DiskOnModule

Standard II DE Series

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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 40 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: 128MB ~ 8GB
- High performance and reliability
- Noiseless and stable installation to system
- Operating voltage 3.3V or 5.0V operation
- Standard IDE (ATA) Interface
- Master and Slave Switch
- Write Protection Switch
- Operating as Boot Disk
- Data Storage Device to8GB
- Code Storage Device for Embeded Operating System

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 ± 5% or DC +5.0V ± 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.

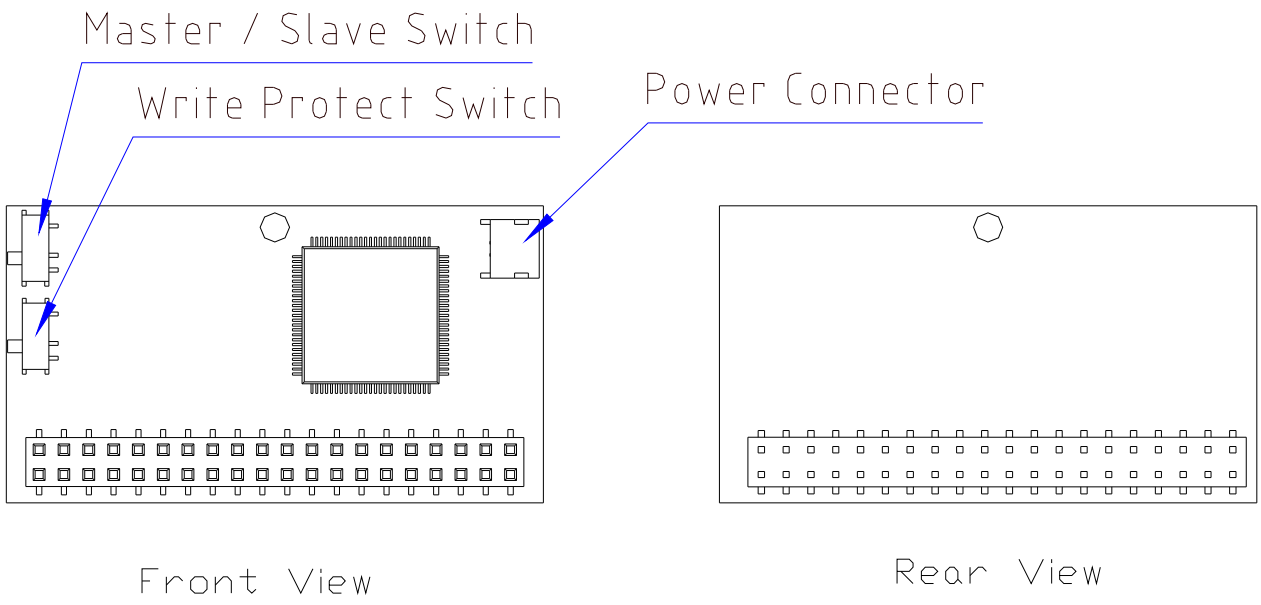
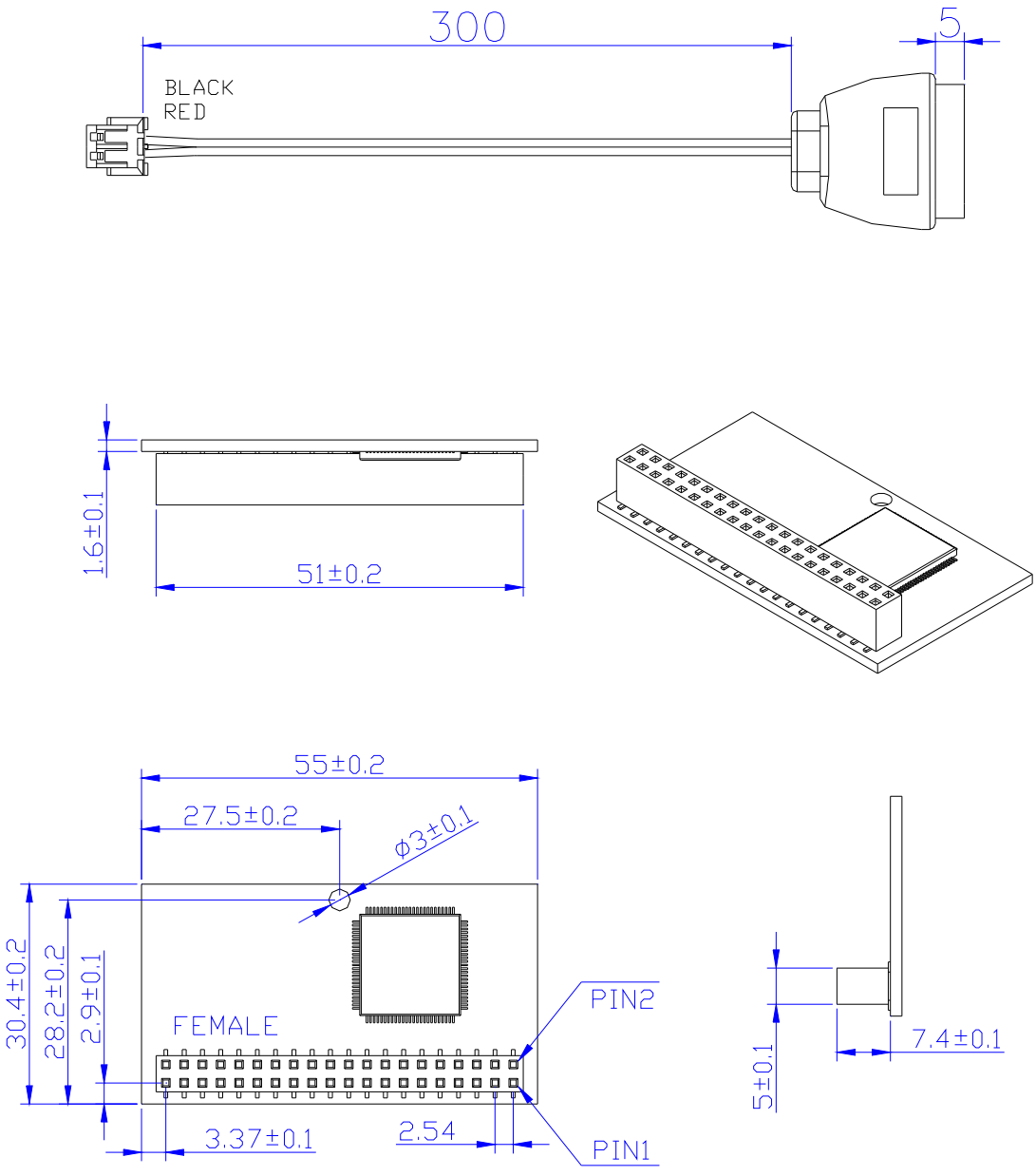


