

Welldisk Technology Corp.

MSATA

Datasheet

W30S32-XXXXX

8GB、 16GB、 32GB、 64G、 128GB

、 256GB、 512GB、 1TB

Version A1.3



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Revision History

Revision	Draft Date	History	Author
1.0	2016/9/19	New release	Golden Lee
1.1	2016/11/11	Update capacity support from 4GB	Golden Lee
1.2	2016/12/15	1. Remove 4GB & 8GB capacity support 2. Update performance & power consumption	Golden Lee
1.3	2017/4/10	Add hardware write protect function support	Golden Lee
1.4	2017/5/2	Add pSLC support	Golden Lee
1.5	2017/8/1	Add hardware quick erase function support	Golden Lee
1.6	2017/10/12	Add 3D TLC Flash support	Golden Lee



Product Overview

- **Capacity**
 - MLC: 16GB up to 512GB
 - pSLC: 8GB up to 256GB
 - 3D TLC: 30/32GB up to 960GB/1TB
- **SATA Interface**
 - SATA Revision 3.2
 - SATA 1.5Gbps, 3Gbps, and 6Gbps interface
- **Flash Interface**
 - Flash Type: MLC, 3D TLC
- **Performance**
 - Read up to 550 MB/s
 - Write up to 490 MB/s
- **Power Consumption**^{Note1}
 - Active mode: <2,690mW
 - Idle mode: <300mW
- **TBW (Terabyte Written)**^{Note2}
 - MLC: 544 TBW for 512GB
 - pSLC: 1,215 TBW for 256GB
- **MTBF**
 - MLC: 2,000,000 hours
 - pSLC: 2,500,000 hours
- **Advanced Flash Management**
 - Static and Dynamic Wear Leveling
 - Bad Block Management
 - TRIM
 - SMART
 - Over-Provision
- **Low Power Management**
 - DEVSLP Mode (Optional)
 - DIPM/HIPM Mode
- **Temperature Range**
 - Operation (Standard): 0°C ~ 70°C (3D TLC)
 - Operation (Wide): -40°C ~ 85°C
 - Storage: -40°C ~ 85°C
- **Compliant**
 - RoHS
 - CE & FCC

Notes:

1. Please see “Power Consumption” for details.
2. Please see “TBW (Terabytes Written)” in Chapter 2 for details.

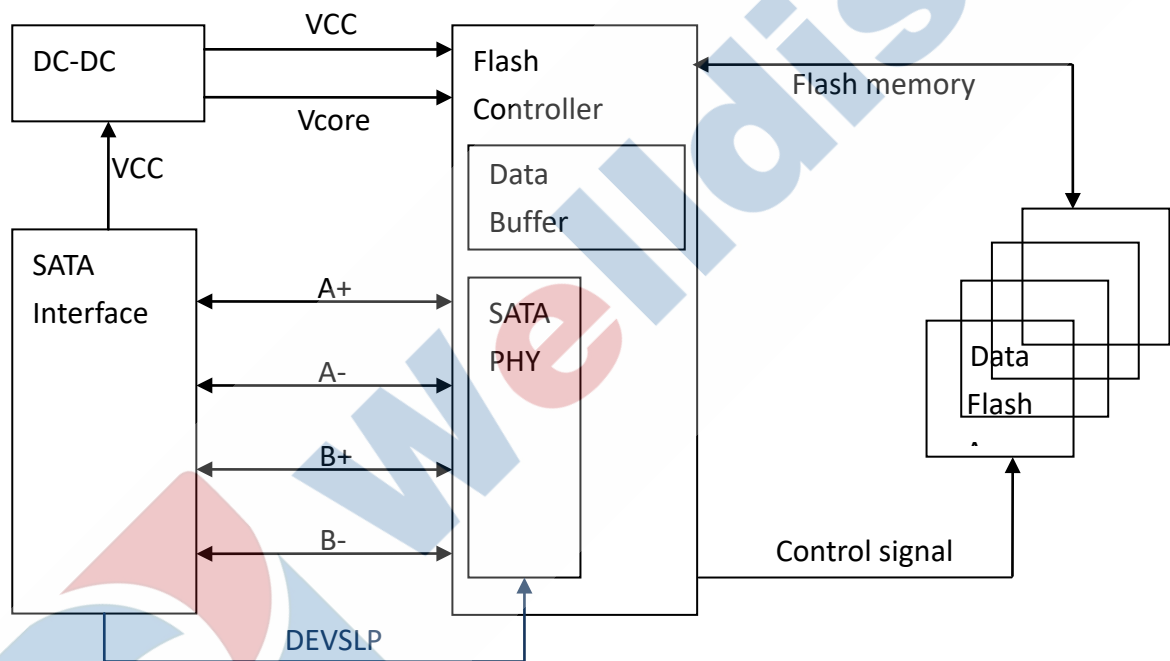
1. INTRODUCTION



1.1. General Description

Welldisk's mSATA delivers all the advantages of flash disk technology with the Serial ATA I/II/III interface and is fully compliant with the standard mSATA form factor, known as JEDEC MO-300 standard. The module is designed to operate at a maximum operating frequency of 200MHz with 30MHz external crystal. Its capacity could provide a wide range up to 1TB. Moreover, it can reach up to 550MB/s read as well as 490MB/s write high performance based on Toshiba NAND flash (with 32MB SDR enabled and measured by CrystalDiskMark v5.0). Meanwhile, the power consumption of the mSATA module is much lower than traditional hard drives.

