

DiskOnModule Turbo DQ Series



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1. Product Description

1.1 Product Overview

PQI's DiskOnModule (DOM) is the storage device based on NAND flash memory technology. This product complies with 44 PIN IDE (ATA) standard interface and is suitable for data storage media and code storage device for embedded system and boot disk. By using **DiskOnModule**, it is possible to operate good performance for the systems, which have IDE interface.

With small form factor, the applicable appliance can add or install IDE storage device on its Mother Board or Complete set.

● **Application Fields;**

- Industrial PC and Thin Client
- Game and Telecommunication Machine
- Ticketing, Examining, testing machine
- Army, Health and Production Equipment and Machine

1.2 Product Features

- Small form factor with IDE (ATA) Standard Interface connector
- Memory Capacities: 32MB ~ 4GB
- High performance and reliability
- Noiseless and stable installation to system
- Operating voltage 3.3V or 5.0V operation
- Standard IDE (ATA) Interface
- Selection of write Protection Switch function by customers
- Operating as Boot Disk
- Data Storage Device to 4GB
- Code Storage Device for Embedded Operating System
- Selection of Industrial or Wide Temperature type by customers

1.3 System Requirement

- The Host system which is connected to DiskOnModule should meet system requirements at minimum;

1.3.1 Power Requirement

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

1.3.2 Operating System

- Windows 2000/XP
- Linux
- DOS
- WinXP Embedded
- WinCE

1.3.3 Interface

- IDE (ATA) Standard Interface

2. Specification

2.1 Physical Specifications

2.1.1 Overlook

The overlook views of DiskOnModule are illustrated in Figure 1.

