BN-S012AC-S	12,288,000	375	4	16	24,000		
BN-S016AC-S	16,384,000	500	4	16	32,000		
BN-S024AC-S	24,576,000	375	8	16	48,000		
BN-S032AC-S	32,766,000	500	8	16	64,000		
BN-S040AC-T	40,239,104	307	8	32	78,592	SPC TYPE II 45.0x42.8x5.0 (1.77x1.69x0.2)	
BN-S048AC-T	48,365,568	369	8	32	94,464		
BN-S064AC-T	64,487,424	492	8	32	125,952		
BN-S080AC-T	Please contact Panasonic for latest specifications.						

SMALL GENERAL-PURPOSE MEMORY CARDS - CONTINUED

Power Supply Characteristics (Table 1) (BN-SAC-S series)

Temperature = 0~70°C

	Symbol	Conditions	Min.	Typ.	Max.	Min.	Typ.	Max.
DC Input Voltage (V)	Vcc			3.3±0.3			5.0±0.5	
Operating Power Current (mA) At Read At Write	I_{CCR} I_{CCW}			25 21			20 27	
Stand by current (mA)	ISB	V_{IH}=Vcc V_{II}=0V		0.05	0.1		0.05	0.1

Interface Characteristics (Table 2)

	Characteristics
Read Data Transfer Rate (Card » Host)	3.5 Mbytes/sec
Write Data Transfer Rate (Host » Card)	0.65 Mbytes/sec
Data Transfer Rate (Host « » Buffer in Card)	8.0 Mbytes/sec

System Environment (Table 3)

	Min.	Max.
Operating Temperature (°C)	0	70
Storage Temperature (°C)	-30	85
Humidity (R.H.%)	5	95
Vibration (G)		15
Impact (G)		1000

SmallFlash Series

Features

1. Operates with single 5V power supply.
2. High speed read/write operation
3. 100,000 read/write cycle time (typ.).
4. Either Fujitsu (AMD) or Sharp (Intel) Flash chip can be selected.

Specification Table

Part No.	Memory capacity (bytes)	Access Time	Current Consumption	Operating Temperature (*3)	Storage Temperature (*3)	Dimension mm (inch)	Number of pins
BN-S02MFCC (*1)	2M						
BN-S02MF4C (*2)	2M						
BN-S04MFCC	4M						
BN-S04MF4C	4M	250nS	150mA (Max)	0°C~70°C	-30°C~80°C	SPC TYPE I 45.0x42.8x3.3 (1.77x1.69x0.13)	68
BN-S08MFCC	8M						
BN-S08MF4C	8M						
BN-S16MFCC (*4)	16M						
BN-S16MF4C	16M						

*1) FC type uses Fujitsu (AMD) Flash chips. *2) F4 type uses Sharp (Intel) Flash chips. *3) High-speed and wide-range operating-temperature products are available separately. *4) 16Mbytes will be available from October 1998.

SmallSRAM Series

Specification Table

Part No.	Memory capacity (bytes)	Access Time	Current Consumption	Back up time Rechargable Lithium Battery VL621 (at25°C)	Operating Temperature	Storage Temperature	External Dimension mm (inch)	Number of Pins
BN-S128SR	128K			2 months				
BN-S256SR	256K			3 months				
BN-S512SR	512K	200ns	150mA (Max)	2 months	0°C~60°C	-20°C~70°C	SPC TYPE I 45.0x42.8x3.3 (1.77x1.69x0.13)	68
BN-S01MSR	1M			8 months				
BN-S02MSR	2M			4 months				

Adapter card for SmallPC card

Features

1 PC card Type II shape.
2 With this adapter full compatibility with the PC card standard is assured.
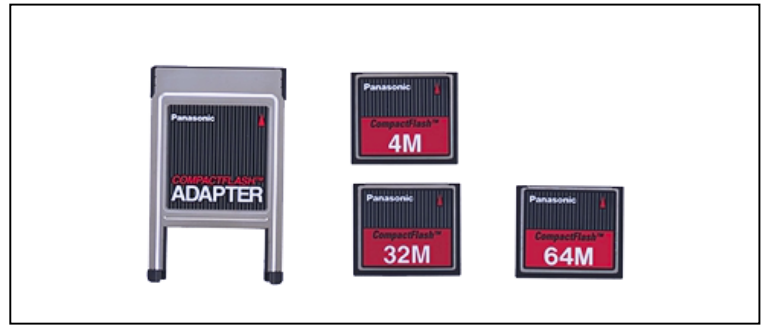
Specification Table

Part No.	Dimension mm (inch)
BN-SPCADP	PC card Type II 85.6x54.0x5.0 (3.37x2.13x0.2)

CompactFlash^{TM}

Features

1. Low power consumption
2. High speed read / write operation
3. 1 million read / write cycle time
4. Can be used in a standard PC card slot when used with an adapter.