1.2. Block Diagram



mSATA Block Diagram

2. PRODUCT SPECIFICATIONS



- **Capacity**
 - MLC: From 16GB up to 512GB (support 48-bit addressing mode)
 - pSLC: From 8GB up to 256GB (support 48-bit addressing mode)
 - 3D TLC: From 30/32GB up to 960GB/1TB (support 48-bit addressing mode)
- **Electrical/Physical Interface**
 - SATA Interface
 - ◆ Compliant with SATA Revision 3.2
 - ◆ Compatible with SATA 1.5Gbps, 3Gbps and 6Gbps interface
 - ◆ Support power management
 - ◆ Support expanded register for SATA protocol 48 bits addressing mode
 - ◆ Embedded BIST function for SATA PHY for low cost mass production
- **Built-in 2-channel NAND flash interface controller**
 - Compliant with Toggle 1.0 and Toggle 2.0 NAND Flash interface
 - Compliant with ONFI 4.0 interface:
 - ◆ SDR up to mode 5
 - ◆ NV-DDR up to mode 5
 - ◆ NV-DDR2 up to mode 7
 - ◆ NV-DDR3 up to mode 8
- **Supported NAND Flash**
 - Support up to 16 Flash Chip Enables (CE) within single design
 - Toshiba 15nm/3D-NAND MLC and TLC
 - Support all types of SLC/MLC/TLC/3D-NAND, 8KB/page and 16K/page NAND flash
 - Support ONFI 2.3, ONFI 3.0, ONFI 3.2 and ONFI 4.0 interface: 2 channels at maximum
- **ECC Scheme**
 - Applies the LDPC (Low Density Parity Check) of ECC algorithm
- **UART function**
- **GPIO**
- **Support SMART and TRIM commands**
- **Support Hardware Write Protect function (optional)**
- **Support Hardware Quick Erase function (optional)**

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- Capacity Information

Capacity	Cylinders	Heads	Sectors	Total Sectors	User Data Size
8GB	15,525	16	63	15,649,200	Depended on file management
16GB	16,383	16	63	31,277,232	
30GB	16,383	16	63	58,626,288	
32GB	16,383	16	63	62,533,296	
60GB	16,383	16	63	117,231,408	
64GB	16,383	16	63	125,045,424	
120GB	16,383	16	63	234,441,648	
128GB	16,383	16	63	250,069,680	
240GB	16,383	16	63	468,862,128	
256GB	16,383	16	63	500,118,192	
480GB	16,383	16	63	937,703,088	
512GB	16,383	16	63	1,000,215,216	
960GB	16,383	16	63	1,875,385,008	
1TB	16,383	16	63	2,000,409,264	

- Performance

- MLC:

Capacity	Flash Structure	Flash Type	Sequential	
			Read (MB/s)	Write (MB/s)
16GB	16GB x 1	15nm, TSOP	300	80
32GB	16GB x 2	15nm, TSOP	550	160
64GB	16GB x 4	15nm, TSOP	550	310
128GB	64GB x 2	15nm, BGA	550	460
	32GB x 4	15nm, BGA	550	460
256GB	64GB x 4	15nm, BGA	550	490
512GB	128GB x 4	15nm, BGA	550	490

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■ **pSLC:**

Capacity	Flash Structure	Flash Type	Sequential	
			Read (MB/s)	Write (MB/s)
8GB	16GB x 1	15nm, TSOP	300	80
16GB	16GB x 2	15nm, TSOP	550	160
32GB	16GB x 4	15nm, TSOP	550	310
64GB	64GB x 2	15nm, BGA	550	460
	32GB x 4	15nm, BGA	550	460
128GB	64GB x 4	15nm, BGA	550	490
256GB	128GB x 4	15nm, BGA	550	490

■ **3D TLC:**

Capacity	Flash Structure	Flash Type	Sequential	
			Read (MB/s)	Write (MB/s)
30GB/32GB	32GB x 1	TSB Bics3, TSOP	300	35
60GB/64GB	32GB x 2	TSB Bics3, TSOP	550	100
120GB/128GB	64GB x 2	TSB Bics3, TSOP	550	450
		TSB Bics3, BGA	550	450
240GB/256GB	64GB x 4	TSB Bics3, TSOP	550	490
	128GB x 2	TSB Bics3, TSOP	550	490
	128GB x 2	TSB Bics3, BGA	550	490
480GB/512GB	128GB x 4	TSB Bics3, TSOP	550	490
	256GB x 2	TSB Bics3, BGA	550	490
960GB/1TB	256GB x 4	TSB Bics3, BGA	550	490

Notes:

1. The performance was estimated based on Toshiba NAND flash.
2. Performance may differ according to flash configuration and platform.
3. The table above is for reference only.