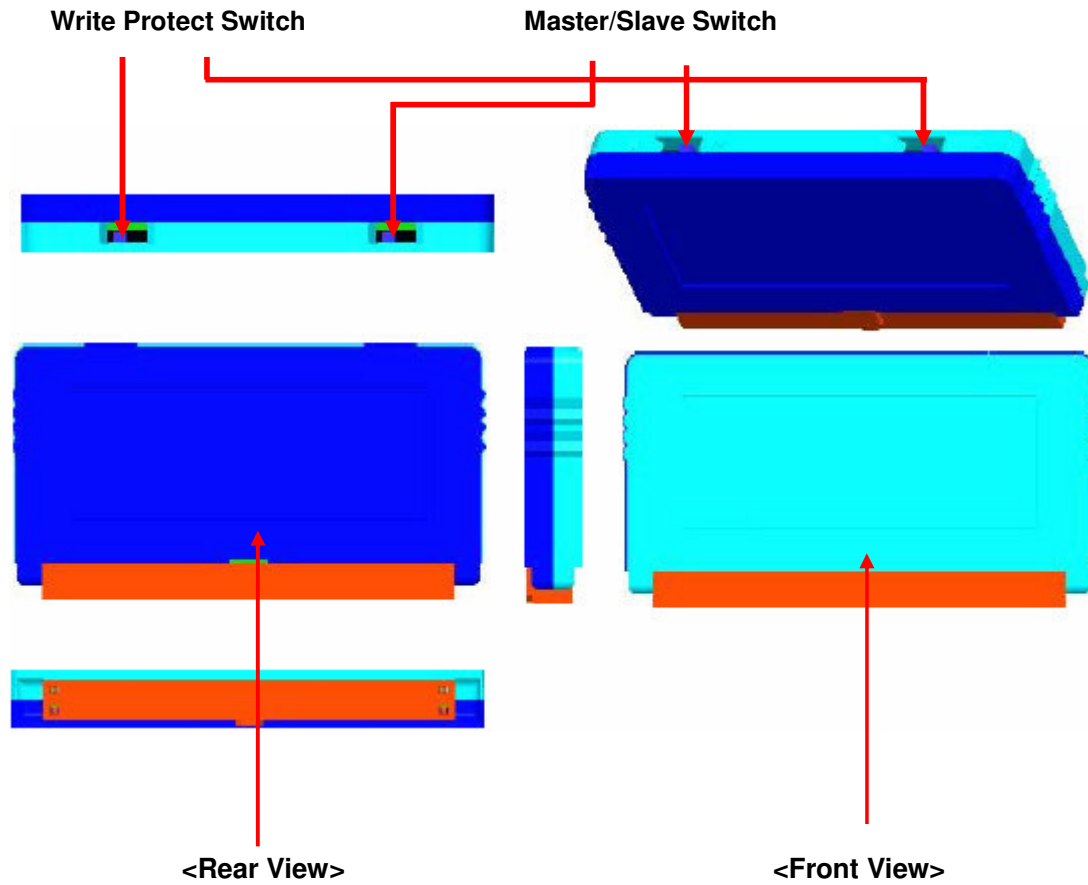


Figure 1: DiskOnModule Overlook Diagram

2.1.2 Dimension

The Dimensions of DiskOnModule are illustrated in Figure 2 and described in Table 1.

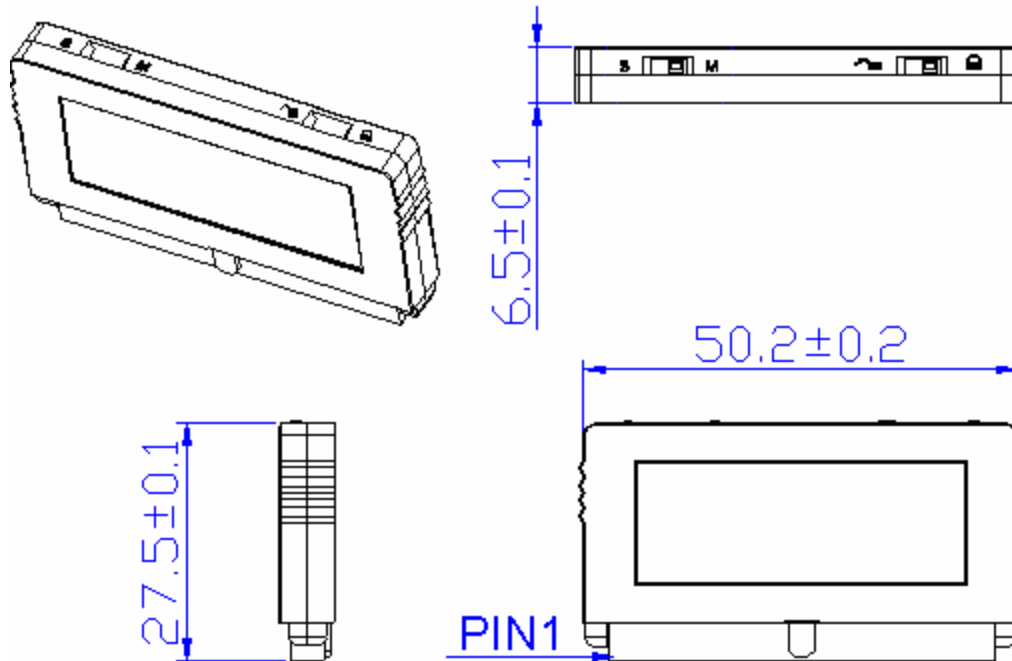


Figure 2: DOM Dimensions

Table 1: DiskOnModule Physical Dimension

Length	50.2 ± 0.2 mm
Width	27.5 ± 0.1 mm
Thickness	6.5 ± 0.1mm

2.1.3 Weight

- Weight: 15g

2.2 Electronic Specifications

2.2.1 Product Definition

DiskOnModule is designed to operate and work as Data or Code Storage device by NAND Flash Memory and its Controller through IDE (ATA) Standard Interface to Host Systems.

