

BS202

Product Specification

- Support SATA interface rate of 6Gb/s
- Power loss protection
- Ultra high-performance and low power consumption
- Support dynamic power management and SMART
- TRIM command supported
- With DRAM Cache

Revision History

Version	Date	Description
1.0	Jan. 2021	First Release
2.0	May. 2021	Version Update
3.0	Jul. 2021	Version Update
4.0	Dec. 2021	Add TBW and Performance data update

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Table of Contents

Revision History	2
Table of Contents	3
1. Introduction	4
1.1 Overview	4
1.2 Product Information	4
1.3 Features	4
2. Architecture	5
3. Product Specifications	6
3.1 Capacity	6
3.2 Performance	6
3.3 Test Equipment	7
3.4 Power Loss Protection Specifications	8
3.5 Electrical	9
3.6 Environmental Conditions	10
3.7 Reliability	11
4. Mechanical Information	12
5. Pin and Signal Descriptions	12
5.1 Pin Locations	12
5.2 Signal Descriptions	13
6. Supported Command Sets	16
6.1 ATA General Feature Command Set	16
6.2 Power Management Command Set	16
6.3 Security Mode Feature Set	16
6.4 SMART Command Set	17
6.5 Data Set Management Command Set	17
6.6 Host Protected Area Command Set	17
6.7 48-Bit Address Command Set	17
6.8 General Purpose Log Command Set	18
6.9 Native Command Queuing	18
6.10 Software Settings Preservation	18
7. Certifications and Declarations	18

1. Introduction

1.1 Overview

This BS202 Series SSD (solid state Drive) of BIWIN fully consists of semiconductor devices using NAND Flash Memory which provide high reliability and high performance for a storage media. This BS202 Series SSD product supports power loss data protect. In order to meet Power-off Protection, this BS202 Series SSDs utilize tantalum capacitors and a supervisory control IC which make the data not to be lost when electricity of instrument turn off suddenly. The series product is perfect for the computer enthusiasts who want to improve the system performance in the easiest way.

This BS202 Series SSD product electrically complies with the SATA-III standards and is electrically compatible with a serial ATA disk drive. In order to meet the high quality, this BS202 SSD products utilize high performance SATA-III SSD controller and Trinary-Level cell (TLC) NAND Flash Memory. Moreover, to ensure the data integrity, many advanced technologies are used such as dynamic bad block management, dynamic and static wear-leveling, and error correction code (ECC). In addition, this BS202 Series could also provide rugged features in industrial PC under an extreme environment with a high MTBF.

1.2 Product Information

Model Name	Part Number	Capacity	DRAM(DDR3L)
BS202	CMI59GS2505-128	128GB	256MB
	CMI59GS2505-256	256GB	256MB