Specification Table

Part No.	Memory capacity (bytes)	Number of Cylinders	Number of Heads	Number of Sectors/Tracks	Number of Sectors	Dimension mm (inch)	Number of pins
BN-C004AB-T	4,063,232	62	8	16	7963		
BN-C008AB-T	8,192,000	125	8	16	16000		
BN-C012AB-T	12,255,232	187	8	16	23936	36.4x42.8x3.3 (1.43x1.69x0.13)	50
BN-C016AB-T	16,384,000	250	8	16	32000		
BN-C024AB-T	24,576,000	375	8	16	48000		
BN-C032AB-T	32,768,000	500	8	16	64000		
BNC048AB-T	Please contact Panasonic for the latest specifications.						
BN-C064AB-T	Please contact Panasonic for the latest specifications.						

Power Supply Characteristics

Temperature = 0~60°C

	Symbol	Min.	Typ.	Max.	Min.	Typ.	Max.
DC Input Voltage (V)	Vcc		3.3±0.3			5.0±0.5	
Operating Power Current (mA)							
At Read	I_{CCR}		31			45	
At Write	I_{CCW}		34			52	
Stand by current (mA)	I_{SB}		0.03			0.03	

Interface Characteristics

	Characteristics
Read Data Transfer Rate (Card » Host)	3.5 Mbytes/sec
Write Data Transfer Rate (Host » Card)	1.2 Mbytes/sec
Data Transfer Rate (Host « » Buffer in Card)	8.0 Mbytes/sec

System Environment

	Min.	Max.
Operating Temperature (°C)	0	60
Storage Temperature (°C)	-20	85
Humidity (R.H.%)	5	95
Vibration (G)		15
Impact (G)		1000

Adapter card for CompactFlash^{TM}

Features

1. PC card Type II shape.

Specification Table

Part No.	Dimension mm (inch)
BN-CFADP	PC card Type II 85.6x54.0x5.0 (3.37x2.13x0.2)

* Matsushita Battery Industrial Co., Ltd. is an authorized licensee of the CompactFlash^{TM} and CF ^{TM} trademarks.

ATA PC CARD ADAPTER FOR SmartMedia™*

With this ATA PC card adapter, SmartMedia™ can be used as a full size ATA card.

Features
1. Complies with PC card ATA standards.
2. Type II shape.
3. Operates with a single 5V power Supply.
4. High speed read/write Operation.
5. Built in ejector.
6. Automatic SmartMedia™ voltage detection function (3.3V or 5V)

Specification Table

Part No.	SmartMedia™ Type		Dimension mm (inch)	Number of pins
	Operating Voltage	Memory capacity (bytes)		
BN-FDAD	5V	2M, 4M	PC Card TYPE II 85.6x54.0x5.0 (3.37x2.13x0.2)	68
	3.3V	2M, 4M, 8M, 16M		

Power Supply Characteristics

Temperature = 0~60°C

	Symbol	Conditions	Min.	Typ.	Max.
DC Input Voltage (V)	V_{cc}			5.0 ± 0.5	
Operating Power Current (mA) At Read At Write	I_{CCR} I_{CCW}			10 20	15 35
Stand by current (mA)	I_{SB}	$V_{IH}=V_{cc}$ $V_{IL}=0V$		0.55	

Interface Characteristics

	Characteristics
Read Data Transfer Rate (Card » Host)	3.5 Mbytes/sec
Write Data Transfer Rate (Host » Card)	0.65 Mbytes/sec
Data Transfer Rate (Host « » Buffer in Card)	8.0 Mbytes/sec

System Environment

	Min.	Max.
Operating Temperature (°C)	0	60
Storage Temperature (°C)	-20	70
Humidity (R.H.%)	5	95
Vibration (G)		15
Impact (G)		50

*SmartMedia™ and Logos are trademarks of Toshiba Corporation

Features

1 Complies with PC card ATA standards.

2 Operates with PC card driver software for personal computers.

3 AB type operates with IDE mode.

4 CE Marking approved.

5 Grounding clips for EMI protection

6 Low power consumption.(Table 1)

7 AA type operates with a single 5V power supply. AB type operates with either 3.3V or 5V.

8 High-speed read/write operation.(Table 2)

9 Excellent reliability against vibration and shock.(Table 3)

10 1 million read/write cycle life.

