Unity Digital
PH Series
2.5inch
IDE/PATA eSSD
Datasheet Rev. B

Unity Digital

SATA DOM Module Specification

(SATA Flash Module)

Preliminary Version 0.2

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REVISION HISTORY

Rev.	History	Draft Date	Author
0.1	First Release	2011/11/16	Grace Chen
0.2	Modify Controller Block Diagram	2011/12/01	Hao Tran

1.3 Electrical/Physical interface

a. SATA interface

- Support SATA 1.5Gbps and 3Gbps interface.

b. DDR IO

- Support DDR2 I/O interface

c. Flash IO

- Support 1.8V and 3.3V voltage level
- Support 1.8V for ONFI Flash
- Support 3.3V for conventional asynchronous flash

1.4 Controller Features

a. SATA II

- SATA Revision 2.6 compliant.
- Compatible with SATA 1.5Gbps and 3Gbps interface.
- Power management supported
- Support expanded register for SATA protocol 48 bits addressing mode
- Embedded BIST function of SATA PHY for low cost mass production

b. NAND Flash Interface

- With built-in hardware ECC circuit (up to 44bit/1KB).
- Support SLC and MLC with large block of 4/8/16KB per page NAND Flash
- ONFI2.0 Interface supports up to 2 channels
- Bus width: 8/16 bit

c. DDR2 interface

- 16 bit data bus
- Data Rate: 480Mbps
- Support Capacity : 64MB

d. Built-in 32-bit micro-controller

e. UART

f. GPIO

2. Product Specifications

2.1 Support Capacity

Up to 64GB (support 48bit addressing mode)

2.2 Performance

With the advantage of 4 chip-enables, the performance can reach 180MB/s for sequential read and 75MB/s for sequential write with 64MB DDRII cache buffer.

2.3 ECC scheme

- Support 44-bit ECC correct per 1K Byte data

2.4 Environmental Conditions

- Temperature: -40°C to 85°C in storage / 0°C to 70°C in operating
- Humidity: RH 95% under 55°C
- Shock*: 1500G/0.5ms
- Vibration*: 80-2000Hz/20G
- Acoustic = 0dB

*Subject to be changed without notice.

3. Electrical Specifications

3.1 Pin and Signal Assignment

Table 1: Pin assignments and descriptions

Pin #	Pin Definition	Description
1	GND	
2	+A	Host Transmitter Differential Signal Pair
3	-A	Host Transmitter Differential Signal Pair
4	GND	
5	-B	Host Receiver Differential Signal Pair
6	+B	Host Receiver Differential Signal Pair
7	GND	

3.2 Supply voltage

Table 2: Supply Voltage of SATA DOM

Parameter	Rating
Operating Voltage	5V

3.3 Power Consumption

Table 3: Power consumption of SATA DOM

Parameter	Value (mA)
Idle	TBD
Write	TBD
Read	TBD

4. Command Description

4.1 ATA Command List

Table 4: ATA command list

Op-Code	Command Description
06h	Data Set Management
10h	Recalibrate
20h	Read Sectors
21h	Read Sectors without Retry
24h	Read Sectors EXT
25h	Read DMA EXT
27h	Read Native Max Address EXT
29h	Read Multiple EXT
2Fh	Read Log EXT
30h	Write Sectors
31h	Write Sectors without Retry
34h	Write Sectors EXT
35h	Write DMA EXT
37h	Set Native Max Address EXT
39h	Write Multiple EXT
3Dh	Write DMA FUA EXT
3Fh	Write Long EXT
40h	Read Verify Sectors
41h	Read Verify Sectors without Retry
42h	Read Verify Sectors EXT
60h	Read FPDMA Queued
61h	Write FPDMA Queued
70h	Seek
90h	Execute Device Diagnostic
91h	Initialize Device Parameters
92h	Download Microcode
B0h	SMART
C4h	Read Multiple
C5h	Write Multiple
C6h	Set Multiple Mode
C8h	Read DMA

4.2 Identify Device Data

The table lists sector data returned by the command of IDENTIFY DEVICE.

