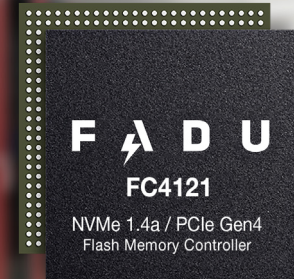


Gen4 High-Performance SSD



3D TLC NAND

DELTA E1.S SSD

Bare Drive / 9 / 15 / 25mm Heatsink
NVMe 1.4a / PCIe Gen4 x 4 /
OCP Cloud Spec 2.0

FADU Technology develops and advances Flash storage technology to meet the explosively increasing data storage demands placed on OEM enterprise servers and hyperscale cloud data centers. Our products are based on industry standard specifications, powered by FADU's proprietary Flash Memory Controller architecture, and are compatible with multiple NAND suppliers. FADU's storage designs address all aspects of Flash-based storage – very low power, ultra-high performance, rich feature sets, solid reliability and superior QOS.

The **FADU DELTA E1.S SSD Family** is designed for NVMe 1.4a / PCIe Gen4 x4, and OCP Cloud Spec 2.0 and is powered by FADU's FC4121 Gen4 Flash Memory Controller.

The innovative architecture delivers low power and high performance by eliminating thermal issues that lead to throttling. The DELTA E1.S SSDs support higher and more stable QOS at a lower Queue depth, predictive look-ahead error correction algorithms, and super-low latency. These drives support standard hyperscale, enterprise and cloud features including SR-IOV, SGL, Multi-stream, ZNS, IOD and CMB, PMR.

The FADU DELTA E1.S Family is available as a bare drive or with 9mm, 15mm, or 25mm heatsinks, which help lower airflow requirements, leaving more thermal headroom for the CPU.



The DELTA E1.S SSD is ideal for hyperscale and edge cloud data center storage and supports a variety of Flash including 3D eTLC and cTLC, QLC*, Low-Latency SLC* and XL-FLASH*. This device is available with the FC4121 controller and customized firmware or as a completed, private-labeled SSD.

www.fadu.io

Product Family

DELTA E1.S SSD

NVMe 1.4a / PCIe Gen4 x4 SSD in an E1.S form factor with various heat sinks, powered by the FADU FC4121 RISC-V Flash Memory Controller using 3D TLC*.

Key Parameters

Host Interface	<ul style="list-style-type: none">• NVMe 1.4a• PCIe Gen4 x 4 Lanes
NAND Interface	Supports 3D eTLC and cTLC, QLC*, Low-Latency SLC*, and XL-Flash*
Capacity	2TB / 4TB / 8TB / 16TB
Controller	FADU FC4121
Reliability	2 Million Hours MTBF
E1.S (3.84TB)	
Seq. Read	7.3 GB/s @ 4TB / 7% OP
Seq. Write	4.6 GB/s @ 4TB / 7% OP
4KB Random Read Max	1490 KIOPS sustained @4TB
4KB Random Write Max	180 KIOPS sustained @4TB
OP	7%
DWPD	1 DWPD Endurance (7%)
Latency:	80µs Read 15µs Write
Avg. Power:	
Active Read	<13W
Standby	~1W

* Check for availability. Data based on SK hynix V6 NAND.

DELTA E1.S SSD Comparison

When comparing the DELTA E1.S SSD vs other Flash storage devices, the DELTA drive is significantly faster at lower power, delivering the best KIOPS/W performance.

E1.S

	FADU DELTA E1.S SSD		COMPETITOR
	3.84TB	Improvement	3.84TB
Performance (7% OP)			
Seq. Read (GB/s)	7.3	+4%	7.000
Seq. Write (GB/s)	4.6	+31%	3.500
Random Read (KIOPS)	1490		1500
Random Write (KIOPS)	180		300
DWPD	1		1
Power			
Active Power-Read (W)	<13	-35%	20
Idle Power (W)	~1		
KIOPS/Watt			
KIOPS/W (Read)	115	+53%	75

FADU's DELTA SSD Gen4 Platform includes the DELTA SSD, FADU FC4121 Flash Memory Controller, customizable firmware and SSD design.

FADU sells to OEMs in two ways:

- Turnkey & Ready to Assemble

We customize and supply the Flash Controller and SSD design ready for you to assemble your SSD





- Private Label a Finished SSD

You consign your NAND Flash to us and we customize, manufacture and private label your finished SSD for you

For more information please visit www.fadu.io or email sales@fadu.io.

Support for the DELTA E1.S SSD

The DELTA E1.S SSD design is supported by leading NAND manufacturers.

	NAND	Formats	Capacity
	V6	E1.S	Up to 16TB
		E1.S	Up to 16TB
	B47	E1.S	Up to 16TB
	BICS 4/5	E1.S	Up to 16TB

Features

Compatibility

- OCP Cloud Spec 2.0
- NVMe 1.4a / PCIe Gen4 x 4
- Enterprise and Commercial NAND Support

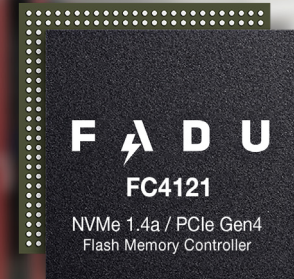
Security

- AES 256-bit for User Data Encryption, TRNG, and FIPS 140-2 support
- End-to-end data protection with dynamic internal RAID
- Trusted Boundary, Secure Boot and Key Wrapping (NIST 800-38F)