11 Built-in ECC

Specification Table

(BN-AA series)

Part No.	Memory capacity (bytes)	Number of Cylinders	Number of Heads	Number of Sectors/Tracks	Number of Sectors	Physical Specification mm (inch)			Number of pins
						Length	Width	Thickness	
BN-002AA-S	2,048,000	125	4	8	4,000	85.6±0.2 (3.37±0.008)	54.0±0.1 (2.13±0.004)	5.0 (Max) (0.2)	68
BN-004AA-S	4,096,000	250	4	8	8,000				

(BN-AB series)

Part No.	Memory capacity (bytes)	Number of Cylinders	Number of Heads	Number of Sectors/Tracks	Number of Sectors	Physical Specification mm (inch)			Number of pins
						Length	Width	Thickness	
BN-004AB-M	4,096,000	125	4	16	8,000	85.6±0.2 (3.37±0.008)	54.0±0.1 (2.13±0.004)	5.0 (Max) (0.2)	68
BN-008AB-M	8,192,000	250	4	16	16,000				
BN-012AB-M	12,288,000	375	4	16	24,000				
BN-016AB-M	16,384,000	500	4	16	32,000				
BN-020AB-M	20,480,000	625	4	16	40,000				
BN-024AB-M	24,576,000	375	8	16	48,000				
BN-040AB-M	40,960,000	625	8	16	80,000				
BN-080AB-M	81,920,000	625	8	32	160,000				
BN-096AB-M	98,304,000	375	16	32	192,000				
BN-160AB-M	163,840,000	625	16	32	320,000				
BN-320AB-M	Please contact Panasonic for the latest specifications.								

Overview

PC-card ATA flash memory cards comply with the PC Card Standard of PCMCIA (Personal Computer Memory Card International Association) and JEIDA (Japan Electronic Industry Development Association). The product is a semiconductor disk card using flash memory as the storage medium. Because the product does not have any mechanically moving parts like a hard disk, it is resistant to vibration or shocks and realizes high-speed access and low power consumption. For this reason, the products are intended to be used as storage media for portable communication terminal devices (notebook computers, palmtop computers, PDAs, portable terminals, etc.), digital cameras, cellular phone base stations, factory automation (FA) equipment used in severe environments, and as alternatives for small-capacity hard drives.

Power Supply Characteristics (Table 1)

(BN-AA series)   Temperature = 0-70°C

	Symbol	Conditions	Min.	Typ.	Max.
DC Input Voltage (V)	Vcc			5.0±0.5	
Operating Power Current (mA) At Read At Write	I_{CCR} I_{CCW}			40 50	100 120
Stand by current (mA)	I_{SB}	$V_{IH}=Vcc$ $V_{IL}=0V$		0.85	

(BN-AB series)

	Symbol	Conditions	Min.	Typ.	Max.	Min.	Typ.	Max.
DC Input Voltage (V)	Vcc			3.3±0.3			5.0±0.5	
Operating Power Current (mA) At Read At Write	I_{CCR} I_{CCW}			20 25	35 35		25 30	40 40
Stand by current (mA)	I_{SB}	$V_{IH}=Vcc$ $V_{IL}=0V$		0.25			0.30	

Interface Characteristics (Table 2)

(BN-AA series)

	Characteristics
Read Data Transfer Rate (Card » Host)	3.5 Mbytes/sec
Write Data Transfer Rate (Host » Card)	0.46 Mbytes/sec
Data Transfer Rate (Host « » Buffer in Card)	8.0 Mbytes/sec

(BN-AB series)

	Characteristics
Read Data Transfer Rate (Card » Host)	3.5 Mbytes/sec
Write Data Transfer Rate (Host » Card)	0.65 Mbytes/sec
Data Transfer Rate (Host « » Buffer in Card)	8.0 Mbytes/sec

System Environment (Table 3)

