CompactFlash for Fix Disk
CF-1GB-B, CF-2GB-B, CF-4GB-B, CF-8GB-B
User's Guide
CONTEC CO., LTD.

Thank you for purchasing the CompactFlash (hereafter abbreviated CF) Memory Card.   This product is a CFA standard CompactFlash.

Follow the procedures in this guide to use the product.
The product consists of the items listed below. Check, with the following list, that your package is complete.   If you discover damaged or missing items, contact your retailer.

Product Configuration List

- CF Memory Card (One of the following) …1
  [CF-1GB-B, CF-2GB-B, CF-4GB-B or CF-8GB-B]
- Warranty Certificate …1

- User's Guide (this booklet) …1

- Serial number label …1

Disposal

When disposing of the product, follow the disposal procedures stipulated under the relevant laws and municipal ordinances.

Safety Information

This document provides safety information using the following symbols to prevent accidents resulting in injury or death and the destruction of equipment and resources.   Understand the meanings of these labels to operate the equipment safely.

⚠ DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

Handling Precautions

⚠WARNING ──────────────────────────

- Do not modify the product.   Doing so may cause fire, electric shock.
- If smoke or abnormal odor is detected, immediately turn off the PC and peripheral devices and unplug the power cables.
- Never touch this product with a wet hand.   Doing so can short-circuit the product to cause fire, electric shock, and/or failure.

⚠ CAUTION ──────────────────────────

- This is a precision product.   Do not strike or bend the product.
  Otherwise, the CF Memory Card may malfunction.
- Do not insert any foreign matter into the connector of this product.   Doing so can break the connector.
- Before handling the product, touch a metal object around to release any built-up static charge from your body to prevent the product from being damaged by static electricity.
- CF-xGB-B Series is limited in the number of cycles they can be written (rewritten) to due to the nature of its memory used.   Note that the write life depends on the actual operating conditions.
- Do not turn off the power during disk access (writing).   Doing so may break the data.
- The product comes with a protective function that prevents the disk from damaging during an instantaneous stop but this function is not designed to protect data written onto the disk.   When protecting data, use it under the condition which has no instantaneously stops.
- This product is designed to be plugged only in one orientation.   Do not force it to be plugged in.
- No part of this document may be copied or reproduced in any form by any means without prior written consent of CONTEC CO., LTD.
- The information in this document is subject to change without notice.
- All relevant issues have been considered in the preparation of this document.   Should you notice an omission or any questionable item in this document, contact your retailer.
- Regardless of the foregoing statements, CONTEC is not liable for any damages whatsoever (including damages for loss of business profits) arising out of the use or inability to use this CONTEC product or the information contained herein.
- This product is not formatted. Please be sure to format before use.

Features

- Conforming to the CFA (CompactFlash Association) standard

- Capable of partitioning internal memory *1

- Containing no rotating or moving part as in hard disk drives, thus best suited for applications which require high environmental resistance (to temperature, humidity, vibration, shock) and for continuous operation for extended periods of time.

- Never making any sound such as motor rotation sound or access noise during seeking, thus best suited for applications which require complete silence.

- Capable of being used as a hard disk drive when used in an IDE-connected CF slot

- Using SLC (Single Level Cell) NAND flash memory provides reliability and writing speed as well as write endurance that are superior to those of MLC (Multi Level Cell), making it suitable for industrial applications.

- By eliminating a rotating or moving part, power consumption is reduced to approximately 1/3 *2 of that of hard disk drive.

- Normalizing the number of rewriting for all areas to reduce the unevenness so that long life is attained.

- When turning off the power during data writing, the power supply is retained for several milliseconds by the internal power protection circuit, resulting in strong resistance against power shutoff.

- High data reliability can be ensured by the features of 15-bit correction/512 bytes error correction for the CF-1GB-B, and of 8-bit correction/512 bytes error correction for the CF-2GB-B, the CF-4GB-B, and CF-8GB-B.

- Auto recovery feature ensures automated data recovery from data errors that occurs with repeated reading.

- S.M.A.R.T. (Self-Monitoring Analysis and Reporting Technology) is supported, making it possible to know the current number of write cycles.