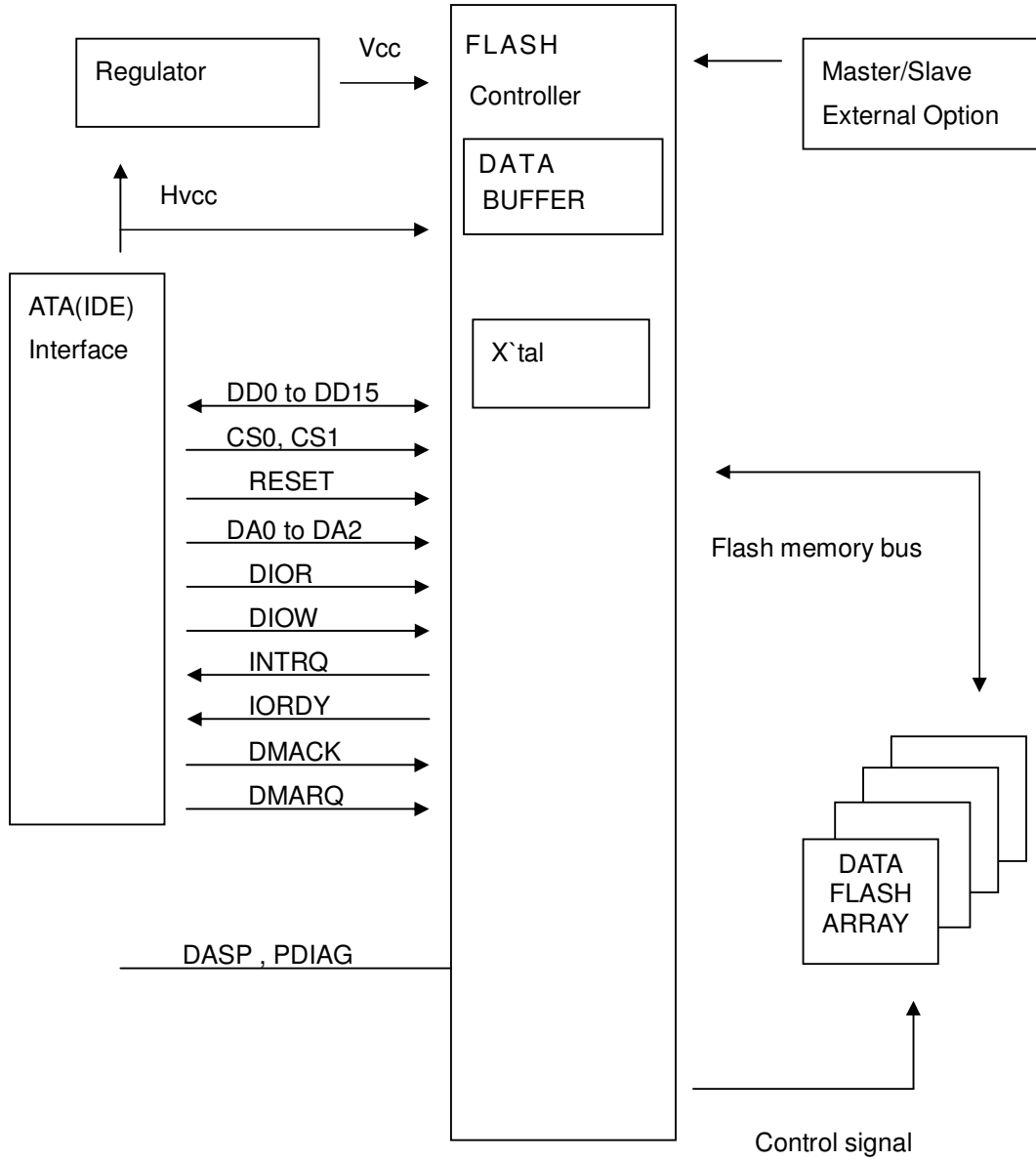


Figure 3: DiskOnModule Block Diagram

2.2.2 Operating Voltage

- Voltage DC +3.3V ± 5% or DC +5.0V ± 10%

2.2.3 Capacity and Block Size information

- Capacity: 32MB ~ 4GB
- Sector Size: 512B

2.2.4 Power Consumption

- DC Information

Voltage	Testing Item	Read Sector Current	Write Sector Current	Stand-By Current
5V	Maximize/Peak Current	34.35mA	39.8mA	20.6mA
	Normal Current	34mA	38.9mA	9.6mA
	Watts	171.75mW	199mW	103mW
3.3V	Maximize/Peak Current	32.45mA	36.5mA	17.7mA
	Normal Current	31.8mA	35.7mA	9.6mA
	Watts	107.085mW	120.45mW	58.41mW

