



Micro Disk Module Product Specification

V3.0

Contents:

A. Product Information	1
B. System Features.....	2
C. Specifications.....	3
D. Pin Assignments and Signal Descriptions	4
E. System Power Consumption.....	6
F. Power Management	6
G. Electrical Specifications	7
H. DC Characters.....	8
I. AC Characters.....	9
J. Physical Specification.....	10
K. Part Numbers	12

A. Product Information

PCcardsDirect's Micro Disk Module is solid-state design and IDE compatible. It is an ideal replacement for standard IDE hard disk. It's a solid-state design offers no seek errors even under extreme shock and vibration conditions. The Micro Disk Module is extremely small and highly suitable for rugged environments, thus providing an excellent solution for mobile applications with space limitations. It is fully compatible with all consumer applications designed for data storage, allowing simple use for the end user. The Micro Disk Module is O/S independent, thus offering an optimal solution for embedded systems operating in non-standard computing environments. It provides memory storage for mobile computing applications, consumer electronics and embedded systems.

This Micro Disk Module is IDE compatible and offering various capacities. It has low power consumption and can operate from a single 3.3/5.0 Volt power supply. The operating temperature grade is commercial operating temperature grade (0°C ~+70 °C) and industrial operating temperature grade (-40°C ~ +85 °C). Optional vertical type with case and horizontal type include rightwards side or leftwards side.

B. System Features

- Industry ATAPI-5 Standard Compliant.
- Max Capacity supported: 8GB.
- Optional designs for vertical type and horizontal type
- High reliability assured based on the internal ECC (Error Correcting Code) function.
- Reliable wear-leveling algorithm to ensure the best of flash endurance.
- Auto Standby and Sleep Mode supported.
- Flexible file system structure.
- Dual Channel operation supported for performance enhancement.
- Automatic Recognition and Initialization of flash devices.
- Excellent performance supporting Ultra DMA Mode 4.
- Capacity supported: 128MB, 256MB, 512MB, 1GB, 2GB, 4GB, 8GB.

C. Specifications

Compatibility	PC ATA and True IDE	
Flash Technology	NAND Type SLC Flash Memory Base	
	40-pin	44-pin
Form Factor	Vertical Type	Vertical Type
	Horizontal Leftward Type	Horizontal Leftward Type
	Horizontal Rightward Type	Horizontal Rightward Type
Connector Types	2.54mm Female	2.00mm Female
Master/Slave	Setup By Jump	Setup By Switch
System Performance		
Data Transfer Mode	PIO Mode 4 or UDMA Mode 4	
Sequential Read	20Mbytes / sec Max.	
Sequential Write	19Mbytes / sec Max.	
Average Access Time	2ms (estimated)	
Environmental Specification		
Standard Temperature	Operation	0°C ~ +70°C
	Non-operation	-20°C ~ +80°C
Wide Temperature	Operation	-40°C ~ +85°C
	Non-operation	-50°C ~ +95°C
Vibration	Operation max	20 G
	Non-operation max	20 G
Humidity	Operation max	5~95% non-condensing
	Non-operation max	5~95% non-condensing
Shock	Operation max	1500 G
	Non-operation max	1500 G
Reliability		
MTBF	> 1,000,000 hours	
Error Code Correction	4 bits ECC Code	
Endurance	Greater than 1,000,000 cycles logically contributed by Wear-leveling and advanced bad sector management algorithms	
Data Reliability	< 1 non-recoverable error 1014 bits read	
Data Retention	10 years	
Power Consumption		
Power Voltage	+3.3V ± 5%	+5V ± 10%
Read	57.7mA(Typ.)	57.7mA(Typ.)
Write	60mA(Typ.)	60mA(Typ.)
Sleep Mode	2.3mA(Typ.)	2.3mA(Typ.)
Power input(for 40 pin)	A power cable with 4pin to 2pin connector	