- **TBW (Terabytes Written)**

- **MLC:**

Capacity	Flash Structure	TBW
16GB	16GB x 1	23
32GB	16GB x 2	45
64GB	16GB x 4	90
128GB	64GB x 2	181
	32GB x 4	
256GB	64GB x 4	262
512GB	128GB x 4	544

- **pSLC:**

Capacity	Flash Structure	TBW
8GB	16GB x 1	41
16GB	16GB x 2	82
32GB	16GB x 4	164
64GB	64GB x 2	303
	32GB x 4	
128GB	64GB x 4	607
256GB	128GB x 4	1215

Notes:

1. Samples were built using Toshiba NAND flash.
2. TBW may differ according to flash configuration and platform.
3. The endurance of SSD could be estimated based on user behavior, NAND endurance cycles, and write amplification factor. It is not guaranteed by flash vendor.

3. ENVIRONMENTAL SPECIFICATIONS



3.1. Environmental Conditions

3.1.1. Temperature and Humidity

- Temperature:
 - ◆ Storage: -40°C to 85°C
 - ◆ Operational (Standard grade): 0°C to 70°C
 - ◆ Operational (Wide grade): -40°C to 85°C
- Humidity:
 - ◆ Standard grade: RH 90% under 40°C (operational)
 - ◆ Wide grade: RH 95% under 55°C (operational)

■ High Temperature Test Condition

	Temperature	Humidity	Test Time
Operation (Standard)	70°C	0% RH	72 hours
Operation (Wide)	85°C	0% RH	72 hours
Storage (Standard)	85°C	0% RH	72 hours
Storage (Wide)	85°C	0% RH	168 hours

Result: No any abnormality is detected.

■ Low Temperature Test Condition

	Temperature	Humidity	Test Time
Operation (Standard)	0°C	0% RH	72 hours
Operation (Wide)	-40°C	0% RH	72 hours
Storage (Standard)	-40°C	0% RH	72 hours
Storage (Wide)	-40°C	0% RH	168 hours

Result: No any abnormality is detected.

■ High Humidity Test Condition

	Temperature	Humidity	Test Time
Operation (Standard)	40°C	93% RH	24 hours
Operation (Wide)	55°C	95% RH	72 hours
Storage (Standard)	40°C	95% RH	72 hours
Storage (Wide)	55°C	95% RH	96 hours

Result: No any abnormality is detected.

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■ Temperature Cycle Test

	Temperature	Test Time	Cycle
Operation (Standard)	0°C	30 min	10 cycles
	70°C	30 min	
Operation (Wide)	-40°C	30 min	20 cycles
	85°C	30 min	
Storage (Standard)	-40°C	30 min	10 cycles
	85°C	30 min	
Storage (Wide)	-40°C	30 min	50 cycles
	85°C	30 min	

Result: No any abnormality is detected.

3.1.2. Shock

■ Shock Specification

	Acceleration Force	Half Sin Pulse Duration
Non-Operational	1500G	0.5ms
Operational	1500G	0.5ms

Result: No any abnormality is detected when power on.

3.1.3. Vibration

■ Vibration Specification

	Condition		Vibration Orientation
	Frequency/Displacement	Frequency/Acceleration	
Non-Operational	20Hz~80Hz/1.52mm	80Hz~2000Hz/20G	X, Y, Z axis/60 min for each

Result: No any abnormality is detected when power on.

3.1.4. Drop

■ Drop Specification

	Height of Drop	Number of Drop
Non-operational	80cm free fall	6 face of each unit, 2 times

Result: No any abnormality is detected when power on.

3.1.5. Bending

■ Bending Specification

	Force	Action
Non-operational	≥20N	Hold 1min/5times

Result: No any abnormality is detected when power on.

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3.1.6. Electrostatic Discharge (ESD)

■ Contact ESD Specification

Device	Capacity	Temperature	Relative Humidity	+/- 4KV	Result
mSATA	512GB	24.0°C	49% (RH)	Device functions are affected, but EUT will be back to its normal or operational state automatically.	PASS

3.2. MTBF

MTBF, an acronym for Mean Time between Failures, is a measure of a device's reliability. Its value represents the average time between a repair and the next failure. The measure is typically in units of hours. The higher the MTBF value, the higher the reliability of the device. The predicted result of WellDisk's mSATA is more than 2,500,000 hours.