Table 5: List of Device Identification

Word	Default Value	Description
0	0040h	General configuration
1	*1	Obsolete – Number of logical cylinders
2	C837h	Specific configuration
3	0010h	Obsolete – Number of logical heads
4-5	0000h	Retired
6	003Fh	Obsolete – Number of logical sectors per logical track
7-8	0000h	Reserved for assignment by the Compact Flash Association
9	0000h	Retired
10-19	ASCII	Serial number (20 ASCII characters)
20-21	0000h	Retired
22	0000h	Obsolete
23-26	ASCII	Firmware revision (8 ASCII characters)
27-46	ASCII	Model number (40 ASCII characters)
47	8010h	READ/WRITE MULTIPLE commands function
48	0000h	Reserved
49	2F00h	Capabilities
50	4000h	Capabilities
51-52	0000h	Obsolete
53	0007h	Words 88 and 70:64 valid
54	*1	Obsolete – Number of logical cylinders
55	0010h	Obsolete – Number of logical heads
56	003Fh	Obsolete – Number of logical sectors per track
57-58	*2	Obsolete – Current capacity in sectors
59	0110h	Number of sectors transferred per interrupt on MULTIPLE commands
60-61	*3	Maximum number of sector (28bit LBA mode)
62	0000h	Obsolete
63	0407h	Multi-word DMA modes supported/selected
64	0003h	PIO modes supported
65	0078h	Minimum Multiword DMA transfer cycle time per word

Table 5: List of Device Identification (Cont'd)

Word	Default Value	Description
66	0078h	Manufacturer's recommended Multiword DMA transfer cycle time
67	0078h	Minimum PIO transfer cycle time without flow control
68	0078h	Minimum PIO transfer cycle time with IORDY flow control
69	0100h	Additional Supported (support download microcode DMA)
70-74	0000h	Reserved
75	001Fh	Queue depth (NCQ)
76	0706h	Serial SATA capabilities
77	0004h	Reserved for future Serial ATA definition
78	004Ch	Serial ATA features supported
79	0040h	Serial ATA features enabled
80	03F8h	Major Version Number
81	0110h	Minor Version Number
82	346Bh	Command set supported
83	7D09h	Command set supported
84	6063h	Command set/feature supported extension
85	3469h	Command set/feature enabled
86	BC01h	Command set/feature enabled
87	6063h	Command set/feature default
88	007Fh	Ultra DMA Modes
89	001Eh	Time required for security erase unit completion
90	001Eh	Time required for Enhanced security erase completion
91	0000h	Current advanced power management value
92	FFFEh	Master Password Revision Code
93	0000h	Hardware reset result. The contents of the bits (12:0) of this word shall change only during the execution of s hardware reset.
94	0000h	Vendor's recommended and actual acoustic management value
95	0000h	Stream Minimum Request Size
96	0000h	Streaming Transfer Time – DMA
97	0000h	Streaming Access Latency – DMA and PIO

Table 5: List of Device Identification (Cont'd)