D. Pin Assignments and Signal Descriptions

D.1 Pin Assignments

Pin #	Pin Name	Pin Type	Pin #	Pin Name	Pin Type
1	-RESET	I	2	GND	Ground
3	Data 7	I/O	4	Data 8	I/O
5	Data 6	I/O	6	Data 9	I/O
7	Data 5	I/O	8	Data 10	I/O
9	Data 4	I/O	10	Data 11	I/O
11	Data 3	I/O	12	Data 12	I/O
13	Data 2	I/O	14	Data 13	I/O
15	Data 1	I/O	16	Data 14	I/O
17	Data 0	I/O	18	Data 15	I/O
19	Ground	Power	20	Key Pin	Power
21	Reserved	-	22	GND	Ground
23	-IOW	I	24	GND	Ground
25	-IOR	I	26	GND	Ground
27	IORDY	O	28	Reserved	--
29	Reserved	-	30	GND	Ground
31	IRQ	O	32	-IOCS16	O
33	A1	I	34	-PDIAG	I/O
35	A0	I	36	A2	I
37	-CS0	I	38	-CSI	I
39	DASP	I/O	40	GND	Ground
41	VCC1	Power	42	VCC1	Power
43	GND1	Ground	44	Reserved2	Ground

Note:

1. 1: These 4 pins are for IDE 44-pin standard.
2. 2: 44 Pin use for Ground.

D.2 Signal Descriptions

Signal Name	Dir.	PIN	Description
RESET	I	1	This pin Host Reset. Reset signal is from the host and it is active low.
Data [15:0]	I/O	3-18	These lines carry Data, Command and Status information between the host and controller.D0 is LSB and D15 is MSB.
IOW	I	23	The I/O Write Strobe pulse is used to clock I/O data on the Data bus into the controller registers. The clocking will occur on the negative to the positive edge of the signal (trailing edge).
IOR	I	25	This is an I/O Read strobe generated by the host. This signal gates I/O data into the bus from the controller. The clocking will occur on the negative to the positive edge of the signal (trailing edge).
IRQ	O	31	This is an interrupt request from the controller to host, asking for service. The output of this signal is tri-state when the interrupt are disabled by the host.
A[2:0]	I	33,35,36 A	[2:0] are used to select the one of eight registers in the Task File.
CS0,CS	I	37,38	-CS0 is the chip select for the task file registers while -CS1 is used to select the Alternate Status Register and the Device Control Register.
IRDY	O	27	This signal is negated to extend the host transfer cycle of any host register access (Read or Write) when the device is not ready to respond to a data transfer request.
IOCS16	O	32	This open drain output signal is asserted low by the controller to indicate to the host the current cycle is a 16-bit (word) data transfer.
PDIAG	I/O	34	This bi-directional open drain signal is asserted by the slave after an Execute Diagnostic command to indicate to the master it has passed it's diagnostics.
DASP	I/O	39	This open drain output is asserted low any time the drive is active. In a Master/Slave configuration, this signal is used the slave to inform the master which has slave present.
GND		02,19,22,24,26,30,40,43	Ground
VCC		20,41,42 +	5V or 3.3V Power

E. System Power Consumption

DC Input Voltage (VCC)	3.3V / 5V \pm 5%	
+5V Current (Average Value)	Maximum stand by current	160uA
	Maximum loading current	150uA

F. Power Management

PCcardsDirect Micro Disk Module provides automatic power saving mode.

- 1. Standby Mode:** When Micro Disk Module finished initialization after power reset or hardware reset, it goes into Standby Mode to wait for Command In or Soft Reset.
- 2. Active Mode:** If Micro Disk Module received any Command In or Soft Reset, it goes into Active Mode. In Active Mode, it is capable of executing any ATA commands. The power consumption is the greatest in this mode.
- 3. Sleep Mode:** The Micro Disk Module will enter Sleep Mode if there is no Command In or Soft Reset from the host for about 4ms or sleep command is asserted. This time interval can be modified by firmware if necessary. Sleep Mode provides the lowest power consumption. During Sleep Mode, the system main clock is stopped. This mode can be waked up from hardware reset, software reset or any ATA

