

Solid State Disk

DM Series (Vertical)



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1. Product Description

1.1 Product Overview

PQI's **Solid State Disk DM series** based on NAND type flash memory technology. This product complies with 10 PIN embed USB interface on mother-board and is suitable for data storage memory medium for portable system which requires small capacity main storage device or boot disk based on Linux, WinCE operating system. By using **Solid State Disk**, it is possible to operate good performance for the portable system which has USB interface slots on mother-board.

PQI's **Solid State Disk** is a storage device based on flash memory technology, which emulates an ordinary magnetic hard disk. The **Solid State Disk** series products provide an all in one module solution for solid-state flash disk. The **Solid State Disk** is suitable for use in portable and embedded systems which have limited space and power consumption.

Unlike IDE drives, no signal cable and extra, special space is required. The **Solid State Disk** is a solid-state solution for IDE Hard Disk drive, which has no moving parts. That provides a good stability in a moving system. The **Solid State Disk** products are also free from extra and special algorithm or some firmware driver. Just plug the **Solid State Disk** into the USB slot and play it, users can play the **Solid State Disk** as same as the Hard Disk Drives.

The **Solid State Disk** family provides the capacities ranging from 64MB up to 2GB. In the future, the capacity will be increased up to 4GB.

- **Application Fields;**
 - Industrial PC and Thin Client
 - Low-end and low cost consumer PC
 - Game and Telecommunication Machine
 - Ticketing, Examining, testing machine
 - Army, Health and Production Equipment and Machine
 - Other machines and Equipments with USB interface slots on mother-board
 - **Windows Vista ReadyBoost™ Embedded Device on Mother-Board**

1.2 Product Features

1. *USB Interface:*

- 1) Support Standard USB (Universal Serial Bus) interface.
- 2) Fully compatible with USB Specification 2.0/1.1
- 3) Support USB Mass Storage Command Protocol.
- 4) High Speed (480 Mbits/sec), Full Speed (12 Mbits/sec) and Low Speed (1.5 Mbits/sec) transfer support.
- 5) USB Power saving support.
- 6) Support NAND Flash memory with write-protected ability.
- 7) Support interleave flash algorithm.

2. *Error Correction Logic:*

- 1) Reed Solomon code 12bit symbol length
- 2) 4 symbol Error Correction
- 3) Error Correction of 4 symbol random error per 512 Bytes of data.
- 4) Automatic on-the-fly, in-buffer error correction.

1.3 System Requirement

- The Host system which is connected to USB Solid State Disk should meet system requirements at minimum;

1.3.1 Power Requirement

- Voltage: DC 5V

1.3.2 Operating System

- Storage only: Windows 2000/XP/VISTA, WinXP Embedded
- Storage and Boot Disk: Linux, DOS, WinCE, WinXP Embedded (Service Pack2)

1.3.3 Interface

- Standard USB 2.0/1.1 Interface (10pin)

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2. Feature

2.1 Physical Specifications

2.1.1 Overlook

The overlook views of USB Solid State Disk are illustrated in Figure 1.

