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DiskOnChip

DiskOnChip PCI-G Evaluation Board

User Manual

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DOCUMENT CONTROL INFORMATION

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TABLE OF CONTENTS

1. Introduction 4
1.1. Supported Devices 4
1.2. Features 4
2. PCI-G EVB Package Contents 5
3. System Requirements 5
4. PCI-G EVB Board Contents 6
4.1. Determining the Base Address 6
4.2. Selecting the Voltage 6
4.3. Locking Protected Areas 7
4.4. Working in 16-Bit Mode 7
5. Installing and Configuring the PCI-G EVB 8
5.1. Installing DiskOnChip as an Additional Disk Drive 8
5.2. Using the PCI-G EVB as a Boot Device (DOS) 8
5.3. Identifying DiskOnChip on the PCI-G EVB 9
5.4. Reformatting DiskOnChip 9
6. Additional Software Utilities 10
6.1. DOS 10
6.2. Using PMC Connectors 10
7. Ordering information 11
How to Contact Us 12

1. INTRODUCTION

The DiskOnChip PCI-G Evaluation Board (EVB) provides a quick, easy way to evaluate the DiskOnChip in platforms with a PCI extension slot. The PCI-G EVB is a useful tool for designers who need to evaluate, program, duplicate or test DiskOnChip, even before their target platform is available. Once installed, the DiskOnChip PCI-G EVB can be accessed as an additional disk drive or as a boot device.

M-Systems' DiskOnChip products are high-performance, single-chip flash disks that provide full hard drive emulation for all major operating systems and platforms. This unique product line offers a complete data storage solution for applications in which mechanical hard drives cannot be used, such as embedded systems, Internet access devices, network computers and mobile systems. DiskOnChip provides superior performance through a true 16-bit bus interface, and offers security-enabling and data-protection features.

1.1. Supported Devices

The PCI-G EVB General DiskOnChip interface connector, in combination with the relevant second-floor adapter, supports the DiskOnChip product line.

A TrueFFS driver is required to work with any of the DiskOnChip products. TrueFFS is natively supported by every major OS, such as Windows CE, Windows 2000, QNX, and VxWorks. The latest TrueFFS drivers can be obtained from M-Systems for these operating systems and others, such as DOS, Linux, pSOS and NT Embedded. For other environments (including OS-less) the TrueFFS Software Development Kit (SDK) can be obtained. When using DiskOnChip as the boot device in a non-x86 environment, M-Systems' Boot Software Development Kit (BDK) package is required. Contact M-Systems regarding availability for both packages.

1.2. Features

The PCI-G EVB includes the following features:

- Support for the current DiskOnChip product line using the second-floor adapter.
- An independent memory window for each device on-board
- Support for 1.8V, 3.3V and 5V VCC core and VCC_I/O
- Variable 8-bit or 16-bit operation
- Support for the DiskOnChip hardware protection option, including the LOCK# signal
- Two **fixed** memory base address are available for the DiskOnChip second-floor adapter (using a jumper)
- General DiskOnChip interface connector on both sides of the EVB for more flexibility (only one can be used at a time)

2. PCI-G EVB PACKAGE CONTENTS

The PCI-G EVB package includes the following:

- DiskOnChip PCI-G Evaluation Board
- Release Letter
- Quick Installation Guide
- Data CD with:
  - o Software utilities and tools
  - o Additional documentation

  Note: It is recommended to download the latest software utilities from our website at www.m-systems.com.
- M-Systems limited warranty

3. SYSTEM REQUIREMENTS

- PC or any other platform with free PCI bus slots.
- 32KB free memory space (between D000 and D800 or D800 and DA00).
- It is recommended to have a bootable DOS diskette on hand as all software utilities included are compiled for DOS.

4. PCI-G EVB BOARD CONTENTS

The PCI-G EVB can support most DiskOnChip form factors. You can also cascade up to four devices using the relevant adapter daughter board.

Table 1: Jumpers and Indicators

Item	Description
D1	5V Power indicator LED
D2	3.3V Power indicator LED
D3	1.8V Power indicator LED
J1	VCC IO Power setting
J2	EPROM programming (Not in use)
J3	External Rom (Not in use)
J4	Base address setting
J5	V_Core Power setting
JP1	CPLD Programming header
JP2, JP3	VCC IO Setting (Internal use)
JP4 – JP9	Optional headers - TBD
JP10, JP11	VCC_IO setting (Internal use)

4.1. Determining the Base Address

The PCI-G EVB supports two selectable memory base addresses, each residing in a separate memory address. Table 2 defines the memory table for J4.

Table 2: DiskOnChip Memory Table

J4, Pins 1 & 2 (U2)*	J4, Pins 2 & 3 (U7)
D000	D800

* Default factory settings.

4.2. Selecting the Voltage

To determine the voltage supplied to VCC_Core and VCC_IO, use jumpers J1 and J5 as described in Table 3.

Table 3: Selecting the Operating Voltage

Jumper	Pins 1 & 2*	Pins 3 & 4	Pins 5 & 6	Pins 7 & 8
J1 (VCC_Core)	3.3V*	1.8V	5V	VREF**
J5 (VCC_IO)	3.3V*	1.8V	5V	VREF**

* Default factory settings.

**VREF can be set through VR1 and VR2.

4.3. Locking Protected Areas

The PCI-G EVB supports the Lock feature. When the LOCK# pin on the second floor adapter is set using a dedicated jumper, the EVB does not allow writing to write-protected areas or access to read-protected areas, even when the correct password is entered.