G. Electrical Specifications

Symbol	Parameter	Rating	Units
VCC	Power Supply	-0.3 to 5.5	V
VIN	Input Voltage	-0.3 to VCC +0.3	V
VOUT	Output Voltage	-0.3 to VCC +0.3	V
VCCQ	Power supply for host I/O and embedded regulator	-0.6 to 5.5	V
VIN_HOST	Input voltage for host I/O	-0.3 to VCCQ +0.3	V
VOUT_HOST	Output voltage for host I/O	-0.3 to VCCQ +0.3	V
TOPR-I	Operating temperature for industrial grade	-40 ⁰ C to +85 ⁰ C	⁰ C
TOPR	Operating temperature for commercial grade	0 ⁰ C to +70 ⁰ C	⁰ C
TSTG	Storage temperature	-55 ⁰ C to 150 ⁰ C	⁰ C

H. DC Characters

H.1. DC Characteristics (TOPRi = -40°C ~ +85°C, VCC = 3.3V ~ 3.6V)

Symbol	Parameter	Condition	MIN.	TYP.	MAX.	Units
VIL	Input low voltage	CMOS			0.2*VCC	V
VIH	Input high voltage	CMOS	2.0			V
Vt-	Schmitt trigger negative going threshold voltage	CMOS	0.9			V
Vt+	Schmitt trigger negative going threshold voltage	CMOS			2.5	V
VOL	Output low voltage	IOL=4,8mA			0.4	V
VOH	Output high voltage	IOH=4,8mA	VCC-0.8			V
Rt	Input Pull-up/down resistance	VIL=0V or VIH=VCC		75		KΩ

H.2. DC Characteristics (TOPRi = -40°C ~ +85°C, VCC = 4.5V ~ 5.5V)

Symbol	Parameter	Condition	MIN.	TYP.	MAX.	Units
VIL	Input low voltage	COMS(*1)			0.2*VCC	V
VIH	Input low voltage	COMS(*1)	20.			V
VILQ	Host I/F pin input low voltage	TTL(*2)			0.8	V
VIHQ	Host I/F pin input high voltage	TTL(*2)	20			V
Vt-	Schmitt trigger negative going threshold voltage	VCCQ(*2)	0.8			V
Vt+	Schmitt trigger negative going threshold voltage	VCCQ(2)			2.0	V
Vt-	Schmitt trigger negative going threshold voltage	VCC(*1)	0.9			V
Vt+	Schmitt trigger negative going threshold voltage	VCC(*1)			2.5	V
VOL	Output low voltage	IOL=4.8mA			0.4	V
VOH	Output high voltage	IOH=4.8mA	VCC-0.8			V
VOLQ	Host I/F pin output low voltage	IOL=4.8mA			0.4	V
VOHQ	Host I/F pin output high voltage	IOH=4.8mA	VCCQ-0.8			V
Rt	Input Pull-up / down resistance	VIL=0V or VIH=VCC		75		KΩ

- Note:**
3. 1. For the pins, which were driven by VCC.
 4. 2. For the host interface pins only, which were driven by VCC.

I. AC Characters

AC Characteristics ($T_a = -40^{\circ}\text{C} \sim +85^{\circ}\text{C}$, $V_{cc} = 5\text{V} \pm 10\%$, $V_{CC} = 3.3\text{V} \pm 5\%$)

