

Consumer
2.5" SATA III SSD
A55 Series
Datasheet

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Index

Revision History	3
1. Description.....	4
2. Mechanical Dimension	4
3. Specifications.....	5
3.1.Power Consumption :	5
3.2.Physical Specification :	5
3.2.1. Storage Capacity :	5
3.2.2. Sector Size :	5
3.2.3. Power Supply :	5
3.3. Performance Specification :	5
3.3.1. Transfer Mode :	5
3.3.2. Wear-leveling.....	5
3.3.3. Performance	5
3.4. Environmental Specification :	6
3.4.1. Temperature :	6
3.4.2. Humidity	6
3.4.3. Vibration :	6
3.4.4. Shock :	6
3.5.Reliability Specification :	7
3.5.1. Insertions :	7
3.5.2. Data Retention :	7
3.5.3. ECC(Error Correction code) :	7
3.5.4. MTBF :	7
3.6.Compliance Specification :	7
3.7.Weight :	7
3.8.Compatibility :	7
4. Block Diagram.....	7
5. Pin Assignments and Descriptions.....	8
6. DC Electrical Characteristics	9
7. ATA Command List	10
8. Identify Device Data	11
9. Part Number List.....	15

Revision History

Revision No.	Date	Remarks
1.0	2017/08/24	1. Formal release.
1.1	2020/05/21	1. Update SSD product photo. 2. Add 2TB SSD in product line.
1.2	2021/11/02	1. Update Storage capacity information in section 3.2.1. 2. Update SSD performance in section 3.3.3. 3. Add SSD TBW in section 3.5.5. 4. Add SSD compatibility in section 3.8.
1.3	2022/12/20	1. Update Compliance Specification in section 3.6.
1.4	2023/02/17	1. Update Performance Specification in section 3.3.3 2. Update Storage Capacity Specification 3.2.1. 3. Add 4TB SSD in product line. 4. Remove 64GB SSD in product line. 5. Add 4TB SSD in section 3.1. 6. Remove 64GB SSD in section 3.1.

1. Description

The 2.5" SATA Solid State Disk A55 is designed with Reliability, Capacity, High Performance and Flexibility as the four main criteria.

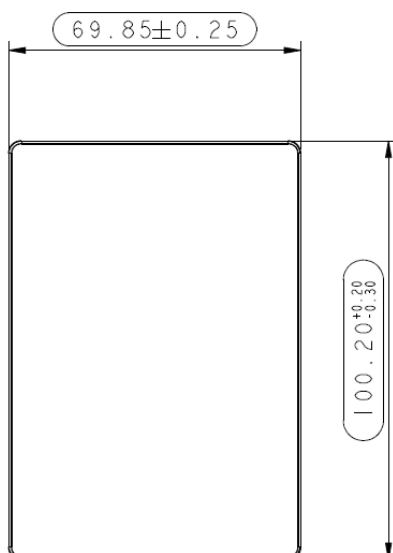


2. Mechanical Dimension

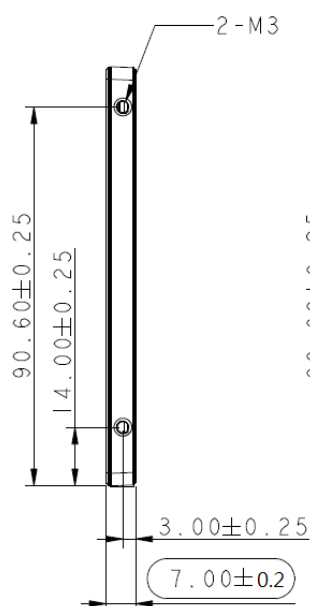
Two kinds of housing dimension are supported:

- A55 Dimension: 100.20mm(L) x 69.85mm(W) x 7.00mm(H)

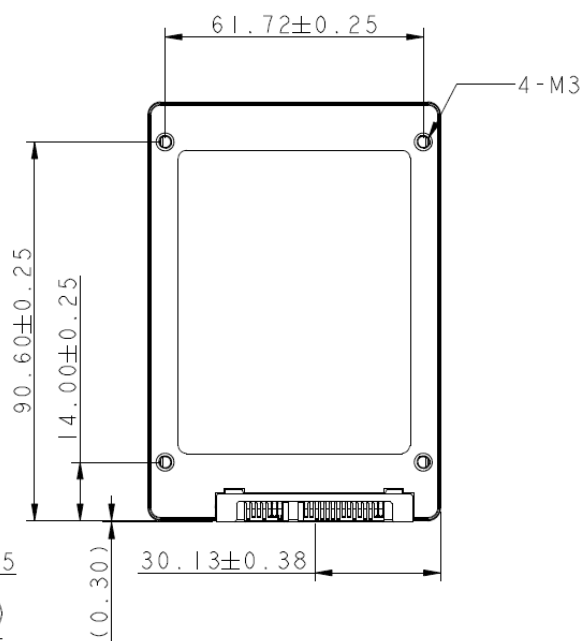
Top View



Side View



Bottom View



3. Specifications

3.1. Power Consumption :

	128GB	256GB	512GB	1TB	2TB	4TB
Active mode	280mA	330mA	370mA	400mA	720mA	720 mA
Idle mode	60mA	60mA	60mA	60mA	60mA	330 mA