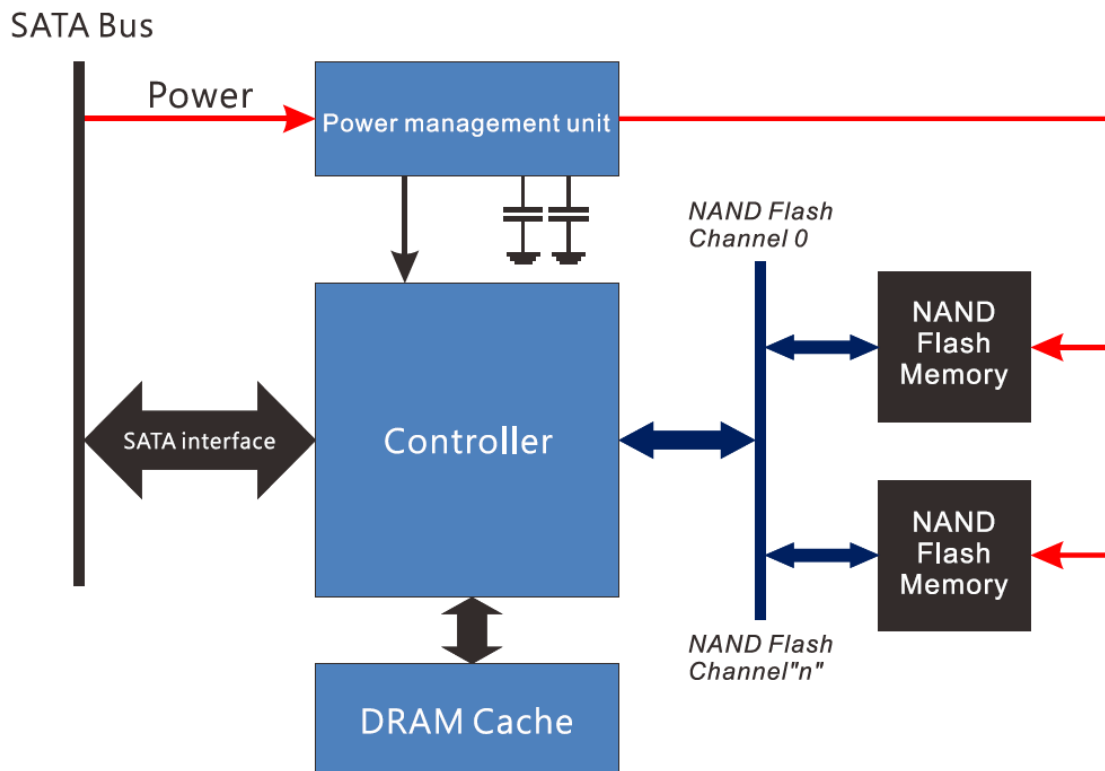
1.3 Features

- High performance
- Power loss protection
- Increased system responsiveness
- High reliability
- Small form-factor
- Minimum weight
- Enhanced ruggedness
- DRAM cache: DDR3L

2. Architecture

The BIWIN SSD BS202 Series utilizes a cost-effective, high-performance BIWIN SATA-to-NAND controller to manage a full SATA 6 Gb/s bandwidth with the host while managing multiple NAND flash memory devices on 4 channels.

Figure1. Block Diagram



3. Product Specifications

This section provides details on the BIWIN SSD mSATA BS202 Series product specifications.

3.1 Capacity

Table1. User Addressable Sectors

Unformatted Capacity	128GB	256GB
Total User Addressable Sectors in LBA Mode	250,069,680	500,118,192

Note:

- 1GB = 1,000,000,000 bytes; 1 sector = 512 bytes.
- LBA count shown represents total user storage capacity and will remain the same throughout the life of the drive. The total usable capacity of the SSD may be less than the total physical capacity because a small portion of the capacity issued for NAND flash management and maintenance purposes.

3.2 Performance

Performance	128GB	256GB
Random Read/Write IOPS (Input/Output Operations per Second)		
4K Read(Up to)	48K	81K
4K Write(Up to)	30K	61K
Maximum Sustained Read and Write Bandwidth (CDM)		
Sequential Read(Up to)	560MB/s	560MB/s
Sequential Write(Up to)	124MB/s	250MB/s
Latency (AS SSD)		
Read(Typ)	0.033ms	0.033ms
Write(Typ)	0.058ms	0.044ms

Notes:

1. Table for reference only. Performance may vary according to flash configuration and platform. The acceptable range is within 10%.
2. Sequential Read/Write, 4K Random Read/Write measured using CrystalDiskMark (CDM)V8.0;
3. Read/Write Latency measured using AS SSD Benchmark V2.0.

3.3 Test Equipment

Equipment	Item	Equipment	Item
CPU	Intel i9-10900K	Motherboard	ROG STRIX Z490-A
Chipset	Intel Z490	Memory	BIWIN DDR4 2666MHz 16G
Graphics Card	On Board VGA	OS SSD	BIWINTeCH Phoenix SSD 512GB
Power Supply	HuntKey ATX-500W	OS Version	Windows 10 X64

Notes: Capacity of 128GB, 256GB share the same test equipment.