※ Testing Platform;

- Mother-Board: GA-K8U-939, CPU: K8 2.0G, System Memory: DDR 512MB,
 Operating System: DOS 6.22, Test Program: RWALL10 & DOMSV31
 Test sample : IDE 1.8" SSD 4GB

2.3 Performance Specifications

2.3.1 Modes

- PIO mode 4
- Ultra DMA 2
- Setting to Ultra DMA 0 or 1 also available as following to Customer's request

2.3.2 Access Time

- DiskOnModule's maximum access time is about 0.25msec.

※ Testing Platform

Testing S/W: QBench, Testing OS: DOS, Data: 1sector (512B)
 Testing base: Time required Between Host to Device

2.3.3 Seek Time

- DiskOnModule has no seek time by being based on Flash Memory technology.

2.3.4 Mount Time

The Mount Time for initializing and mounting DiskOnModule is different by depending on Operating System and testing Platform.

2.3.5 Data Transfer Time

- Sequential Read: 15 MB/sec
- Sequential Write: 12 MB/sec

※ Test Platform: GIGA 8I945GME Intel:945+ICH7 3.0GHz DDR:400

Testing Software: HD Bench 3.4 Testing OS: Windows XP

Notice The value is various bases on the testing platform.

2.3.6 Data Retention

- 10years without requiring power support

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

2.3.7 Wear-leveling

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

2.3.8 Bad Block Management

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

2.3.9 Read/Write Cycle

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

2.4 Environmental Specifications

2.4.1 Temperature

- Operating Temperature: 0°C to +70°C, Non Operating Temperature: -40°C to +85°C (Industrial type)
- Operating Temperature: -40°C to +85°C, Non Operating Temperature: -55°C to +95°C (Wide Temperature type)

2.4.2 Humidity

- Operating Humidity (30°C Max. Wet Bulb Temp): 8% to 95%
- Non-Operating Humidity (30°C Max. Wet Bulb Temp): 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

- Random Vibration (Operation) : Testing Specification

Frequency (Hz)	PSD (G2/Hz)	Acceleration (Grms)	Dwell Time (Min)
10	0.01	6Grms	30min per axis (X · Y · Z)
100	0.08		
500	0.08		

- Random Vibration (Non-Operating): Testing Specification

Frequency (Hz)	PSD (G2/Hz)	Acceleration (Grms)	Dwell Time (Min)
10	0.1	6Grms	30min per axis (X · Y · Z)
100	0.04		
500	0.04		
2000	0.004		

- Frequency Range: 3 ~ 2000Hz
- Testing Result: Pass

2.4.5 Shock and Altitude

T. B. D.

2.5 Reliability Specifications

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

- 1B data by 128B will be corrected.

2.5.2 Read and Erase/Program Cycle

- Read: No Limitation
- Erase/Program: 5,000,000 times

(Estimated on reference to Doc No.SM070001)

2.5.3 MTBF (Mean Time Between Failure)

- 2,000,000 hours

(Estimated on reference to Doc No.SM070002)

2.6 Compliance Specifications

- CE
- FCC

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

3. Function

3.1 Switch Setting

3.1.1 Master/Slave Switch

- On case which the switch place “Master” side, then the DOM will be recognized as C: Drive in system and operate as main storage device.
- On case of placing in “Slave” side, the DOM will be recognized as slave disk and operate as slave storage device.