	Min.	Max.
Operating Temperature (°C)	0	70
Storage Temperature (°C)	-30	80
Humidity (R.H.%)	5	95
Vibration (G)		15
Impact (G)		1000

68 PINS PCMCIA / JEIDA STANDARD CARD (MEMORY INTERFACE TYPE)

Features (SRAM Card)

1 High capacity types are available with Panasonic MB technology.

2 TTL Input level. (V_{IH}(min.)=2.2V)

3 Low standby mode current.(Typical 100μA)

4 Snap in type battery holder with lock switch for easy battery replacement.

5 Conventional CR2025 lithium battery for memory backup.

**6** CE Marking approved.

Specification Table

	Part No. (Note 1)	Memory capacity (bytes)	Access Time	Current Consumption	Back up time Lithium Battery CR2025 25°C	Sub Battery	Operating Temperature (Note 2)	Storage Temperature	External Dimension mm (inch)
SRAM CARD	BN-064HSR	64K	200ns	150mA (Max)	5 years	Yes	0°C~60°C	-20°C~70°C	PC Card TYPE I 54.0x85.6x3.3 (2.13x3.37x0.13)
	BN-128HSR	128K							
	BN-256HSR	256K							
	BN-512HSR	512K							
	BN-01MHSR	1M							
	BN-02MHSR	2M			3 years				
	BN-04MHSR	4M			1 year				
	BN-06MHSR	6M			9 months				
	BN-08MHSR	8M			6 months				
MASKED ROM CARD (Note 3)	BN-064HR	64K	250ns	110mA (Max)	---	---	0°C~60°C	-30°C~80°C	
	BN-128HR	128K							
	BN-256HR	256K							
	BN-512HR	512K							
	BN-01MHR	1M							
	BN-02MHR	2M							
	BN-04MHR	4M							
	BN-08MHR	8M							
	BN-16MHR	16M							
	BN-32MHR	32M							

Note 1) SRAM card only--Add "C" to the end of the part number to order cards with attribute memory.
Note 2) High-speed products and wide-range operating-temperature products are available separately.
Note 3) Masked ROM cards incorporate no attribute memories. It is recommended that card attribute information (CIS) be provided to the common memory area.
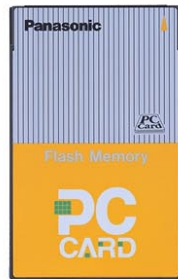
Features

1 Either 8bit or 16bit can be selected in the same card.

2 Various types are available depending on the application.

3 High capacity (up to 28M bytes).

4 Both single power supply and dual power supply are available.

5 Write protection switch.

Specification Table

	Power Supply / Voltage		Part No.	Memory capacity (bytes)	Access Time	Power Consumption	Operating Temperature (note 2)	Storage Temperature	External Dimension mm (inch)
FLASH CARD (Note 3)	Dual Power Supply (5V/12V)	Using 2M bit chips (note 1)	BN-512HFR	512K	250ns	150mA (Max)	0°C~60°C	-30°C~80°C	PC Card TYPE I 54.0x85.6x3.3 (2.13x3.57x0.13)
			BN-01MHFR	1M	250ns	150mA (Max)			
		Using 8M bit chips	BN-02MHF3C	2M					
			BN-04MHF3C	4M					
			BN-08MHF3C	8M					
			BN-10MHF3C	10M					
			BN-16MHF3C	16M					
	Single Power Supply (5V)	Using 8M bit chips	BN-02MHF4C (note 4)	2M					
			BN-02MHFCC (note 5)	2M					
		Using 16M bit chips	BN-04MHF4C	4M					
			BN-04MHFCC	4M					
			BN-08MHF4C	8M					
			BN-08MHFCC	8M					
			BN-12MHF4C	12M					
			BN-12MHFCC	12M					
			BN-16MHF4C	16M					
			BN-16MHFCC	16M					
			BN-20MHF4C	20M					
			BN-20MHFCC	20M					
			BN-24MHFCC	24M					
			BN-28MHFCC	28M					

Note 1) Add "C " after the letter R of the part number for the card with attribute memory.(EEPROM)
Note 2) High-speed products and wide-range operating-temperature products are available separately.
Note 3) Flash memory cards with 8M/16M-bit chips are with attribute memory (EEPROM)
Note 4) F4 type uses Intel (Sharp) chips.
Note 5) FC type uses Fujitsu (AMD) chips.

MEMO

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