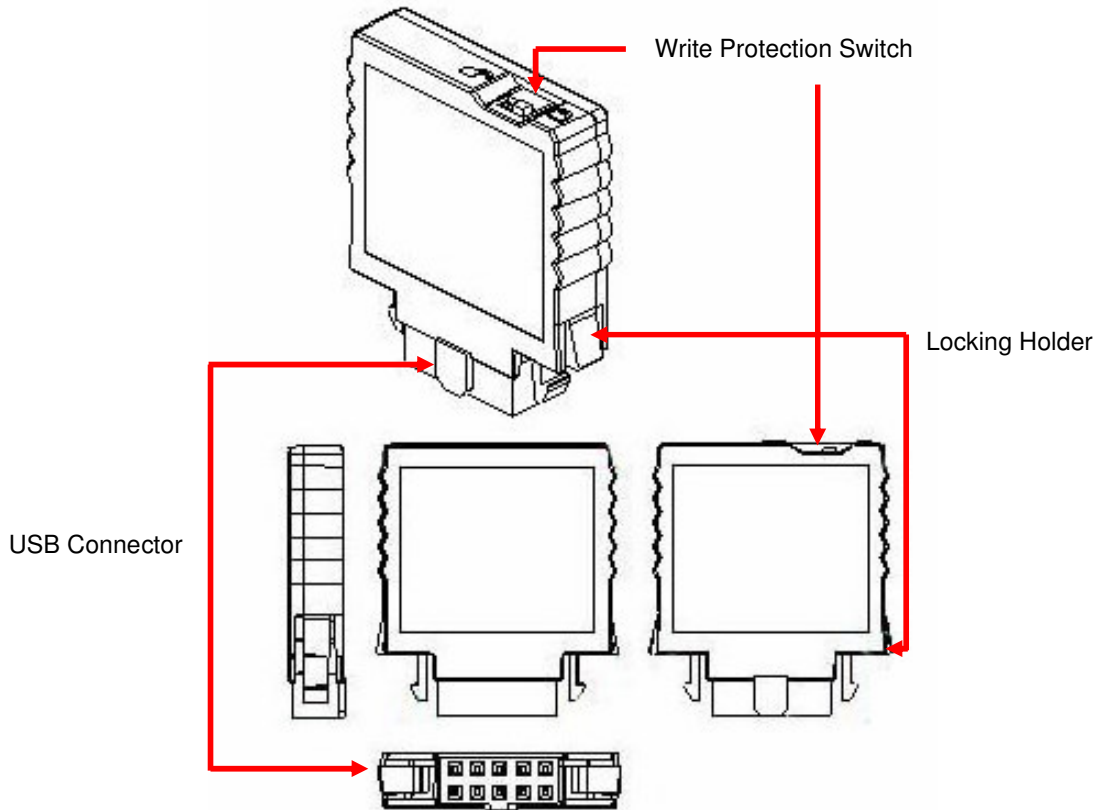


Figure 1: USB Solid State Disk Overlook Diagram

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2.1.2 Dimension

The Dimensions of USB Solid State Disk are illustrated in Figure 2 and described in Table 1.

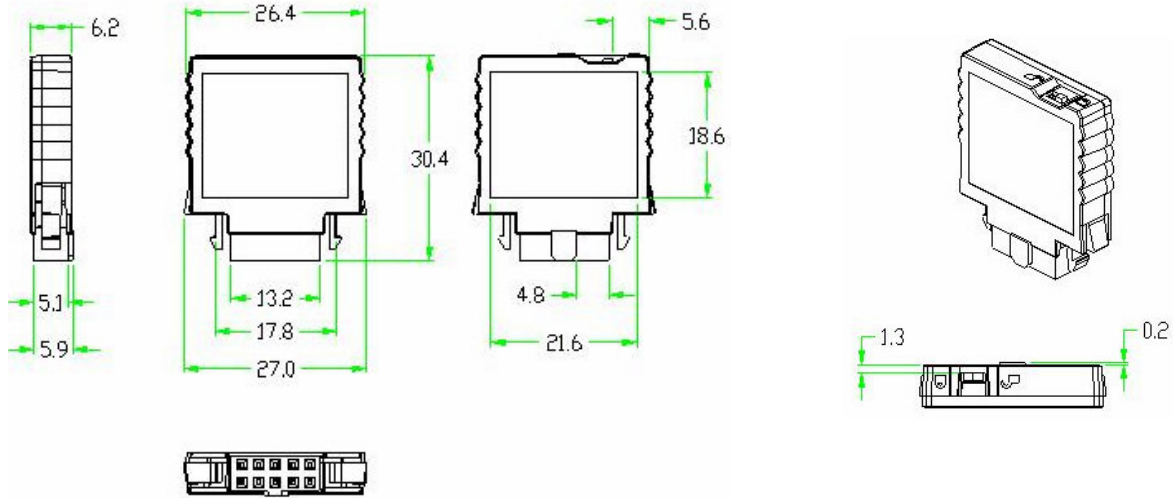


Figure 2: USB Solid State Disk Dimensions

Table 1: USB Solid State Disk Physical Dimension

Height	30.4 ± 0.1 mm
Width	26.4 ± 0.1 mm
Thickness	6.2 ± 0.1 mm

2.1.3 Weight

- Weight: 4.7g

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2.2 Electronic Specifications

2.2.1 Product Definition

USB Solid State Disk is designed to operate and work as Data or Code Storage device by NAND Flash Memory and its Controller through USB 2.0/1.1 Interface to Host Systems.