Figure 1: DiskOnModule Overlook Diagram

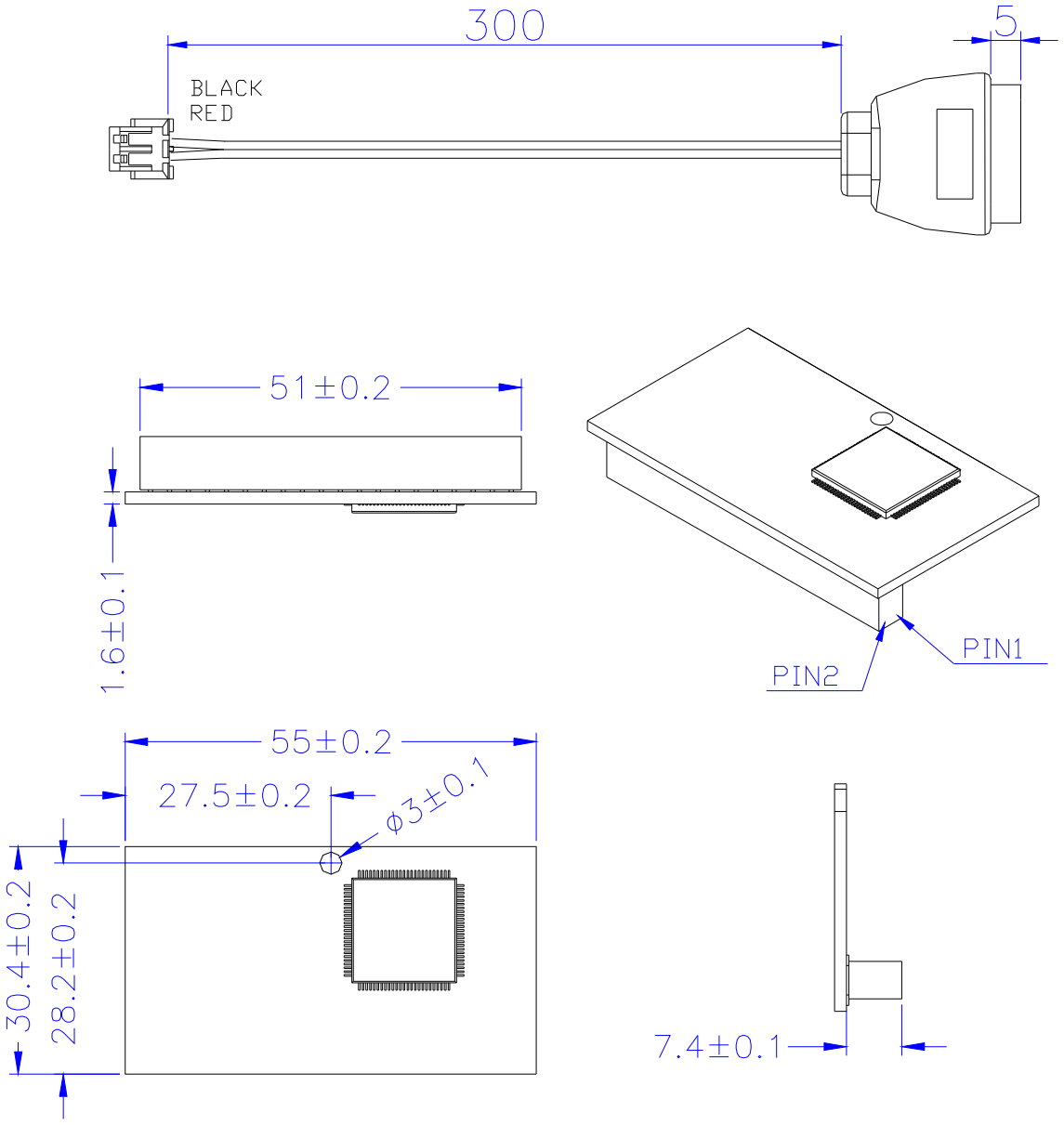
2.1.2 Dimension