3.3. Certification

- RoHS
- CE / FCC

3.4. Compliance

- SATA III (SATA Rev. 3.2)
- Up to ATA/ATAPI-8 (Including S.M.A.R.T)

4. ELECTRICAL SPECIFICATIONS



4.1. Supply Voltage

Parameter	Rating
Operating Voltage	3.3V , ±5%

4.2. Power Consumption

■ MLC

Capacity	Flash Structure	Flash Type	Read	Write	Partial	Slumber	Idle	DEVSLP
16GB	16GB x 1	15nm, TSOP	1180	1200	15	10	262	4.9
32GB	16GB x 2	15nm, TSOP	1185	1300	15	10.5	265	4.9
64GB	16GB x 4	15nm, TSOP	1220	1310	15	10.5	265	4.9
128GB	64GB x 2	15nm, BGA	1270	1600	16	11	280	4.9
	32GB x 4	15nm, BGA	1280	1700	16	11	285	4.9
256GB	64GB x 4	15nm, BGA	1320	2600	16.5	10	285	4.9
512GB	128GB x 4	15nm, BGA	1450	2690	16.5	10.6	285	4.9

Unit: mW

■ pSLC

Capacity	Flash Structure	Flash Type	Read	Write	Partial	Slumber	Idle	DEVSLP
8GB	16GB x 1	15nm, TSOP	1180	1200	15	10	262	4.9
16GB	16GB x 2	15nm, TSOP	1185	1300	15	10.5	265	4.9
32GB	16GB x 4	15nm, TSOP	1220	1310	15	10.5	265	4.9
64GB	64GB x 2	15nm, BGA	1270	1600	16	11	280	4.9
	32GB x 4	15nm, BGA	1280	1700	16	11	285	4.9
128GB	64GB x 4	15nm, BGA	1320	2600	16.5	10	285	4.9
256GB	128GB x 4	15nm, BGA	1450	2690	16.5	10.6	285	4.9

Unit: mW

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■ **3D TLC**

Capacity	Flash Structure	Flash Type	Read	Write	Partial	Slumber	Idle	DEVSLP
30GB/32GB	32GB x 1	TSB Bics3, TSOP	950	850	15	10	300	4.9
60GB/64GB	32GB x 2	TSB Bics3, TSOP	1215	1020	15	10	300	4.9
120GB/128GB	64GB x 2	TSB Bics3, TSOP	1300	1350	15	10	300	4.9
		TSB Bics3, BGA	1270	1360	20	15	325	4.9
240GB/256GB	64GB x 4	TSB Bics3, TSOP	1350	1400	15	10	300	4.9
	128GB x 2	TSB Bics3, BGA	1360	1440	20	15	325	4.9
480GB/512GB	128GB x 4	TSB Bics3, TSOP	1360	1450	22	16	320	4.9
	256GB x 2	TSB Bics3, BGA	1470	1520	22	15	325	4.9
960GB/1TB	256GB x 4	TSB Bics3, BGA	1575	1620	22	15	325	4.9

Unit: mW

Notes:

1. It's average value of power consumption is achieved based on 100% conversion efficiency.
2. The measured power voltage is 3.3V.
3. Samples were built using Toshiba NAND flash and measured under normal temperature.
4. Sequential R/W is measured while testing 4000MB sequential R/W 5 times by CrystalDiskMark.
5. Power Consumption may differ according to flash configuration and platform.



5. INTERFACE

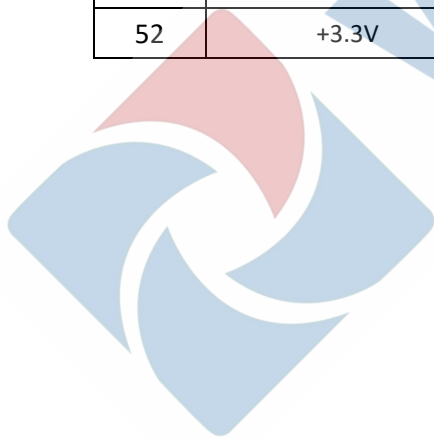


5.1. Pin Assignment and Descriptions

Pin #	mSATA Pin	Description
1	NC	No Connect Reserve for Write Protect (Active high)
2	+3.3V	3.3V Source
3	NC	No Connect
4	DGND	Digital GND
5	NC	No Connect
6	NC	No Connect
7	NC	No Connect
8	NC	No Connect
9	DGND	Digital GND
10	NC	No Connect
11	NC	No Connect
12	NC	No Connect
13	NC	No Connect
14	NC	No Connect
15	DGND	Digital GND
16	NC	No Connect
17	NC	No Connect Reserve for Quick Erase (Active low)
18	DGND	Digital GND
19	NC	No Connect
20	NC	No Connect
21	SATA GND	SATA Ground Return Pin
22	NC	No Connect
23	TXP (out)	Host Receiver Differential Signal Pair
24	+3.3V	3.3V Source
25	TXN (out)	Host Receiver Differential Signal Pair
26	SATA GND	SATA Ground Return Pin
27	SATA GND	SATA Ground Return Pin
28	NC	No Connect
29	SATA GND	SATA Ground Return Pin
30	NC	No Connect