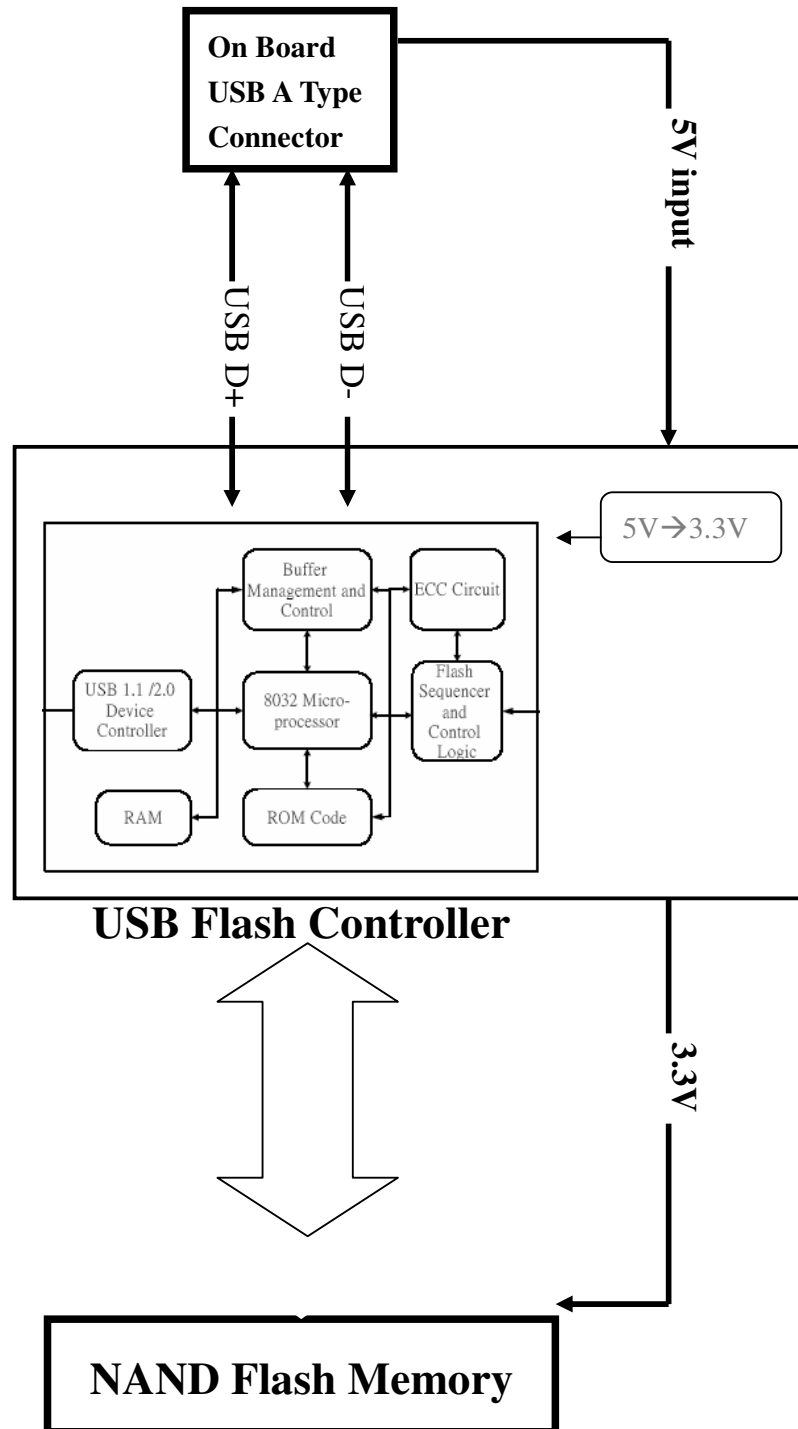


Figure 3: USB Solid State Disk Block Diagram

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2.2.2 Operating Voltage

- Voltage DC +3.3V \pm 5% or DC +5.0V \pm 10%

2.2.3 Capacity and Block Size information

- Capacity: 64MBytes ~ 2GBytes
- Sector Size: 512Bytes

2.2.4 Power Consumption

- DC Information

Table 2: USB Solid State Disk Power Consumption

Mode	Power Consumption
Read	51.3 mA (typ.)
Write	67.1 mA (typ.)
Stand by	45.6 mA (typ.)
Suspend	0.3 mA (typ.)

※ Testing Platform;

- Mother-Board: ASUS P5PE-VM, CPU: Intel Celeron 3GHz, System Memory: DDR2 512MB,
Operating System: WinXP, Test Program: HDBENCH 3.xx .

2.3 Performance Specifications

2.3.1 Modes

- USB 2.0/1.1

2.3.2 Data Transfer Time (On USB 2.0 standard)

- Sequential Read: 16 MB/sec
- Sequential Write: 8 MB/sec
- Interface burst transfer rate (High-speed USB Spec Version 2.0): 480Mb/sec

Notice The value is various bases on the testing platform.

2.3.3 Data Retention

- 10years without requiring power support

Notice The Value of Data Retention is various bases on the type and manufacturer of Flash Memory

2.3.4 Wear-leveling

- Dynamic Wear-Leveling for same level of Write/Erase Cycle

2.3.5 Bad Block Management

- The Bad Blocks of Flash Memory will be replaced into new ones by controller.