I.1 The IDE Mode Access Read AC Characteristics

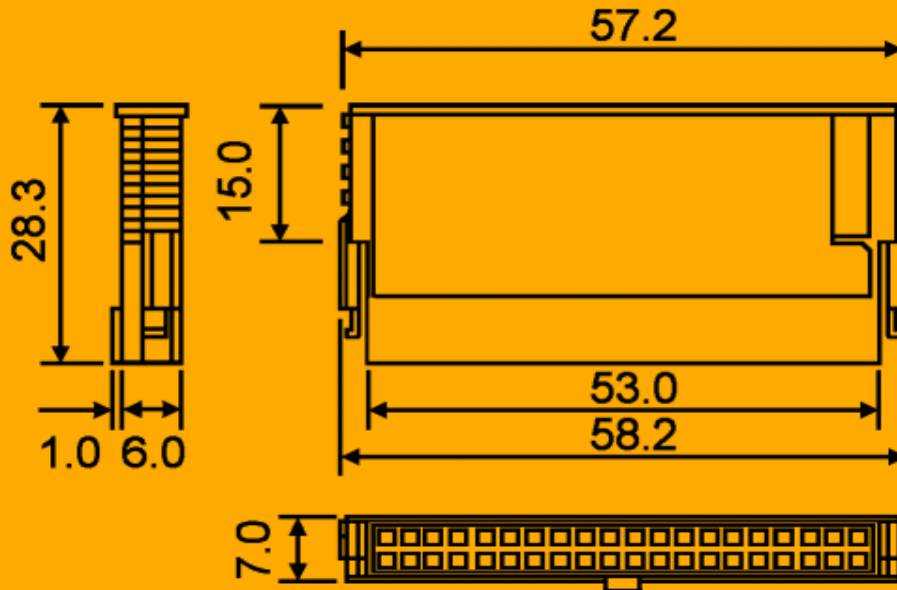
Parameter	Symbol	Min	Typ	Max	Unit
Data delay after IORD	td(IORD)	-	-	50	ns
Data hold following IORD	th(IORD)	5	-	-	ns
IORD width time	tw(IORD)	70	-	-	ns
Address setup before IORD	tsuA(IORD)	25	-	-	ns
Address hold following IORD	ThA(IORD)	10	-	-	ns
CE setup before IORD	tsuCE(IORD)	25	-	-	ns
CE hold following IORD	thCE(IORD)	10	-	-	ns
IOCS16 delay falling from address	tdfIOCS16(ADR)	-	-	35	ns
IOCS16 delay rising from address	tSIOCS16(ADR)	-	-	35	ns

I.2 True IDE Mode Access Write AC Characteristics

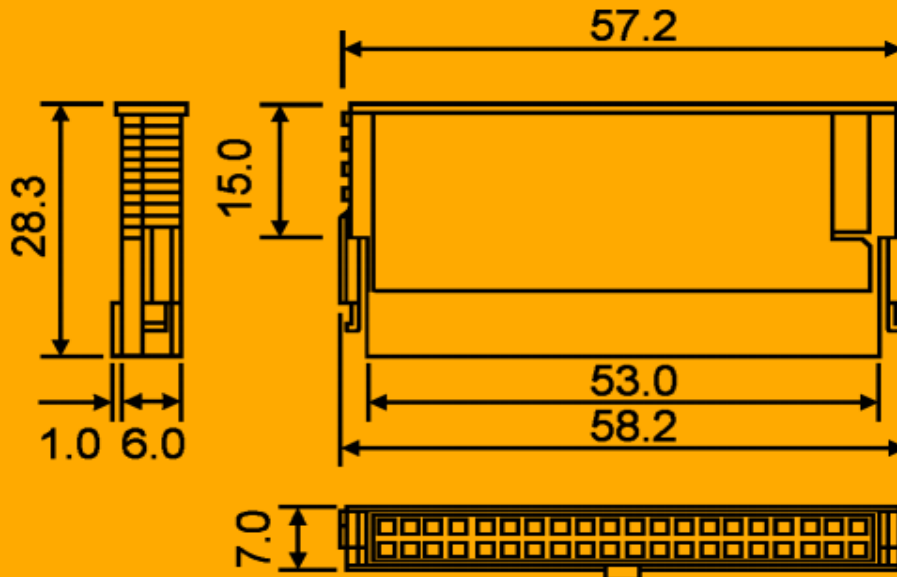
Parameter	Symbol	Min	Typ	Max	Unit
Data delay before IOWR	td(IOWR)	20	-	-	ns
Data hold following IOWR	th(IOWR)	10	-	-	ns
IORD width time	tw(IOWR)	70	-	-	ns
Address setup before IOWR	tsuA(IOWR)	15	-	-	ns
Address hold following IOWR	thA(IOWR)	10	-	-	ns
CE setup before IOWR	tsuCE(IOWR)	5	-	-	ns
CE hold following IOWR	thCE(IOWR)	10	-	-	ns
IOCS16 delay falling from address	tdfIOCS16(ADR)	-	-	35	ns
IOCS16 delay rising from address	tSIOCS16(ADR)	-	-	35	ns