3.4 Power Loss Protection Specifications

Figure 2. Functional Block Diagram

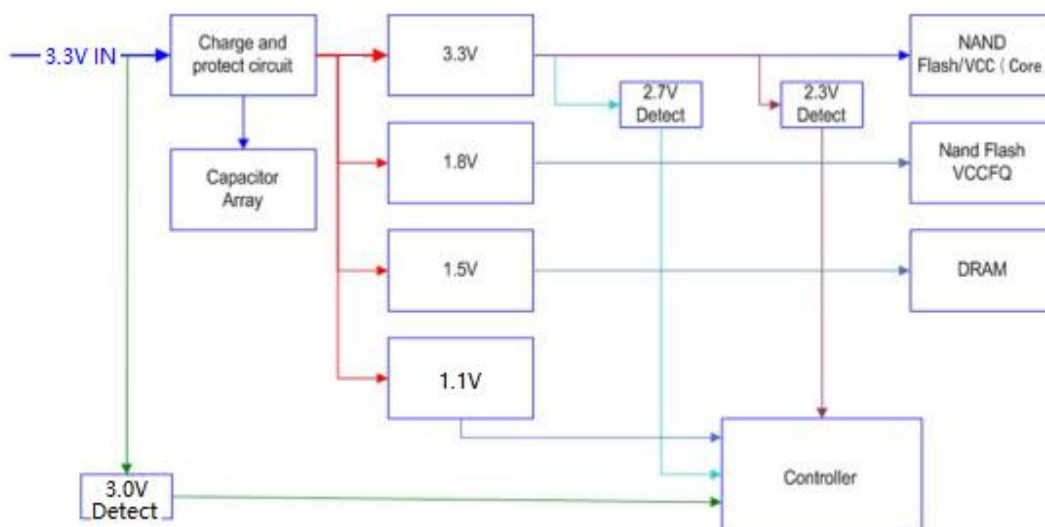
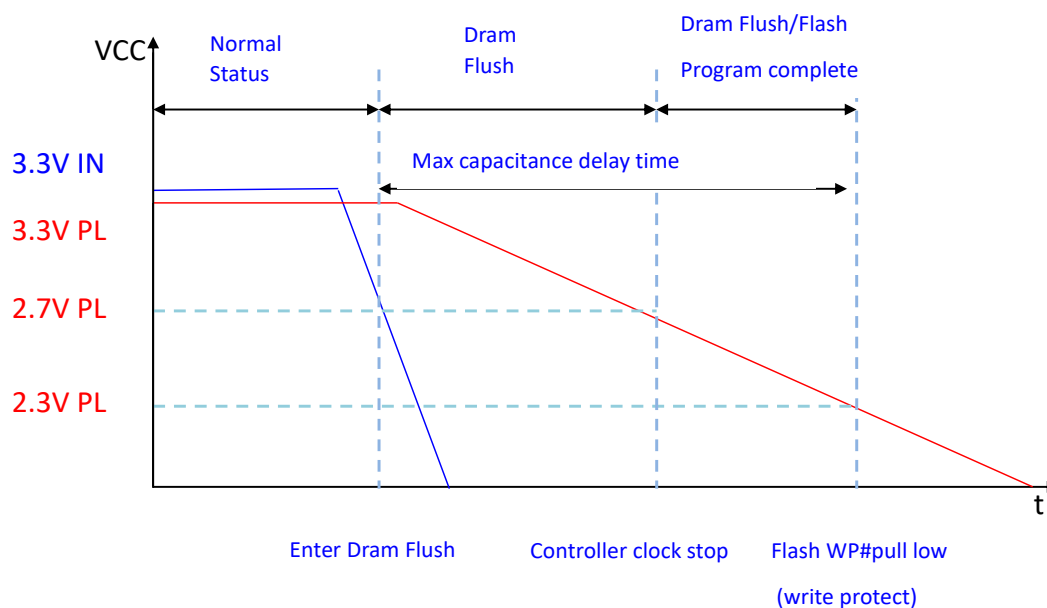


Figure 3. Power Loss Protect Process



3.5 Electrical

Table2. Operating Voltage and Power Consumption

Electrical Characteristics	128GB	256GB
Operating Voltage for 3.3V (+/- 5%)		
Min	3.135V	
Max	3.465V	
Power Consumption (Typical)		
Active (Read)	1.35W	1.36W
Active (Write)	2.05W	2.44W
Idle	0.35W	0.35W

Note: 1. Power Consumption measured using KEITHLEY 2280S.

3.6 Environmental Conditions

Table 3. Temperature, Shock, Vibration

Parameter	Value
Ambient Temperature	
Operating	0 to 70 °C
Non-Operating	-40 to 85 °C
Humidity, Shock, Vibration	
Humidity	20-95% R.H.
Shock ¹	1500G/0.5ms
Vibration ²	6.0667 GRMS (20-2000Hz)

Notes:

1. Under condition that SSD is mounted securely with the input vibration, measured using FSY-50.
2. Under condition that SSD is mounted securely with the input vibration, measured using FT-100.

3.7 Reliability

Table 4. Reliability Specifications

Parameter	Value
Uncorrectable Bit Error Rate (UBER)	1 sector in 10^{16} bits read, max
Mean Time Between Failure (MTBF)	1,500,000 hours

Table 5. Reliability Specifications

Item		128GB	256GB
Warranty	TBW	47TB	94TB
	Period	3 Years	

Note: *Total bytes written = [(Flash P/E cycle) x (number of bits in drive)] / WAF