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Pin #	mSATA Pin	Description
31	RXN (in)	Host Transmitter Differential Signal Pair
32	NC	No Connect
33	RXP (in)	Host Transmitter Differential Signal Pair
34	DGND	Digital GND
35	SATA GND	SATA Ground Return Pin
36	NC	No Connect
37	SATA GND	SATA Ground Return Pin
38	NC	No Connect
39	+3.3V	3.3V Source
40	DGND	Digital GND
41	+3.3V	3.3V Source
42	NC	No Connect
43	NC	No Connect
44	DEVSLP	Enter/Exit DevSleep
45	NC	Reserved pin
46	NC	No Connect
47	NC	Reserved pin
48	NC	No Connect
49	DAS	Device Activity Signal
50	DGND	Digital GND
51	GND	Default connect to GND
52	+3.3V	3.3V Source



6. SUPPORTED COMMANDS



6.1. ATA Command List

Op-Code		Command Description	Op-Code		Command Description
00h		NOP	60h		Read FPDMA Queued
06h		Data Set Management	61h		Write FPDMA Queued
10h		Recalibrate	70h		Seek
20h		Read Sectors	90h		Execute Device Diagnostic
21h		Read Sectors without Retry	91h		Initialize Device Parameters
24h		Read Sectors EXT	92h		Download Microcode
25h		Read DMA EXT	93h		Download Microcode DMA
27h		Read Native Max Address EXT	B0h		SMART
29h		Read Multiple EXT	B0h	D0h	SMART READ DATA
2Fh		Read Log EXT	B0h	D1h	SMART READ DATA ATTRIBUTE THRESHOLD
30h		Write Sectors	B0h	D2h	SMART ENABLE/DISABLE ATTRIBUTE AUTOSAVE
31h		Write Sectors without Retry	B0h	D3h	SMART SAVE ATTRIBUTE VALUES
34h		Write Sectors EXT	B0h	D4h	SMART EXECUTE OFF-LINE IMMEDIATE
35h		Write DMA EXT	B0h	D5h	SMART READ LOG
37h		Set Native Max Address EXT	B0h	D6h	SMART WRITE LOG
39h		Write Multiple EXT	B0h	D8h	SMART ENABLE OPERATIONS
3Dh		Write DMA FUA EXT	B0h	D9h	SMART DISABLE OPERATIONS
3Fh		Write Long EXT	B0h	DAh	SMART RETURN STATUS
40h		Read Verify Sectors	B0h	DBh	SMART ENABLE/DISABLE AUTOMATIC OFF-LINE
41h		Read Verify Sectors without Retry	B1h		DEVICE CONFIGURATION OVERLAY
42h		Read Verify Sectors EXT	B1h	C0h	DEVICE CONFIGURATION RESTORE
45h		Write Uncorrectable EXT	B1h	C1h	DEVICE CONFIGURATION FREEZE LOCK
47h		Read Log DMA EXT	B1h	C2h	DEVICE CONFIGURATION IDENTIFY
57h		Write Log DMA EXT	B1h	C3h	DEVICE CONFIGURATION SET
B1h	C4h	DEVICE CONFIGURATION IDENTIFY DMA	ECh		Identify Device
B1h	C5h	DEVICE CONFIGURATION SET DMA	EFh		Set Features
C4h		Read Multiple	EFh	02h	Enable 8-bit PIO transfer mode

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Op-Code		Command Description	Op-Code		Command Description
C5h		Write Multiple	EFh	03h	Set transfer mode based on value in Count field
C6h		Set Multiple Mode	EFh	05h	Enable advanced power management
C8h		Read DMA	EFh	10h	Enable use of Serial ATA feature
C9h		Read DMA without Retry	EFh	10h 02h	Enable DMA Setup FIS Auto-Activate optimization
CAh		Write DMA	EFh	10h 03h	Enable Device-initiated interface power state (DIPM) transitions
CBh		Write DMA without Retry	EFh	10h 06h	Enable Software Settings Preservation (SSP)
CEh		Write Multiple FUA EXT	EFh	10h 07h	Enable Device Automatic Partial to Slumber transitions
E0h		Standby Immediate	EFh	10h 09h	Enable Device Sleep
E1h		Idle Immediate	EFh	55h	Disable read look-ahead feature
E2h		Standby	EFh	66h	Disable reverting to power-on defaults
E3h		Idle	EFh	82h	Disable write cache
E4h		Read Buffer	EFh	85h	Disable advanced power management
E5h		Check Power Mode	EFh	90h	Disable use of Serial ATA feature set
E6h		Sleep	EFh	90h 02h	Disable DMA Setup FIS Auto-Activate optimization
E7h		Flush Cache	EFh	90h 03h	Disable Device-initiated interface power state (DIPM) transitions
E8h		Write Buffer	EFh	90h 06h	Disable Software Settings Preservation (SSP)
E9h		Read Buffer DMA	EFh	90h 07h	Disable Device Automatic Partial to Slumber transitions
EAh		Flush Cache EXT	EFh	90h 09h	Disable Device Sleep
EBh		Write Buffer DMA	EFh	AAh	Enable read look-ahead feature
EFh	CCh	Enable reverting to power-on defaults	F4h		Security Erase Unit
F1h		Security Set Password	F5h		Security Freeze Lock
F2h		Security Unlock	F6h		Security Disable Password
F3h		Security Erase Prepare	F8h		Read Native Max Address