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

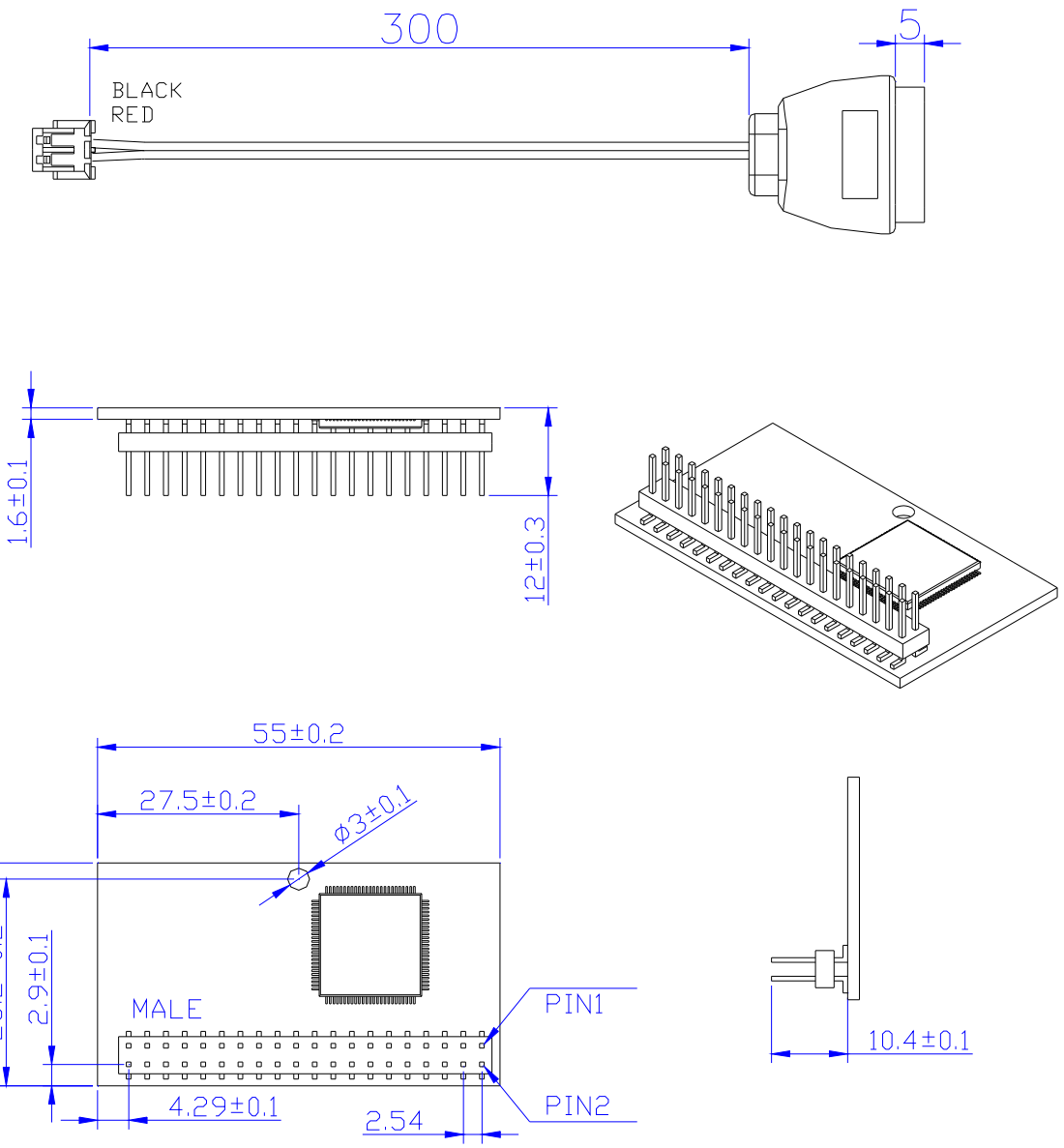
DE0XXXX46XX1 (40 PIN)