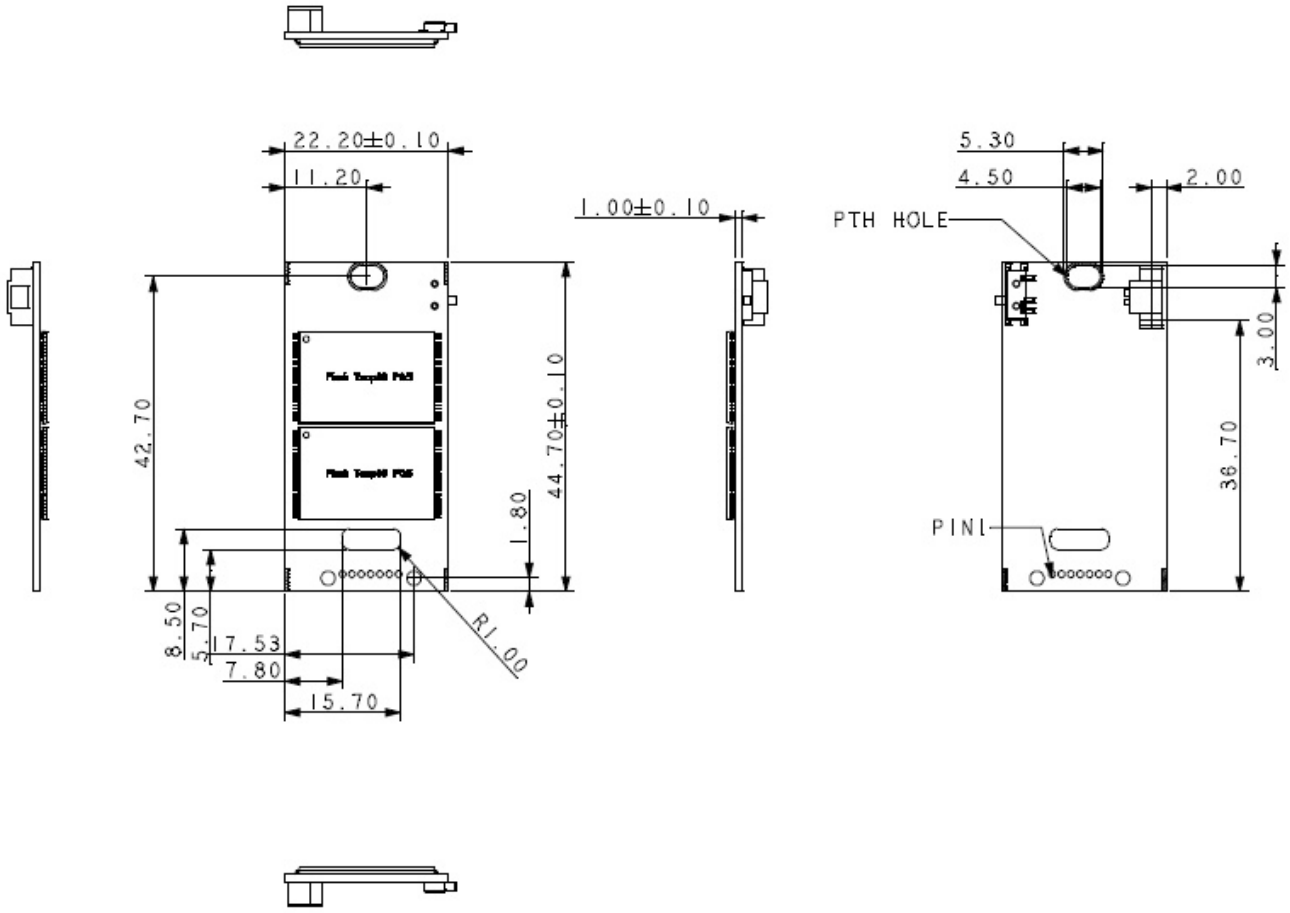
Word	Default Value	Description
98-99	0000h	Streaming Performance Granularity
100-103	*4	Maximum user LBA for 48 bit Address feature set
104	0000h	Streaming Transfer Time – PIO
105	0004h	Maximum number of 512-byte blocks per DATA SET MANAGEMENT command
106	4000h	Physical sector size / Logical sector size
107	0000h	Inter-seek delay for ISO-7779 acoustic testing in microseconds
108-111	0000h	Unique ID
112-116	0000h	Reserved
117-118	0000h	Words per logical Sector
119	4011h	Supported settings
120	4011h	Command set/Feature Enabled/Supported
121-126	0000h	Reserved
127	0000h	Removable Media Status Notification feature set support
128	0021h	Security status
129-159	0000h	Vendor specific
160	0000h	Compact Flash Association (CFA) power mode 1
161-167	0000h	Reserved for assignment by the CFA
168	0005h	Device Nominal Form Factor
169	0001h	DATA SET MANAGEMENT command is supported
170-175	0000h	Reserved
176-205	0000h	Current media serial number
206	0000h	SCT Command Transport
207-208	0000h	Reserved
209	4000h	Alignment of logical blocks within a physical block
210-216	0000h	Reserved
217	0001h	Non-rotating media device
218-221	0000h	Reserved
222	101Fh	Transport major version number
223	0000h	Transport minor version number
224-233	0000h	Reserved

Table 5: List of Device Identification (Cont'd)

Word	Default Value	Description
234	0001h	Minimum number of 512-byte data blocks per DOWNLOAD MICROCODE command for mode 03h
235	00FFh	Maximum number of 512-byte data blocks per DOWNLOAD MICROCODE command for mode 03h
236-254	0000h	Reserved
255	XXA5h	Integrity word (Checksum and Signature)

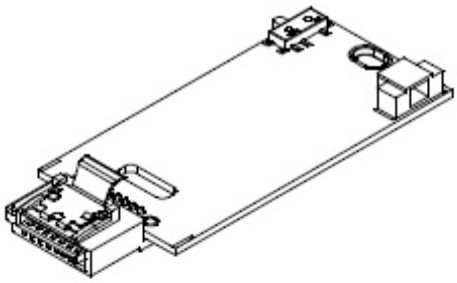
5. Physical Dimensions

Dimensions: 44.70 mm (L) x 22.20 mm (W) x 1.00 mm (H)

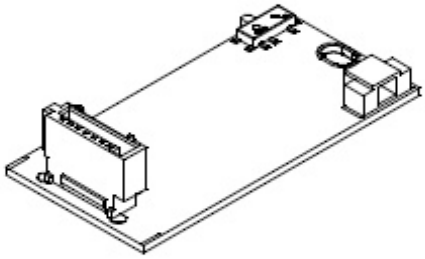


Notes :
1. = Max Component Height
2. = No Component
3. = No Component / Signal Vias / Signal Copper
4. General Tolerance 0.1mm

TYPE 1



TYPE 2



TYPE 3