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6.2. Identify Device Data

The following table details the sector data returned by the IDENTIFY DEVICE command.

Word	F: Fixed V: Variable X: Both	Default Value	Description
0	F	0040h	General configuration bit-significant information
1	X	*1	Obsolete – Number of logical cylinders
2	V	C837h	Specific configuration
3	X	0010h	Obsolete – Number of logical heads (16)
4-5	X	00000000h	Retired
6	X	003Fh	Obsolete – Number of logical sectors per logical track (63)
7-8	V	00000000h	Reserved for assignment by the Compact Flash Association
9	X	0000h	Retired
10-19	F	Varies	Serial number (20 ASCII characters)
20-21	X	0000h	Retired
22	X	0000h	Obsolete
23-26	F	Varies	Firmware revision (8 ASCII characters)
27-46	F	Varies	Model number (xxxxxxxx)
47	F	8010h	7:0- Maximum number of sectors transferred per interrupt on MULTIPLE commands
48	F	4000h	Reserved
49	F	2F00h	Capabilities
50	F	4000h	Capabilities
51-52	X	00000000h	Obsolete
53	F	0007h	Words 88 and 70:64 valid
54	X	*1	Obsolete – Number of logical cylinders
55	X	0010h	Obsolete – Number of logical heads (16)
56	X	003Fh	Obsolete – Number of logical sectors per track (63)
57-58	X	*2	Obsolete – Current capacity in sectors
59	F	0110h	Number of sectors transferred per interrupt on MULTIPLE commands
60-61	F	*3	Maximum number of sector (28bit LBA mode)
62	X	0000h	Obsolete
63	F	0407h	Multi-word DMA modes supported/selected
64	F	0003h	PIO modes supported
65	F	0078h	Minimum Multiword DMA transfer cycle time per word

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Word	F: Fixed V: Variable X: Both	Default Value	Description
66	F	0078h	Manufacturer's recommended Multiword DMA transfer cycle time
67	F	0078h	Minimum PIO transfer cycle time without flow control
68	F	0078h	Minimum PIO transfer cycle time with IORDY flow control
69	F	5F20h	Additional Supported
70	F	0000h	Reserved
71-74	F	0000000000000000 0h	Reserved for the IDENTIFY PACKET DEVICE command
75	F	001Fh	Queue depth
76	F	E70Eh	Serial SATA capabilities
77	F	0006/0004/0002h	Supported Serial ATA Phy speed
78	F	054Ch	Serial ATA features supported
79	V	0040H	Serial ATA features enabled
80	F	03F8h	Major Version Number
81	F	0000h	Minor Version Number
82	F	746Bh	Command set supported
83	F	7D09h	Command set supported
84	F	4163h	Command set/feature supported extension
85	V	7469h	Command set/feature supported or enabled
86	V	BC09h	Command set/feature supported or enabled
87	V	4163h	Command set/feature supported or enabled
88	V	007Fh	Ultra DMA Modes
89	F	0001h	Time required for Normal Erase mode SECURITY ERASE UNIT command
90	F	0001h	Time required for an Enhanced Erase mode SECURITY ERASE UNIT command
91	V	00FEh	Current advanced power management value
92	V	FFFEh	Master Password Revision Code
93	F	0000h	Hardware reset result. The contents of the bits (12:0) of this word can be changed only during the execution of hardware reset.
94	V	0000h	Vendor's recommended and actual acoustic management value
95	F	0000h	Stream Minimum Request Size