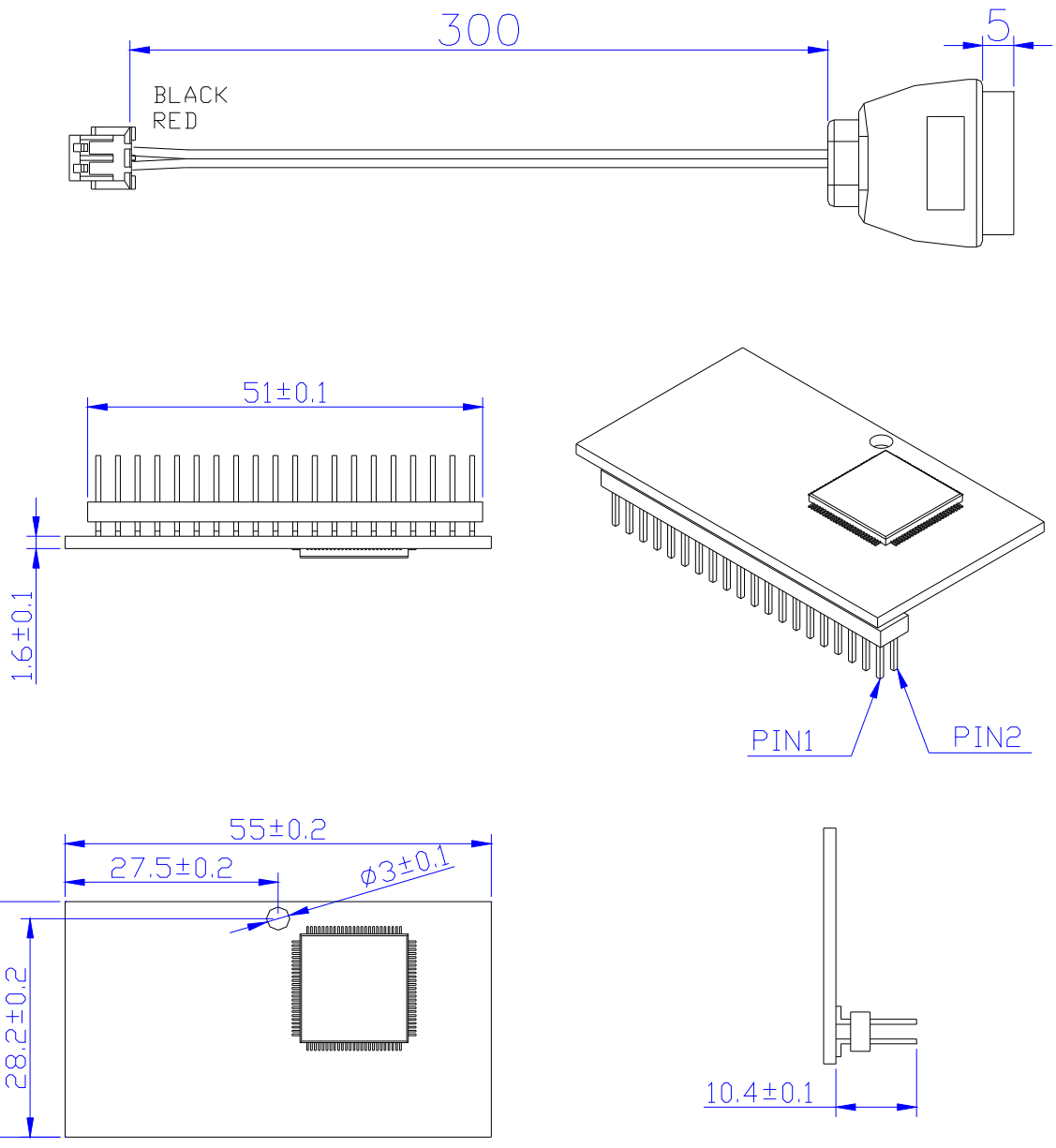
DE0XXXX46XX2 (40 PIN)