Note : DC 5V±5% / 25°C

3.2. Physical Specification :

3.2.1. Storage Capacity :

- 128GB、256GB、512GB、1TB、2TB、4TB

3.2.2. Sector Size :

- 512bytes

3.2.3. Power Supply :

- SATA interface I/O at 5.0V ±5%

3.3. Performance Specification :

3.3.1. Transfer Mode :

- Support SATAI、SATAII、SATAIII

3.3.2. Wear-leveling

- Global wear leveling

3.3.3. Performance

ATTO ^{*1}	SATAIII performance	
Model P/N	Read(MB/s)	Write(MB/s)
SP128GBSS3A55S25	Up to 560	Up to 480
SP256GBSS3A55S25	Up to 560	Up to 500
SP512GBSS3A55S25	Up to 560	Up to 530
SP001TBSS3A55S25	Up to 560	Up to 530
SP002TBSS3A55S25	Up to 560	Up to 530
SP004TBSS3A55S25	Up to 560	Up to 530

Crystal Disk Mark ^{*2}	SATAIII performance (QD32)	
Model P/N	Read(MB/s)	Write(MB/s)
SP128GBSS3A55S25	Up to 460	Up to 360
SP256GBSS3A55S25	Up to 460	Up to 450
SP512GBSS3A55S25	Up to 500	Up to 450
SP001TBSS3A55S25	Up to 500	Up to 450
SP002TBSS3A55S25	Up to 500	Up to 450
SP004TBSS3A55S25	Up to 500	Up to 450

AS SSD Benchmark	SATAIII performance	
Model P/N	Read(MB/s)	Write(MB/s)
SP128GBSS3A55S25	Up to 500	Up to 350
SP256GBSS3A55S25	Up to 500	Up to 450
SP512GBSS3A55S25	Up to 500	Up to 450
SP001TBSS3A55S25	Up to 500	Up to 450
SP002TBSS3A55S25	Up to 500	Up to 450
SP004TBSS3A55S25	Up to 500	Up to 450

Maximum 4K Random Write	SATAIII performance(QD32)	
Model P/N	Read (IOPS)	Write (IOPS)
SP128GBSS3A55S25	Up to 40K	Up to 40K
SP256GBSS3A55S25	Up to 50K	Up to 50K
SP512GBSS3A55S25	Up to 50K	Up to 70K
SP001TBSS3A55S25	Up to 50K	Up to 70K
SP002TBSS3A55S25	Up to 65K	Up to 70K
SP004TBSS3A55S25	Up to 65K	Up to 70K

Note1 : ATTO, Total length 256MB

Note2 : Crystal Disk Mark, Random data pattern with 1000MB 5cycle

3.4. Environmental Specification :

3.4.1. Temperature :

- Operating temperature : 0℃ ~ 70℃
- Storage Temperature : -40℃ ~ 85℃

3.4.2. Humidity

- RH 90% under 40℃ (in Operation)

3.4.3. Vibration :

- 80- 2000Hz/20G

3.4.4. Shock :

- 500G/2ms

3.5. Reliability Specification :

3.5.1. Insertions :

- 10,000 times

3.5.2. Data Retention :

- 10% of program / Erase Endurance cycles: 10 Years
- 100% of program / Erase Endurance cycles: 1 Years

* The value is based on normal program/erase endurance at room temperature. High environmental temperature may shorten the retention period.