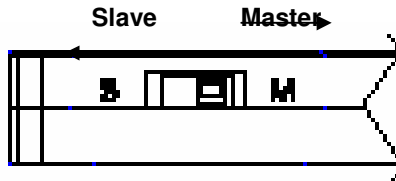


Figure 4: Master/Slave Function Switch

3.1.2 Write Protect Switch

- On case which the switch place “Lock” side, then the data can not be written into DOM and can be read only.
- On case of placing in “Unlock” side, the data can be written and read together.

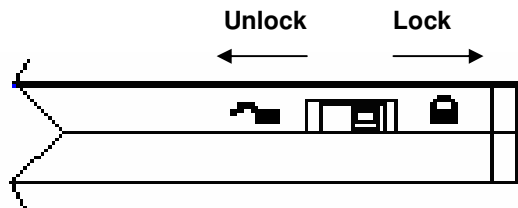


Figure 5: Write Protect Switch

3.2 Pin Signal Assignment

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

Table 2 :ATA connector pin definitions

Signal name	Connector contact	Conductor		Connector contact	Signal name
RESET-	1	1	2	2	Ground
DD7	3	3	4	4	DD8
DD6	5	5	6	6	DD9
DD5	7	7	8	8	DD10
DD4	9	9	10	10	DD11
DD3	11	11	12	12	DD12
DD2	13	13	14	14	DD13
DD1	15	15	16	16	DD14
DD0	17	17	18	18	DD15
Ground	19	19	20	20	(keypin) or Vcc
DMARQ	21	21	22	22	Ground
DIOW-	23	23	24	24	Ground
DIOR-	25	25	26	26	Ground
IORDY	27	27	28	28	CSEL
DMACK-	29	29	30	30	Ground
INTRQ	31	31	32	32	reserved
DA1	33	33	34	34	PDIAG-
DA0	35	35	36	36	DA2
CS0-	37	37	38	38	CS1-
DASP-	39	39	40	40	Ground
+5 V (logic) (see note)	41	41	42	42	+5 V (Motor) (see note)
Ground(return) (see note)	43	43	44	44	TYPE- (0=ATA) (see note)

NOTE – Pins which are additional to those of the 44-pin cable.

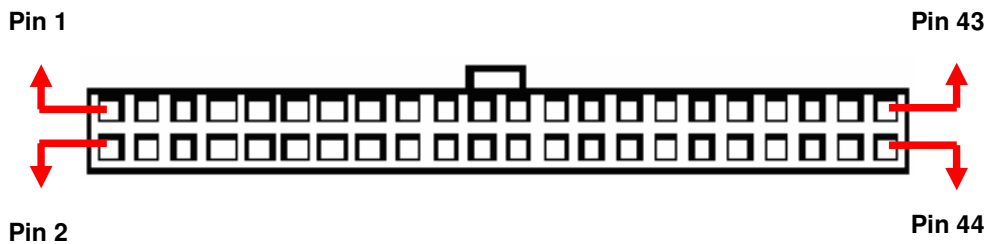


Figure 6: Signal Connector

※ Notes:

- All pins are in a single row, with a 1.27 mm (0.050") pitch.
- The comments on the mating sequence apply to the case of backplane blind mate connector only. In this case, the mating sequences are:
 - the pre-charge power pints and the other ground pins.
 - the signal pins and the rest of the power pins.

4. Ordering Information

Table 3: DiskOnModule Ordering Information

P/N	Capacity (Max)
DQ0 032M -188R D -20	4GB

* 1 : 032M:32MB, 064M:64MB, 128M:128MB, 256M:256MB, 512M:512MB, 010G:1GB, 020G:2GB, 040G:4GB

* 2 : Flash Density
D:32MB, E:64MB, F:128MB, I:256MB, L:512MB, N:1GB, P:2GB

* 3 : DQ0**032M**88R**D0**(WP): With Write Protect Switch
DQ0**032M**88R**D0** : Without Write Protect Switch