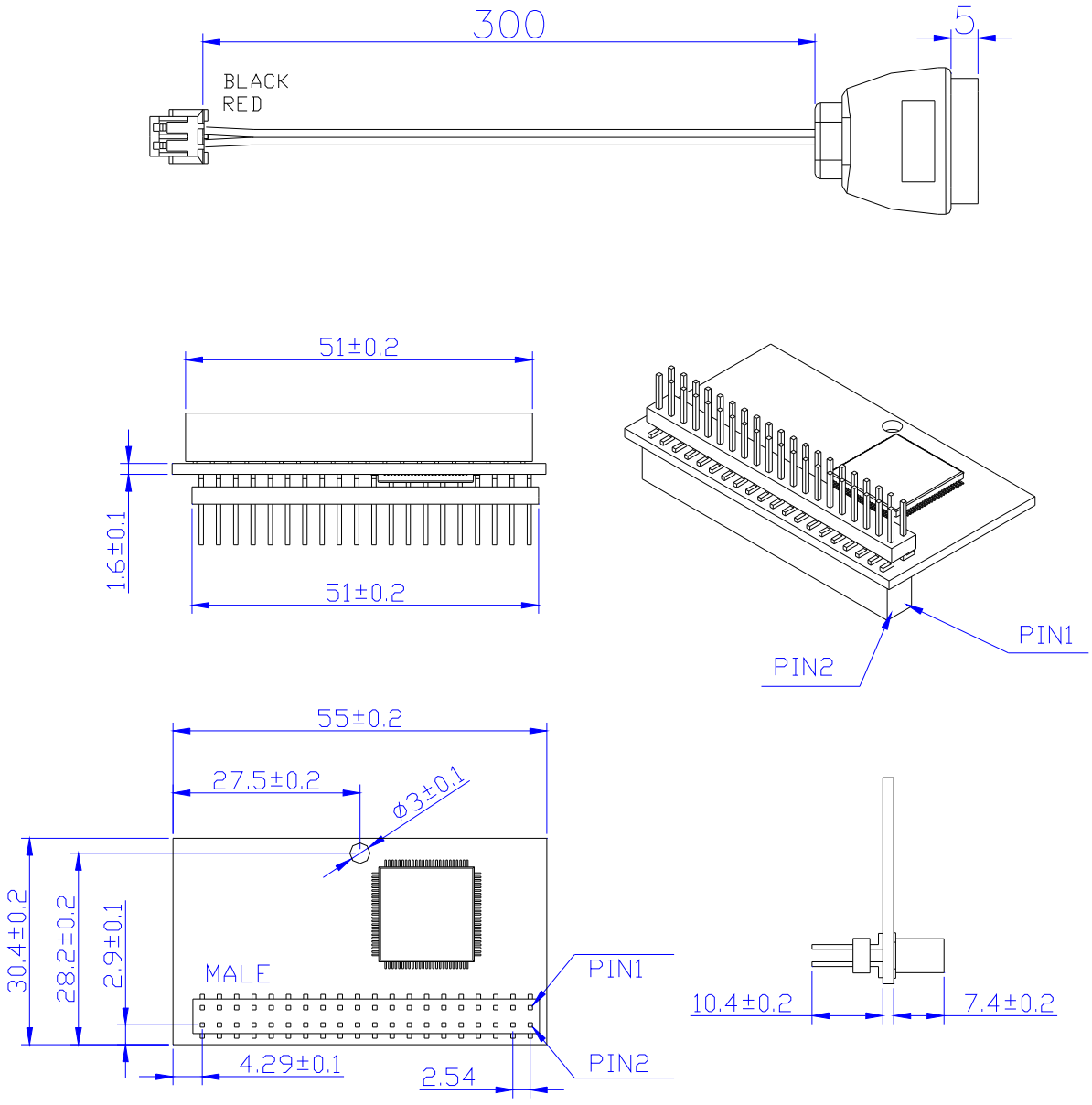
DE0XXXX46XX3 (40 PIN)



DE0XXXX46XX4 (40 PIN)



DE0XXXX46XX5 (40 PIN)



DE0XXXX46XX6 (40 PIN)