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Product Datasheet

Word	F: Fixed V: Variable X: Both	Default Value	Description
96	V	0000h	Streaming Transfer Time – DMA
97	V	0000h	Streaming Access Latency – DMA and PIO
98-99	F	0000h	Streaming Performance Granularity
100-103	V	*4	Maximum user LBA for 48 bit Address feature set
104	V	0000h	Streaming Transfer Time – PIO
105	F	0008h	Maximum number of 512-byte blocks per DATA SET MANAGEMENT command
106	F	4000h	Physical sector size/Logical sector size
107	F	0000h	Inter-seek delay for ISO-7779 acoustic testing in microseconds
108-111	F	0000000000000000 0h	Unique ID
112-115	F	0000000000000000 0h	Reserved
116	V	0000h	Reserved
117-118	F	00000000h	Words per logical Sector
119	F	401Ch	Supported settings
120	F	401Ch	Command set/Feature Enabled/Supported
121-126	F	0h	Reserved
127	F	0h	Removable Media Status Notification feature set support
128	V	0021h	Security status
129-159	X	0h	Vendor specific
160	F	0h	Compact Flash Association (CFA) power mode 1
161-167	X	0h	Reserved for assignment by the CFA
168	F	0003h	Device Nominal Form Factor
169	F	0001h	DATA SET MANAGEMENT command is supported
170-173	F	0h	Additional Product Identifier
174-175		0h	Reserve
176-205	V	0h	Current media serial number
206	F	0039h	SCT Command Transport(
207-208	F	0h	Reserved
209	F	4000h	Alignment of logical blocks within a physical block
210-211	V	0000h	Write-Read-Verify Sector Count Mode 3 (not support)
212-213	F	0000h	Write-Read-Verify Sector Count Mode 2 (not support)
214-216		0000h	NV Cache relate (not support)

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Word	F: Fixed V: Variable X: Both	Default Value	Description
217	F	0001h	Nominal media rotation rate
218	F	0h	Reserved
219	F	0h	NV Cache relate (not support)
220	V	0h	Write read verify feature set current mode
221		0h	Reserved
222	F	107Fh	Transport major version number
223	F	0h	Transport minor version number
224-229		0h	Reserved for CE-ATA
230-233		0h	Extend number of user addressable sectors
234		0001h	Minimum number of 512-byte data blocks per DOWNLOAD MICROCODE command for mode 03h
235		FFFFh	Maximum number of 512-byte data blocks per DOWNLOAD MICROCODE command for mode 03h
236-242	F	0h	Reserved
243		4000h	Security feature 4000 : Self Encrypting Drive
244-254	F	0h	Reserved
255	X	XXA5h XX is variable	Integrity word (Checksum and Signature)



■ **List of Device Identification for Each Capacity**

Capacity (GB)	*1 (Word 1/Word 54)	*2 (Word 57–58)	*3 (Word 60–61)	*4 (Word 100–103)
8	3CA5h	EEC9B0h	EEC9B0h	EEC9B0h
16	3FFFh	FBFC10h	1DD40B0h	1DD40B0h
30	3FFFh	FBFC10h	37E90F0h	37E90F0h
32	3FFFh	FBFC10h	3BA2EB0h	3BA2EB0h
60	3FFFh	FBFC10h	6FCCF30h	6FCCF30h
64	3FFFh	FBFC10h	7740AB0h	7740AB0h
120	3FFFh	FBFC10h	DF94BB0h	DF94BB0h
128	3FFFh	FBFC10h	EE7C2B0h	EE7C2B0h
240	3FFFh	FBFC10h	0FFFFFFh	1BF244B0h
256	3FFFh	FBFC10h	0FFFFFFh	1DCF32B0h
480	3FFFh	FBFC10h	0FFFFFFh	37E436B0
512	3FFFh	FBFC10h	0FFFFFFh	3B9E12B0h
960	3FFFh	FBFC10h	0FFFFFFh	6FC81AB0h
1024	3FFFh	FBFC10h	0FFFFFFh	773BD2B0h



6.3. Write Protect Function

The write protect function is triggered by pin header short. This used to set the device as a write protection device after power up. When the function is triggered, the data can't be written to the device. The device is then set as read only.

This function can be control by host through the mSATA interface Pin 1. Please reference the Pin Description of chapter 5.

6.4. Quick Erase Function

The Quick Erase is a special feature to allow users to erase user data of SSD by hardware trigger. When this feature is triggered by pin header short, the storage blocks of SSD will be erased and the SSD will return to its factory default setting. This feature is particularly useful for emergent circumstances to quickly erase user data.