*1: Most CF cards on the market allow only one partition to be recognized in the Windows 2000 or Windows XP environment (thus recognized as a removable drive). Even when two or more partitions are created in this product, all of the partitions can be recognized (excluding the USB card reader).

*2: PC-HDD100GS-2: Comparison with 2000mW at read/write.

Specification

Item		Specifications			
		CF-1GB-B	CF-2GB-B	CF-4GB-B	CF-8GB-B
Memory capacity	LBA	960MB	1920MB	3840MB	7680MB
	CHS	959MB	1919MB	3839MB	7679MB
Bus specification		Compact Flash (TYPE I)			
Host interface		ATA standard (ATA3-7)/CFA standard (CF4.1) PIO mode0-4 Multiword DMA mode0-2 Ultra DMA mode0-6			
Read *1		40MByte/sec			
Write *1		15MByte/sec			
MTBF		500,000H			
NAND Flash memory life span		50,000 cycles	100,000 cycles		
Write endurance *2		96,000,000 cycles	384,000,000 cycles	768,000,000 cycles	1,536,000,000 cycles
Rated voltage		5VDC ±10% / 3.3VDC ±5%			
Consumed power					
	Sleep	25mW (Max.)			
	Read / Write	650mW (Max.) / 650mW (Max.)			
Ambient temperature (Operation, Storage)		-40 - 85ºC			
Storage temperature (Operation, Storage)		0 - 90%RH (No condensation)			
Physical dimensions (mm)		42.8(W) x 3.3(D) x 36.4(H)			
Weight		About 10g			

*1: An actual performance is different depending on use conditions.

*2: Refers to the allowed number of write cycles when rewriting under 512KB.

Physical dimensions
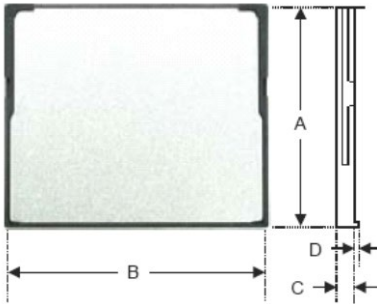
Side	Length [mm]
A	36.40±0.150
B	42.80±0.100
C	3.30±0.100
D	0.63±0.070

About write endurance

CF-xGB-B series have a write endurance which limits the number of $_{cycles}$ each memory may be written, due to the characteristic of the memory that is used.   For the write endurance when the size of the data written is under 512KB, refer to the "Write endurance" row in the specification table.
For the write endurance when the size of the data written is over 512KB, use the calculations below to obtain an estimated value.

Write endurance ($_{cycles}$) =
Total capacity (MB) x the NAND flash memory life span ($_{cycles}$) / Size of file (MB)
Example1: When the file of 1MB is made for CF-2GB-B, and it rewrites it once a second.
Write endurance = 1920MB x 100,000 $_{cycles}$ / 1MB = 192,000,000 ($_{cycles}$)
Longevity = 192,000,000 / (3600 x 24 x 365) $\cong$ 6 (year)

After all these are reference values, confirm its life span by the following S.M.A.R.T.

About S.M.A.R.T.

A self-diagnosis program "SMART" that can obtain the S.M.A.R.T information in a SSD is available for download at TDK website.   Following information can be obtained using this program:

1. Number of flash memory chips mounted inside SSD, and the total number of blocks
2. Total number of write cycles on SSD
3. Number of write cycles of the block where rewriting occurs most frequently
4. Number of write cycles of the block where rewriting occurs least frequently
5. Number of write cycles of all the blocks (10 step histogram)

The life span of the NAND type flash memory can be predicted by determining the number of write cycles for each block.
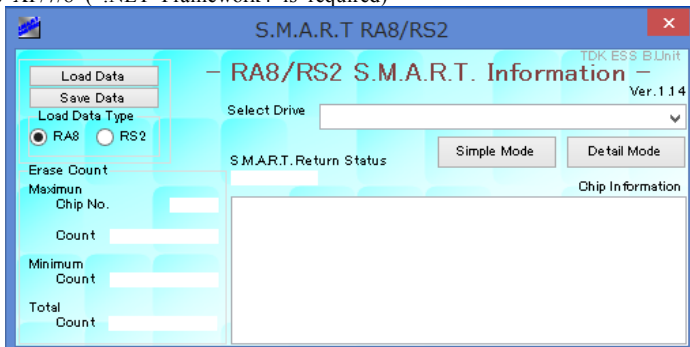
TDK website:

http://www.tdk.co.jp

At the SMART program download destination (Download the module for "RA8 SMART".):
https://product.tdk.com/info/ja/products/flash-storage/flash-storage/tdksmart.html