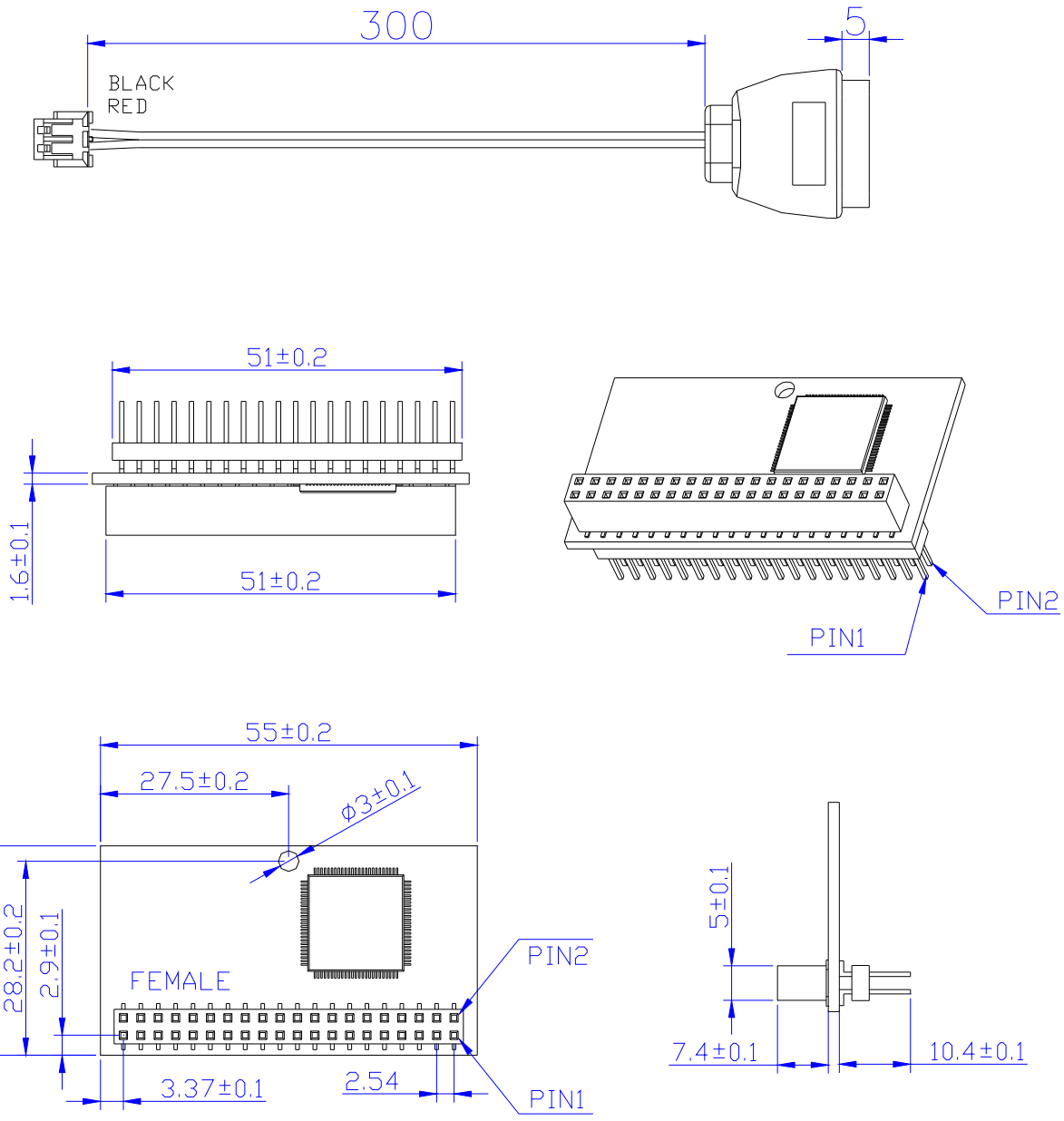


Figure 2: DOM Dimensions

Table 1: DiskOnModule Physical Dimension

Length	55 ± 0.2 mm
Width	30.4 ± 0.2 mm
Thickness	Depends on connector type

2.1.3 Weight

- DiskOnModule Weight: < 12g
- Power Cable Weight: < 11g

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.