4.4. Working in 16-Bit Mode

The PCI-G EVB supports 16-bit operation. When the IF_CFG pin is set on the second floor adapter, the EVB works in full 16-bit mode, achieving approximately twice the performance speed.

5. INSTALLING AND CONFIGURING THE PCI-G EVB

When installing the DiskOnChip PCI-G EVB as a bootable drive in operating systems other then DOS, make sure to place the relevant systems files on DiskOnChip (i.e., execute according to Section 5.1, then install the systems files and continue with Section 5.2).

In Windows systems, the **New hardware found** message is displayed each time you boot with the PCI-G EVB plugged in. To suppress this message, select the option to install a driver, then select the DOC_PCI.INF file located in the PCI_G_EVB directory of the DiskOnChip software utilities. This will NOT install a driver, but will inform Windows of the new hardware and prevent the message from being displayed during boot-up.

When working with the PCI-G EVB in environments other then PC, you must use the DiskOnChip BDK to enable your boot code to access DiskOnChip and load your OS and drivers.

Additional information, scenarios, and advice regarding using DiskOnChip as a bootable drive are available in the *DiskOnChip Software Utilities* user manual.

5.1. Installing DiskOnChip as an Additional Disk Drive

DOS Example:

1. Mount the DiskOnChip second-floor adapter(s) on the PCI-G EVB in the appropriate socket.
2. Insert the PCI-G EVB into a free PCI slot (make sure your host is powered off).
3. Power on your computer (host). You may now access the PCI-G EVB as an additional drive.

Note: TSOP and FBGA devices require formatting before the PCI-G EVB can be accessed as an additional drive (refer to the *DiskOnChip Software Utilities* user manual on our website).

When using other operating systems, you may need to first install the DiskOnChip driver (see the DiskOnChip OS-specific installation manuals).

5.2. Using the PCI-G EVB as a Boot Device (DOS)

The PCI-G EVB may be used either as an additional hard drive or as the system's boot device (drive [C:]). When shipped, DiskOnChip default settings cause it to be installed as the next available drive. This will typically be drive [D:] if the system already includes another drive. To convert it into a bootable DOS drive, perform the following:

1. Boot the system and ensure that the PCI-G EVB is correctly installed as an additional drive.
2. Copy your system files to DiskOnChip by typing **FORMAT D: /S** or **SYS D:** (assuming DiskOnChip is registered as drive [D:]).
3. Remove your hard drive or type **DFORMAT D: (or /WIN:segment) /FIRST /S:DOCnn.EXB /UPDATE**. Observe the following rules:
   - The `/S` flag must be used when the `/FIRST` flag is used. `DOCnn.EXB` stands for the DiskOnChip firmware file name.

- The `/UPDATE` flag instructs DFORMAT to update the firmware without reformatting the flash media, keeping the information on it intact (such as the DOS systems files).

4. Reboot the system. After rebooting, DiskOnChip is identified as drive [C:].

5.3. Identifying DiskOnChip on the PCI-G EVB

There are two utilities that can identify the DiskOnChip unit mounted on the PCI-G EVB. You can use DINFO when the drivers are correctly loaded (indicated by the sign-on messages display). If the messages were not displayed, use DINFO>DIRECT to search for DiskOnChip.

DINFO provides information regarding DiskOnChip size, amount of physical flash used, number of flash devices inside DiskOnChip, drive letter occupied by DiskOnChip, firmware version, and so on.

5.4. Reformatting DiskOnChip

Warning: ***Running DFORMAT erases all data from DiskOnChip. Make sure to back up your data before using this utility.***

DiskOnChip can be reformatted on-board using the DFORMAT utility. The DFORMAT utility can be used whether or not the device was recognized by the system and assigned a drive letter. Assuming DiskOnChip is located at address 0xC800, the format command is:

```
DFORMAT /WIN:C800 /other flags
```

After running DFORMAT, you must reset the system to allow the changes to take effect.

Important: Correct initialization of your DiskOnChip must be performed before starting development. It is highly recommended to thoroughly read the *DiskOnChip Software Utilities* user manual in general, and specifically the chapter discussing DFORMAT.

6. ADDITIONAL SOFTWARE UTILITIES

6.1. DOS

You can use any of the DiskOnChip DOS utilities with the PCI-G EVB. Detailed information can be found in the *DiskOnChip Software Utilities* user manual.

6.2. Using PMC Connectors

You can connect the PCI-G EVB to boards in which the PCI bus is only accessible through PMC connectors (such as the MCP750 reference board), by using PMC-to-PCI adapter cards (vendor supplied). Additional information and links to these products is available on our website (www.m-systems.com, “Third Party Tools”, located in the DiskOnChip section).

7. ORDERING INFORMATION

The DiskOnChip PCI-G EVB supports most of DiskOnChip types using the relevant second adapter. Second floor adapters can be ordered in several configurations, depending on the DiskOnChip you want to evaluate.

Table 4: Ordering Information

Ordering Info	DiskOnChip Products Supported			
	DiskOnChip G2	DiskOnChip G3	DiskOnChip 2000	
	FBGA, TSOP-I	FBGA, TSOP-I	DIP	DIMM
PCI_G_EVB (Part no.: 919U0903400A)	✓	✓	✓	-

Table 5: Adapter Ordering Information

Ordering Information	Part Number
BGA9x12-ZIF-ADPT	Generic adapter for FBGA 9x12 mm form factor
BGA7x10-ZIF-ADPT	Generic adapter for FBGA 7x10 mm form factor
DOC-DIP32-ADPT	Generic adapter for DIP 32-pin form factor
TSOP-ZIF-ADPT-R1	Generic adapter for TSOP-I 48-pin form factor

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