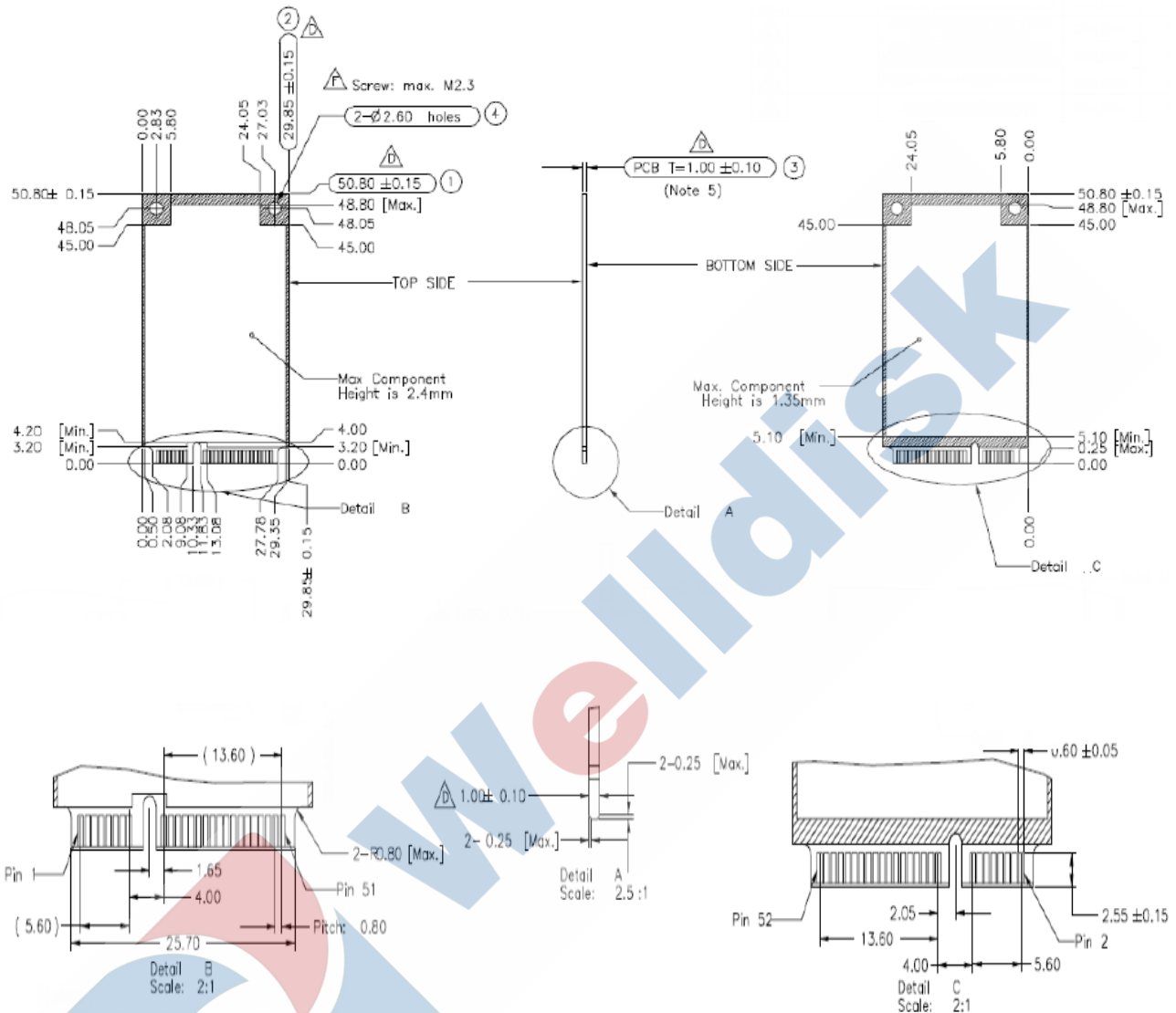
This function can be control by host through the mSATA interface Pin 17. Please reference the Pin Description of chapter 5.

Note: These two functions can not be existed in one unit due to using the same GPIO.







7. PHYSICAL DIMENSION

Dimension: 50.8mm(L) x 29.85mm(W) x 4mm(H)



Notes :

1.  = Max Component Height is
2.  = No Component
3.  = No Component / Signal Vias / Signal Copper/Print
4. General Tolerance : ±0.1mm
- △ 5. Card Thickness applies across tab and includes plating and/or metalization
- △ 6. Check Point: ① ~ ④
- △ 7. Screw Max. Size M2.3

DIM	CLASS	COMMON TOLERANCE			Finish	
		A	(B)	C	Material	Angles
L ≤ 3		±0.05	±0.10	±0.20	Scale : 1 / 1	Unit : mm
3 < L ≤ 6		±0.05	±0.10	±0.20	Drawing by	Otto_Lian
6 < L ≤ 16		±0.10	±0.15	±0.30	Approval	Tom
16 < L ≤ 30		±0.10	±0.15	±0.30	Date	2014/11/03
30 < L ≤ 120		±0.15	±0.20	±0.50	Size : A4	Rev:F
120 < L ≤ 315		±0.20	±0.50	±0.80		Page 1/1

8. TERMINOLOGY



The following table is to list out the acronyms that have been applied throughout the document.

Term	Definitions
ATTO	Commercial performance benchmark application
DEVSLP	Device Sleep Mode
DIPM	Device initiated power management
HIPM	Host initiated power management
LBA	Logical block addressing
MB	Mega-byte
MTBF	Mean time between failures
NCQ	Native command queue
SATA	Serial advanced technology attachment
SDR	Synchronous dynamic access memory
S.M.A.R.T.	Self-monitoring, analysis and reporting technology
SSD	Solid state disk



9. PARTNUMBER DECODER**W 30 S3 2 – XXXX X**