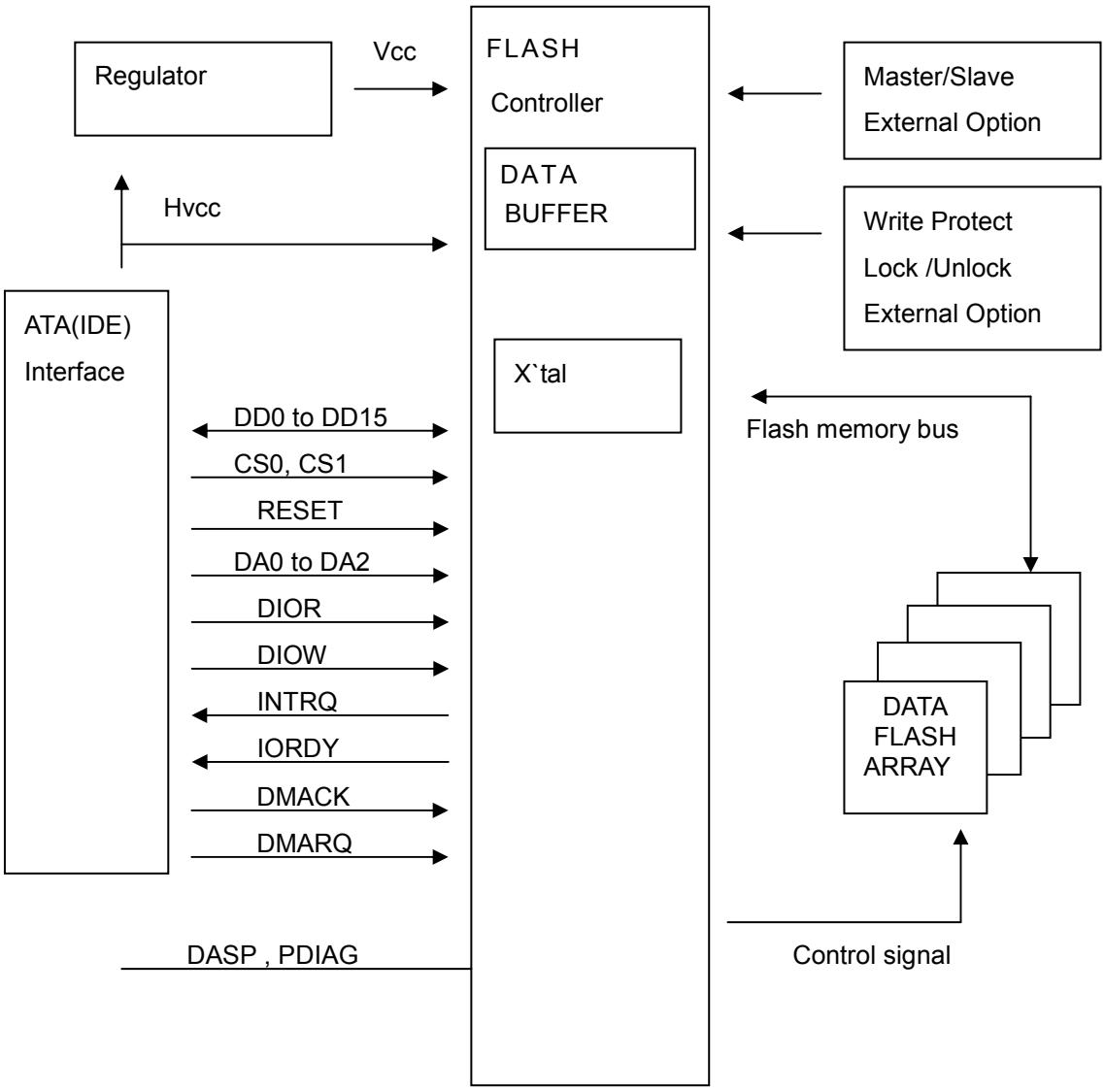


Figure 3: DiskOnModule Block Diagram

2.2.2 Operating Voltage

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

2.2.3 Capacity and Block Size information

- Capacity: 128MB ~ 8GB
- Sector Size: 512B

2.2.4 Power Consumption

- DC Information

Test Item	**3.3V**	**5.0V**
Write Current	45mA	48mA
Read Current	43mA	45mA
Sleep Current	0.6mA	0.8mA

※ *Testing Platform;*
- Mother-Board: GA-K8U-939, CPU: K8 2.0G, System Memory: DDR 512MB, Operating System: DOS 6.22, Test Program: RWALL10 & DOMSV31

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 Seek Time

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

2.3.3 Mount Time

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

2.3.4 Data Transfer Time by Channel mode

Mode	Single		Dual Mode	
Condition	Sequential Read	Sequential Write	Sequential Read	Sequential Write
Speed	10MB/s	5MB/s	20MB/s	10MB/s

※ *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.

2.3.5 Data Retention

- 10years without requiring power support

2.3.6 Wear-leveling

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

2.3.7 Bad Block Management

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

2.4 Environmental Specifications

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

2.4.2 Humidity
- Operating Humidity: 10% to 95%
- Non-Operating Humidity: 10% to 95% (with no condensation relative humidity)

2.4.3 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		

- Sine Vibration (Non-Operation) : Testing Specification

Testing Specification		
Frequency（Hz）	Acceleration（G）	Dwell Time（min）
10~500 Hz	15 G	30min per axis (X・Y・Z)

2.4.4 Bare Drop Testing
- Testing Conditions: 75cm height
- Testing Orientation: (Free fell) Front/Rear/Right/Left/Top/Bottom side
- 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)
- Built-in Reed Solomon 4bytes/sector correction and 5bytes/sector detection.

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)
- 2,000,000 hours

(Estimated on reference to Doc No.SM070002)

2.5.4 Power Cycle
- The Power Cycling is tested to 5000 loop. => “Pass”

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.

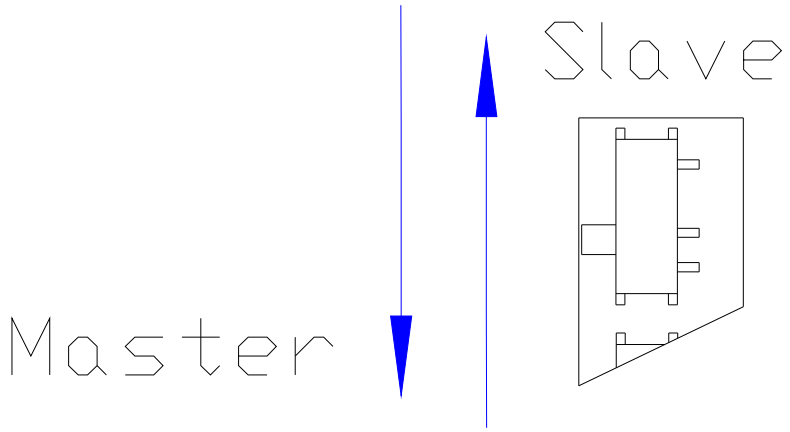


Figure 4: Master/Slave Function Switch

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.