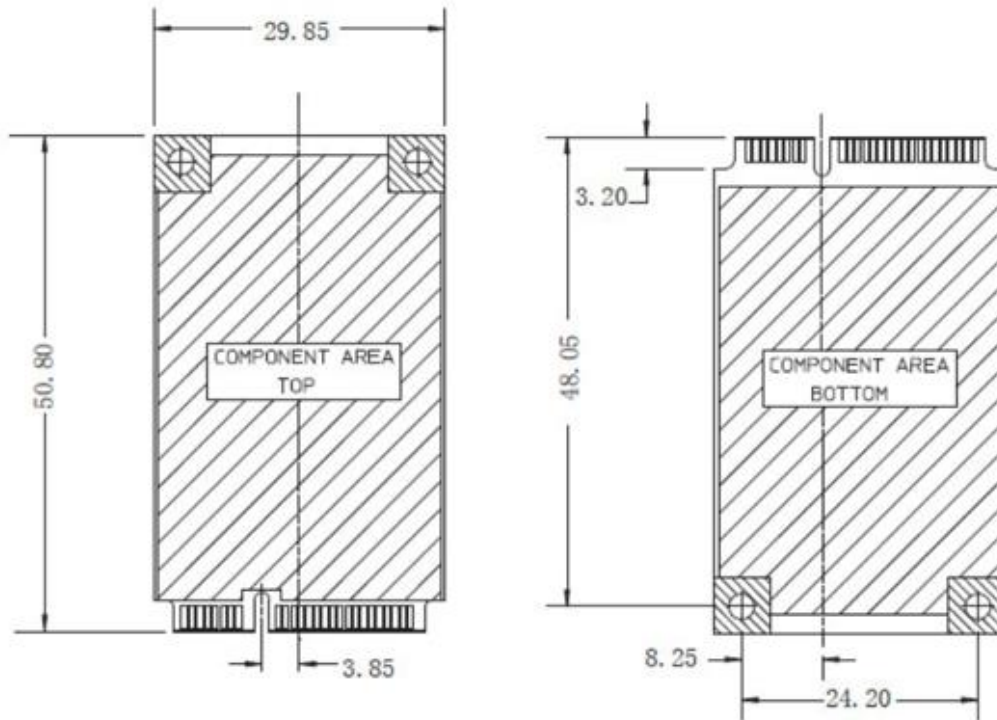
WAF=4.0

4. Mechanical Information

Figure 4 shows the physical dimension of the BIWIN SSD BS202 Series.

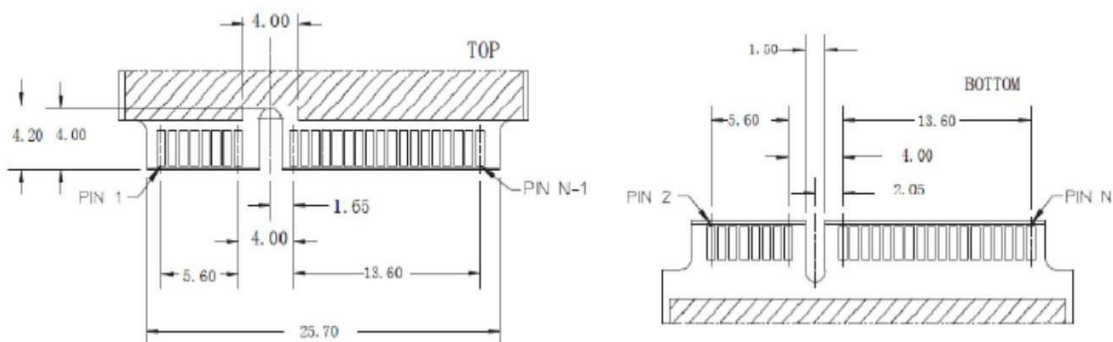
Figure 4. BIWIN SSD BS202 Dimensions

All dimensions are in millimeters.



5. Pin and Signal Descriptions

5.1 Pin Locations



5.2 Signal Descriptions

Table 6. Connector Pin Signal Definitions

Pin#	Assignment	Description
1	N/A	N/A
2	+3.3V	3.3V source
3	N/A	N/A
4	GND	Return Current Path
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	GND	Return Current Path
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A
14	N/A	N/A
15	GND	Return Current Path
16	N/A	N/A

17	N/A	N/A
18	GND	Return Current Path
19	Detection Pin	Connect to GND
20	N/A	N/A
21	GND	Return Current Path
22	N/A	N/A
23	+B(port1)	SATA differential TX+ based on SSD
24	+3.3V	3.3V source
25	-B(port1)	SATA differential TX- based on SSD
26	GND	Return Current Path
27	GND	Return Current Path
28	N/A	N/A
29	GND	Return Current Path
30	N/A	N/A
31	-A(port1)	SATA differential RX- based on SSD
32	N/A	N/A
33	+A(port1)	SATA differential RX+ based on SSD
34	GND	Return Current Path