Requirement for SMART program:

Windows XP/7/8 (.NET Framework4 is required)

Connector pin position list

```
      1          TOP          25
    ┌─┬──────────────────────────┬──┐
    ┃ ┃ ::::::::::::::::::::::::: ┃  ┃
    └─┴──────────────────────────┴──┘
     26         BOTTOM          50
```

Pinouts *1

Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
01	GND	14	HA[6]	27	HDB[11]	40	VS2-
02	HDB[3]	15	HA[5]	28	HDB[12]	41	RESET-
03	HDB[4]	16	HA[4]	29	HDB[13]	42	IORDY-
04	HDB[5]	17	HA[3]	30	HDB[14]	43	DMARQ
05	HDB[6]	18	HA[2]	31	HDB[15]	44	DMACK-
06	HDB[7]	19	HA[1]	32	CS1-	45	DASP-
07	CS0-	20	HA[0]	33	VS1-	46	PDIAG-
08	HA[10]	21	HDB[0]	34	IORD-	47	HDB[8]
09	ATASEL-	22	HDB[1]	35	IOWR-	48	HDB[9]
10	HA[9]	23	HDB[2]	36	WE-	49	HDB[10]
11	HA[8]	24	IOCS16-	37	INTRQ	50	GND
12	HA[7]	25	CD2-	38	VCC		
13	VCC	26	CD1-	39	CSEL-		

*1: These are the pin-outs as in True IDE mode.

Pin Identification *1

Symbol	I/O	Function
HA[10:0]	I	Address Bus. The available function for A[2:0] only.
PDIAG-	I/O	Diagnostic Port
DASP-	I/O	For External LED
CD[1,2]-	O	Card Detection Signal
CS[0,1]-	IS	Chip Select Signal
CSEL-	I	Master/Slave Select Signal
HDB[15:0]	I/O	Host Data Bus
GND	-	Ground
DMARQ-	O	Use as DMARQ at DMA Transfer
IORD-	IS	I/O Read Strobe Signal Read Assert/Write Strobe Signal at Ultra DMA.
IOWR-	IS	I/O Write Strobe Signal Assert Signal for Transfer at Ultra DMA.
ATASEL-	IS	TrueIDE Select Signal
INTRQ	O	Host Interrupt Signal
DMACK	IS	Use as DMACK at DMA Transfer
RESET-	IS	Host Reset Signal
VCC	-	+5V,+3.3V Power
VS[1,2]-	O	Card Power Voltage Specify
IORDY	O	IORDY Signal Write Assert/Read Strobe Signal at Ultra DMA.
WE-	IS	-
IOCS16-	O	Asserted at 16-bit access

*1: These are the pin-outs as in True IDE mode.

Differences between the CF-xGB-A

		CF-xGB-B	CF-xGB-A
Read *1		40MByte/sec	23Mbyte/sec
Write *1		15MByte/sec	10Mbyte/sec (Write)
Write endurance		CF-1GB-B 96,000,000 cycles *2, CF-2GB-B 384,000,000 cycles *2, CF-4GB-B 768,000,000 cycles *2, CF-8GB-B 1,536,000,000 cycles *2	2,100,000 cycles or more *3
Consumed power	Sleep	25mW (Max.)	5mW (Max.)
	Read / Write	650mW (Max.) / 650mW (Max.)	700mW (Max.) / 700mW (Max.)
S.M.A.R.T.		Have	None
Wear leveling		Leveling is done for the entire area and write endurance is not affected by shortage of the unused area.	Leveling is done only for the unused area: the smaller the unused area becomes, the shorter write endurance will be.

*1: An actual performance is different depending on use conditions.

*2: Refers to the allowed number of write cycles when rewriting under 512KB.

*3: It is different according to the state of operation of the rewriting longevity.

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