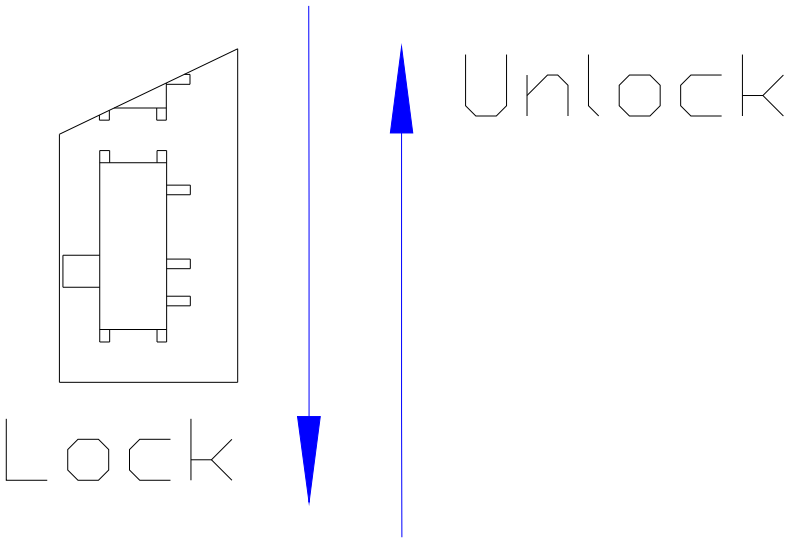


Figure 5: Write Protect Switch

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

※ Notes:

1. All pins are in a single row, with a 2.54 mm (0.100") pitch.

2. 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.

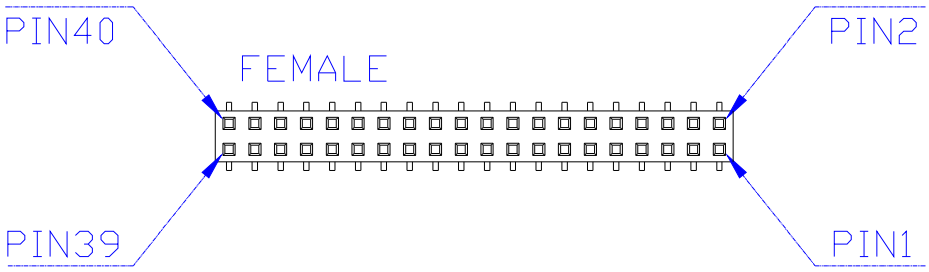


Figure 6: Signal Connector

3.3 Standard-II Capacity and Cylinder, Head, Sector

The table show various capacities available for Standard-II series, if your platform does not support auto-detection function or Standard-II series is not identified, we advice can following below Cylinders, Heads, Sectors number to setting your platform.

Unformatted Disk Capacity	No. of Cylinders	No. of Heads	No. of Sectors	Disk Total Sector
128MB	480	16	32	245760
256MB	960	16	32	491520
512MB	975	16	63	982800
1GB	1950	16	63	1965600
2GB	3900	16	63	3931200

4GB	7801	16	63	7863408

4. Operation Specification

4.1 Absolute Maximum Ratings

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Power supply voltage	VCC	-0.3 ~ +5.6	V
Input voltage	Vin	-0.3 ~ +5.6	V

(Referenced to GND)

Electric characteristics
Vcc=3.14V~5.5V

Item	Symbol	Value			Unit	Measuring conditions
		Min.	Standard	Max.		
Input voltage (TTL level)	V_{IH}	2.0	-	*1	V	
	V_{IL}	-	-	0.7	V	
Output voltage	V_{OH}	2.2	-	*2	V	I_{OH}=-2mA~ -24mA
	V_{OL}	-	-	0.4	V	I_{OL}=2mA~ 24mA

5. Ordering Information

Table 3: DiskOnModule Ordering Information

P/N	Capacity (Max)
DE0***128M****1*46R*2*F*3*1*4*	8GB

*1：128M:128MB, 256M:256MB, 512M:512MB, 010G:1GB, 020G:2GB, 040G:4GB,080G:8GB
*2：*2：R: Industrial type T: Wide Temperature type
*3：Flash Density
F:128MB, I:256MB, L:512MB, N:1GB, P:2GB
*4: Connector Direction: 1:LFD, 2:LDF, 3:LMD, 4:LDM, 5:LMF, 6:LFM
*5：DE0***128M***46R***F***1(WP): With Write Protect Switch
DE0***128M***46R***F***1 : Without Write Protect Switch

6. Contact Information

- For further information, please contact the following PQI or representative which place you are located at.

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