J. Product Model and Physical Specification

40 Pin Vertical Physical Specification



40 Pin Vertical Physical Specification



K. Part Numbers

PCDMOD16MBI-40P 16MB Vertical 40 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD16MBI-44P 16MB Vertical 44 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD32MBI-40P 32MB Vertical 40 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD32MBI-44P 32MB Vertical 44 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD64MBI-40P 64MB Vertical 40 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD64MBI-44P 64MB Vertical 44 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD128MBI-40P 128MB Vertical 40 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD128MBI-44P 128MB Vertical 44 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD256MBI-40P 256MB Vertical 40 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD256MBI-44P 256MB Vertical 44 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD512MBI-40P 512MB Vertical 40 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD512MBI-44P 512MB Vertical 44 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD1024MBI-40P 1GB Vertical 40 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD1024MBI-44P 1GB Vertical 44 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD2048MBI-40P 2GB Vertical 40 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD2048MBI-44P 2GB Vertical 44 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD4096MBI-40P 4GB Vertical 40 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD8192MBI-40P 8GB Vertical 40 PIN INDUSTRIAL TEMP, INDUSTRIAL GRADE, Disk
PCDMOD16MB-40P 16MB Vertical 40 PIN Commercial TEMP, Industrial GRADE, Disk Module
PCDMOD16MB-44P 16MB Vertical 44 PIN Commercial TEMP, Industrial GRADE, Disk Module
PCDMOD32MB-40P 32MB Vertical 40 PIN Commercial TEMP, Industrial GRADE, Disk Module
PCDMOD32MB-44P 32MB Vertical 44 PIN Commercial TEMP, Industrial GRADE, Disk Module
PCDMOD64MB-40P 64MB Vertical 40 PIN Commercial TEMP, Industrial GRADE, Disk Module
PCDMOD64MB-44P 64MB Vertical 44 PIN Commercial TEMP, Industrial GRADE, Disk Module
PCDMOD128MB-40P 128MB Vertical 40 PIN Commercial TEMP, Industrial GRADE, Disk
Module PCDMOD128MB-44P 128MB Vertical 44 PIN Commercial TEMP, Industrial GRADE,
Disk Module PCDMOD256MB-40P 256MB Vertical 40 PIN Commercial TEMP, Industrial
GRADE, Disk Module PCDMOD256MB-44P 256MB Vertical 44 PIN Commercial TEMP,
Industrial GRADE, Disk Module PCDMOD512MB-40P 512MB Vertical 40 PIN Commercial
TEMP, Industrial GRADE, Disk Module PCDMOD512MB-44P 512MB Vertical 44 PIN
Commercial TEMP, Industrial GRADE, Disk Module PCDMOD1024MB-40P 1GB Vertical 40 PIN
Commercial TEMP, Industrial GRADE, Disk Module PCDMOD1024MB-44P 1GB Vertical 44 PIN
Commercial TEMP, Industrial GRADE, Disk Module PCDMOD2048MB-40P 2GB Vertical 40 PIN
Commercial TEMP, Industrial GRADE, Disk Module PCDMOD2048MB-44P 2GB Vertical 44 PIN
Commercial TEMP, Industrial GRADE, Disk Module PCDMOD4096MB-40P 4GB Vertical 40 PIN
Commercial TEMP, Industrial GRADE, Disk Module PCDMOD8192MB-40P 8GB Vertical 40 PIN
Commercial TEMP, Industrial GRADE, Disk Module