3.5.3. ECC(Error Correction code) :

- Support Low Density Parity Check(LDPC) code

3.5.4. MTBF :

- 1,500,000Hrs

3.6. Compliance Specification :

- CE / FCC / ROHS / BSMI / C-TICK / KC / EAC

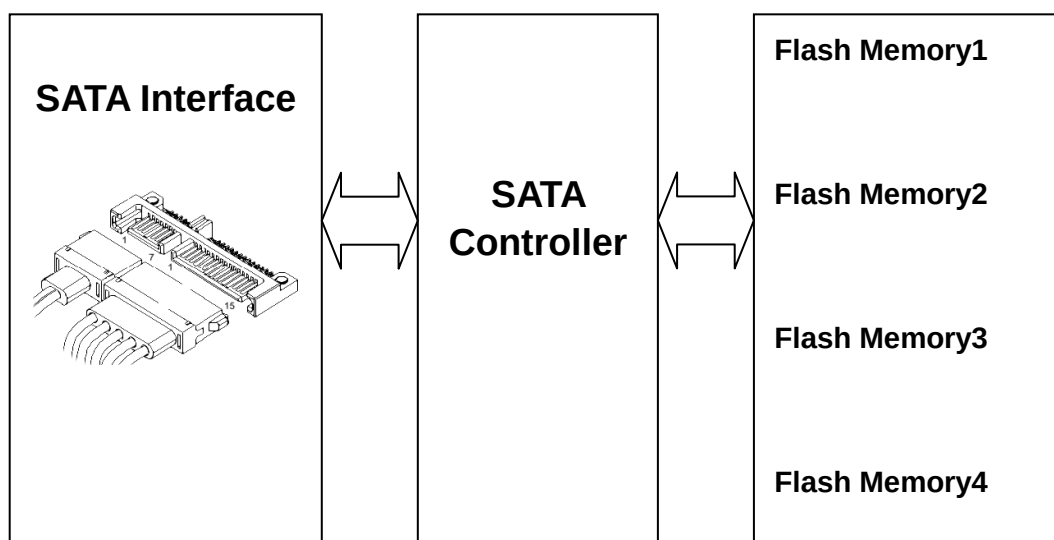
3.7. Weight :

- 63g(Approx)

3.8. Compatibility :

- Compliant with Serial ATA revision 3.1 standard with 6.0 Gb/s transfer rate.
- Compliant with ATA/ATAPI-8 standard and ACS-2 command protocol.
- Support SMART feature command set.
- Support 28/48 bit LBA addressing.
- Native command queuing support with 32-command support.
- Support Trim command.
- Support Write cache.

4. Block Diagram



5. Pin Assignments and Descriptions

	Pin Number	Signal Name	Description
Signal Segment	S1	GND	Ground
	S2	A+	Differential Signal Pair A
	S3	A-	
	S4	GND	Ground
	S5	B-	Differential Signal Pair B
	S6	B+	
	S7	GND	Ground
Power Segment	P1	V33	3.3V Power
	P2	V33	3.3V Power
	P3	V33	DEVSLP
	P4	GND	Ground
	P5	GND	Ground
	P6	GND	Ground
	P7	V5	5V Power
	P8	V5	5V Power
	P9	V5	5V Power
	P10	GND	Ground
	P11	Reserved	-
	P12	GND	Ground
	P13	V12	12V Power (Not used)
	P14	V12	12V Power (Not used)
	P15	V12	12V Power (Not used)

6. DC Electrical Characteristics

Parameter		Minimum	Typical	Maximum	Note
Supply Voltage VDDIO (3.3V)		2.7V	3.3V	3.6V	
Supply Voltage VDDIO (1.8V)		1.7V	1.8V	1.95V	
Vref		0.49*VDDIO	0.5*VDDIO	0.51*VDDIO	
VILH (3.3V)	LVTTL VIH			1.891V (0.525*VDDIO)	LVTTL mode
	LVTTL VIL	1.256V (0.465*VDDIO)			
	Schmitt Vpos			2.152V (0.613*VDDIO)	Schmitt mode
	Schmitt Vneg	1.037V (0.384*VDDIO)			
	Schmitt Vhys	0.454V		0.631V	
	Differential VIH			Vref + 100mV	Differential mode
	Differential VIL	Vref – 100mV			
VILH (1.8V)	LVTTL VIH			1.036V (0.531*VDDIO)	LVTTL mode
	LVTTL VIL	0.787V (0.463*VDDIO)			
	Schmitt Vpos			1.256V (0.655*VDDIO)	Schmitt mode
	Schmitt Vneg	0.606V (0.356*VDDIO)			
	Schmitt Vhys	0.343V		0.504V	
	Differential VIH			Vref + 100mV	Differential mode
	Differential VIL	Vref – 100mV			
Input / Output Leakage		-10uA		+10uA	Without pull-u/d
Pu / Pd Resistance (3.3V)	Pull-up 5K	3.90Kohm		6.50Kohm	At Vout = 0V~VDDIO
	Pull-up 5.5K	4.17Kohm		7.01Kohm	
	Pull-up 75K	59.7Kohm		91.1Kohm	
	Pull-down 75K	58.3Kohm		90.0Kohm	
Pu / Pd Resistance (1.8V)	Pull-up 5K	4.24Kohm		7.97Kohm	At Vout = 0V~VDDIO
	Pull-up 5.5K	4.55Kohm		8.73Kohm	
	Pull-up 75K	61.0Kohm		92.2Kohm	
	Pull-down 75K	58.6Kohm		90.3Kohm	