35	GND	Return Current Path
36	Reserved	No Connect
37	GND	Return Current Path
38	Reserved	No Connect
39	+3.3V	3.3V source
40	N/A	N/A
41	+3.3V	3.3V source
42	N/A	N/A
43	GND	Return Current Path
44	N/A	N/A
45	Reserved	No Connect
46	N/A	N/A
47	N/A	N/A
48	N/A	N/A
49	N/A	N/A
50	GND	Return Current Path
51	GND	Return Current Path
52	+3.3V	3.3V source

6. Supported Command Sets

The BIWIN SSD BS202 Series supports ATA (Advanced Technology Attachment) commands described in this section.

6.1 ATA General Feature Command Set

The BIWIN SSD BS202 Series supports the ATA General Feature command set (non-PACKET), which consists of:

- EXECUTE DEVICE DIAGNOSTIC
- FLUSH CACHE
- IDENTIFY DEVICE
- READ DMA
- READ SECTOR(S)
- READ VERIFY SECTOR(S)
- SEEK
- SET FEATURES
- WRITE DMA
- WRITE SECTOR(S)
- READ MULTIPLE
- SET MULTIPLE MODE
- WRITE MULTIPLE

The BIWIN SSD BS202 Series also supports the following optional commands:

- READ BUFFER
- WRITE BUFFER
- NOP
- DOWNLOAD MICROCODE

6.2 Power Management Command Set

The BIWIN SSD BS202 Series supports the Power Management command set, which consists of:

- CHECK POWER MODE
- IDLE
- IDLE IMMEDIATE
- SLEEP
- STANDBY
- STANDBY IMMEDIATE

6.3 Security Mode Feature Set

The BIWIN SSD BS202 Series supports the Security Mode command set, which consists of:

- SECURITY SET PASSWORD
- SECURITY UNLOCK
- SECURITY ERASE PREPARE

- SECURITY ERASE UNIT
- SECURITY FREEZE LOCK
- SECURITY DISABLE PASSWORD

6.4 SMART Command Set

The BIWIN SSD BS202 Series supports the SMART command set, which consists of:

- SMART ENABLE OPERATIONS
- SMART DISABLE OPERATIONS
- SMART ENABLE/DISABLE AUTOSAVE
- SMART RETURN STATUS

The BIWIN SSD mSATA BS202 Series also supports the following optional commands:

- SMART EXECUTE OFF-LINE IMMEDIATE
- SMART READ DATA
- SMART READ LOG
- SMART WRITE LOG

6.5 Data Set Management Command Set

The BIWIN SSD BS202 Series supports the Data Set Management command set Trim attribute, which consists of:

- DATA SET MANAGEMENT EXT

6.6 Host Protected Area Command Set

The BIWIN SSD BS202 Series supports the Host Protected Area command set, which consists of:

- READ NATIVE MAX ADDRESS
- SET MAX ADDRESS
- READ NATIVE MAX ADDRESS EXT
- SET MAX ADDRESS EXT

The BIWIN SSD mSATA BS202 Series also supports the following optional commands:

- SET MAX SET PASSWORD
- SET MAX LOCK
- SET MAX FREEZE LOCK
- SET MAX UNLOCK

6.7 48-Bit Address Command Set

The BIWIN SSD BS202 Series supports the 48-bit Address command set, which consists of:

- FLUSH CACHE EXT
- READ DMA EXT
- READ NATIVE MAX ADDRESS EXT
- READ SECTOR(S) EXT

- READ VERIFY SECTOR(S) EXT
- SET MAX ADDRESS EXT
- WRITE DMA EXT
- WRITE MULTIPLE EXT
- WRITE SECTOR(S) EXT
- WRITE UNCORRECTABLE EXT

6.8 General Purpose Log Command Set

The BIWIN SSD BS202 Series supports the General Purpose Log command set, which consists of:

- READ LOG EXT
- WRITE LOG EXT

6.9 Native Command Queuing

The BIWIN SSD BS202 Series supports the Native Command Queuing (NCQ) command set, which includes:

- READ FPDMA QUEUED
- WRITE FPDMA QUEUED

Note: With a maximum queue depth equal to 32.

6.10 Software Settings Preservation

The BIWIN SSD BS202 Series supports the SET FEATURES parameter to enable/disable the preservation of software settings.

7. Certifications and Declarations

Certification	Description
CE Compliant	Indicates conformity with the essential health and safety requirements set out in European Directives Low Voltage Directive and EMC Directive.
RoHS Compliant	Restriction of Hazardous Substance Directive