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2.4 Environmental Specifications

2.4.1 Temperature

- Operating Temperature: 0°C to +70°C
- Non-Operating Temperature: -40°C to +85°C

2.4.2 Humidity

- Operating Humidity: 8% to 95%
- Non-Operating Humidity: 8% to 95% (with no condensation relative humidity)

2.4.3 Bare Drop Testing

- Testing Conditions: 75cm height
- Testing Orientation: (Free fell) Front/Rear/Right/Left/Top/Bottom side
- Testing Result: Pass

2.4.4 Vibration

- TBD

2.4.5 Altitude

- TBD

2.5 Reliability Specifications

2.5.1 ECC/EDC (Error Correction Code/Error Detection Code)

- 4symbol random error per 512Bytes of data

2.5.2 Read and Write/Erase Cycle

- Read: No Limitation
- Write/Erase: 5,000,000 times
(Estimated on reference to Doc No.SM070001)

2.5.3 MTBF (Mean Time Between Failure)

- 2,000,000hours
(Estimated on reference to Doc No.SM070002)

2.5.4 Power Cycle

- TBD

2.6 Compliance Specifications

- CE
- FCC

※ Note: Please contact your closest PQI's office for other certificate information.

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3. Function

3.1 Switch Setting

- On case which the switch place "Lock" side, then the data will be read only and can't be written.
- On case of placing in "Open" side, the data will be read and written together.

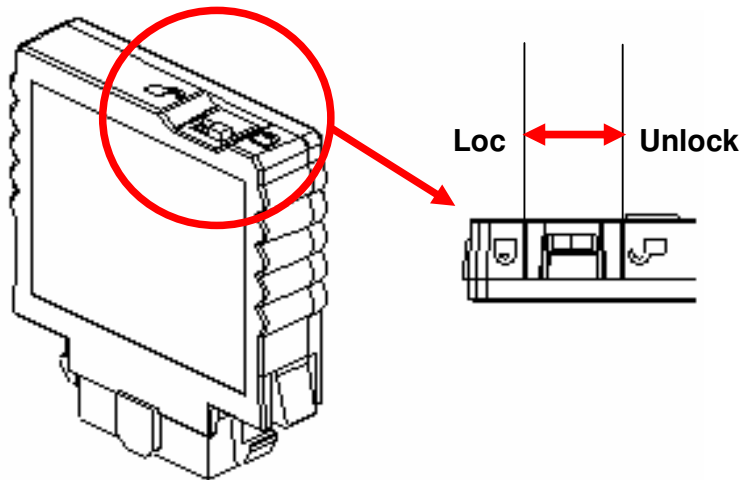


Figure 4: Write Protection Switch

3.2 Pin Signal Assignment

- The signals assigned for USB applications are described in Table 2

Table 3 –USB connector pin definitions

Pin No.	Pin Name	Function
1	VCC	USB power input
3	USB D-	USB differential signal
5	USB D+	The pairs are used to transmit Data/Address/Command
7	VSS	Ground

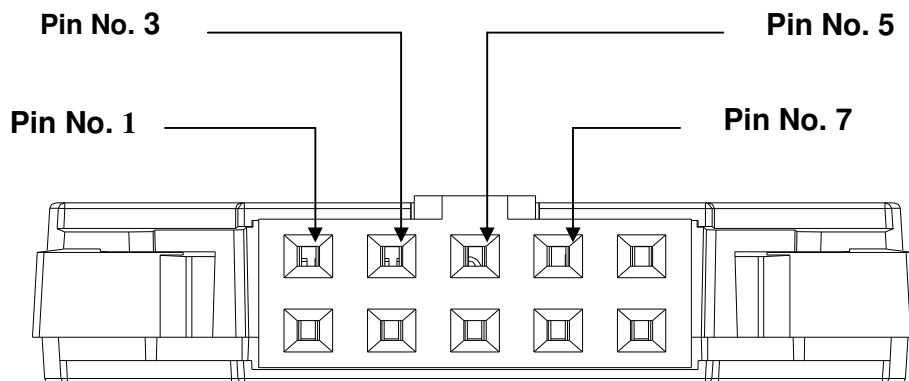


Figure 5: USB Pin Signal Assignment

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4. Ordering Information

Table 4: USB Solid State Disk Ordering Information

P/N	Capacity (Max)
DM0064M-181RE ₂₀	2GB

*1 : 064M=64MB, 128M=128MB, 256M=256MB, 512M=512MB, 010G=1GB, 020G=2GB

*2 : Flash Density

E: 64MB, F: 128MB, I: 256MB, L: 512MB, N: 1GB, P: 2GB