7. ATA Command List

Command Name	Code	Command Name	Code
CHECK POWER	E5h	SECURITY DISABLE PASSWORD	F6h
Data Set management	06h	SECURITY ERASE PREPARE	F3h
DCO	B1H	SECURITY ERASE UNIT	F4h
Download Microcode PIO	92h	SECURITY FREEZE LOCK	F5h
Download Microcode DMA	93h	SECURITY SET PASSWORD	F1h
EXECUTE drive DIAGNOSTICS	90h	SECURITY UNLOCK	F2h
FLUSH CACHIE	E7h	Seek	70h
FLUSH cache Ext	EAh	Set FEATURES	EFh
IDENTIFY DEVICE	ECh	Set Max Address	F9h
IDLE	E3h	Set Max Address Ext	37h
IDLE IMMEDIATE	E1h	SET MULTIPLE MODE	C6h
INITIALIZE DEVICE PARAMETERS	91h	SLEEP	E6h
Read buffer	E4h	Smart	B0h
Read DMA (w/o retry)	C9h	Standby	E2h
Read DMA (w/retry)	C8h	STANDBY IMMEDIATE	E0h
Read DMA Ext	25h	Write buffer	E8h
Read FPDMA QUEUED	60h	Write DMA (w/o retry)	CBh
Read Log Ext	2Fh	Write DMA (w/retry)	CAh
Read MULTIPLE	C4h	Write DMA Ext	35h
Read MULTIPLE Ext	29h	Write DMA FUA Ext	3Dh
Read native max address	F8h	Write FPDMA QUEUED	61h
Read native max Ext	27h	Write Log Ext	3Fh
Read sector(s) (w/o retry)	21h	Write multiple	C5h
Read sector(s) (w/retry)	20h	Write multiple Ext	39h
Read sector(s) Ext	24h	Write multiple FUA Ext	CEh
Read Verify Ext	42h	Write sector (s) (w/o retry)	31h
Read verify sector(s) (w/o retry)	41h	Write sector (s) (w/retry)	30h
Read verify sector(s) (w/retry)	40h	Write sector (s) Ext	34h
RECALIBRATE	10h	Write uncorrectable	45h

8. Identify Device Data

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	0000h	Reserved
49	F	2F00h	Capabilities
50	F	4000h	Capabilities
51-52	X	000000000h	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

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	0100h	Additional Supported (support download microcode DMA)
70	F	0000h	Reserved
71-74	F	0000000000000000h	Reserved for the IDENTIFY PACKET DEVICE command
75	F	001Fh	Queue depth
76	F	0706h	Serial SATA capabilities
77	F	0000h	Reserved for future Serial ATA definition
78	F	0044h	Serial ATA features supported
79	V	0040H	Serial ATA features enabled
80	F	01F8h	Major Version Number
81	F	0000h	Minor Version Number
82	F	346bh	Command set supported
83	F	70d9h	Command set supported
84	F	6023h	Command set/feature supported extension
85	V	3469h	Command set/feature enabled
86	V	bc01h	Command set/feature enabled
87	V	6023h	Command set/feature default
88	V	003Fh	Ultra DMA Modes
89	F	001Eh	Time required for security erase unit completion
90	F	001Eh	Time required for Enhanced security erase completion
91	V	0000h	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
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

Word	F: Fixed V: Variable X: Both	Default Value	Description
105	F	0000h	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	0000000000000000h	Unique ID
112-115	F	0000000000000000h	Reserved
116	V	0000h	Reserved
117-118	F	00000000h	Words per logical Sector
119	F	4015h	Supported settings
120	F	4015h	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	3h 2.5 inch 4h 1.8 inch 5h Less than 1.8 inch	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	0h	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)
217	F	0001h	Non-rotating media device
218	F	0h	Reserved
219	F	0h	NV Cache relate (not support)
220	V	0h	Write read verify feature set current mode

Word	F: Fixed V: Variable X: Both	Default Value	Description
221		0h	Reserved
222	F	101Fh	Transport major version number
223	F	0h	Transport minor version number
224-229		0h	reserved
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		00FFh	Maximum number of 512-byte data blocks per DOWNLOADMICROCODE command for mode 03h
236-254	F	0h	Reserved
255	X	XXA5h XX is variable	Integrity word (Checksum and Signature)

9. Part Number List

SP xxxxB SS3 A55 S25

1 2 3 4 5

1. SP : SILICON POWER Product

2. xxxxB : 128GB/256GB/512GB/001TB/002TB/004TB

3. SS3 : SATA3 SSD

4. A55 : ACE Series

5. S25 : 2.5inch SATA