Features

- SR-IOV (15VF/PF/Port) with Virtualization (Dynamic allocations of Queue/Interrupt)
- CMB (Controller Memory Buffer) up to 16MB
- PMR (Persistent Memory Region) up to 16MB
- Up to 32 Multi-streams (16 per port), ZNS, IOD
- Multiple NS (256) and 170 Queues
- NVMe-MI 1.0a+ / SMART / Health Log / Telemetry / Atomicity of 512KB
- 10 DIF/DIX Vital Product Data (VPD) over SMBus & LED Internal / External Power Loss Protection (PLP)

Gen4 High-Performance SSD



3D TLC NAND

DELTA U.2 SSD

NVMe 1.4 / PCIe Gen4 x 4

FADU Technology develops and advances Flash storage technology to meet the explosively increasing data storage demands placed on OEM enterprise servers and hyperscale cloud data centers. Our products are based on industry standard specifications, powered by FADU's proprietary Flash Memory Controller architecture, and compatible with multiple NAND suppliers. FADU's storage designs address all aspects of Flash-based storage – very low power, ultra-high performance, rich feature sets, solid reliability and superior QOS.

The **FADU DELTA U.2 SSD Family** is designed for NVMe 1.4a/PCIe Gen4 x 4 and is powered by FADU's FC4121 Gen4 Flash Memory Controller.

The innovative architecture delivers low power and high performance by eliminating thermal issues that lead to throttling. The DELTA U.2 SSDs support higher performance and more stable QOS at a lower Queue depth. predictive look-ahead error correction algorithms, and super-low latency. These drives support standard hyperscale and enterprise features including SR-IOV, SGL, Multi-stream, ZNS, IOD, CMB, and PMR.



The DELTA U.2 SSD is ideal for OEM enterprise servers and storage and supports a variety of Flash including 3D eTLC and cTLC, QLC*, Low-Latency SLC* and XL-FLASH*. This device is available with the FC4121 controller and customized firmware or as a completed, private-labeled SSD.

Product Family

DELTA U.2 SSD

NVMe 1.4a / PCIe Gen4 x4 SSD in an U.2 form factor, powered by the FADU FC4121 RISC-V Flash Memory Controller using 3D TLC*.

Key Parameters

Host Interface	<ul style="list-style-type: none">• NVMe 1.4a• PCIe Gen4 x 4 Lanes• Dual-port functionality	
NAND Interface	Supports 3D eTLC and cTLC, QLC*, Low-Latency SLC*, and XL-Flash*	
Capacity	2TB / 4TB / 8TB / 16TB / 32TB	
Controller	FADU FC4121	
Reliability	2 Million Hours MTBF	
U.2 (3.84TB)		
Seq. Read	7.3 GB/s	@ 4TB / 7% OP
Seq. Write	4.6 GB/s	@ 4TB / 7% OP
4KB Random Read Max	1490 KIOPS	sustained @4TB
4KB Random Write Max	180 KIOPS	sustained @4TB
OP	7% / 28%	
DWPD	1 DWPD Endurance (7%) 3 DWPD Endurance (28%)	
Latency:	80µs Read 15µs Write	
Avg. Power:		
Active Read	<13W	
Standby	~1W	

* Check for availability. Data based on SK hynix V6 NAND.

DELTA U.2 SSD Comparison

When comparing the DELTA U.2 SSD vs other Flash storage devices, the DELTA drive is significantly faster at lower power, delivering the best KIOPS/W performance.

U.2

	FADU DELTA U.2 SSD		COMPETITOR
	3.84TB	Improvement	3.84TB
Performance (7% OP)			
Seq. Read (GB/s)	7.3	+4%	7.000
Seq. Write (GB/s)	4.6	+31%	3.500
Random Read (KIOPS)	1490		1500
Random Write (KIOPS)	180		300
DWPD	1		1
Power			
Active Power-Read (W)	<13	-35%	20
Idle Power (W)	~1		
KIOPS/Watt			
KIOPS/W (Read)	115	+53%	75

FADU's DELTA SSD Gen4 Platform includes the DELTA SSD, FADU FC4121 Flash Memory Controller, customizable firmware and SSD design.

FADU sells to OEMs in two ways:

- Turnkey & Ready to Assemble





We customize and supply the Flash Controller and SSD design ready for you to assemble your SSD

- Private Label a Finished SSD

You consign your NAND Flash to us and we customize, manufacture and private label your finished SSD for you

Support for the DELTA SSD

The DELTA U.2 SSD design is supported by leading NAND manufacturers.

	NAND	Formats	Capacity
	V6	U.2	Up to 32TB
		U.2	Up to 32TB
	B47	U.2	Up to 32TB
	BICS 4/5	U.2	Up to 32TB

Features

- NVMe 1.4a / PCIe Gen4 x 4
- Enterprise and Commercial NAND Support

Security

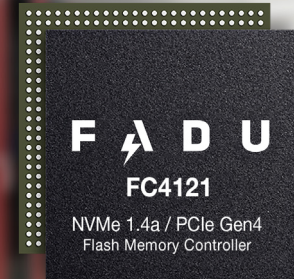
- AES 256-bit for User Data Encryption, TCG OPAL, eDrive, TRNG, FIPS 140-2, and SHA3-512 support
- End-to-end data protection with dynamic internal RAID
- Trusted Boundary and Secure Boot

Features

- Dual-port support
- SR-IOV (15VF/PF/Port) with Virtualization (Dynamic allocations of Queue/Interrupt)
- CMB (Controller Memory Buffer) up to 16MB
- PMR (Persistent Memory Region) up to 16MB
- Up to 32 Multi-streams (16 per port), ZNS, IOD
- Multiple NS (256) with 170 Queues
- NVMe-MI 1.0a+ / SMART / Health Log / Telemetry / Atomicity of 512KB
- 10 DIF/DIX Vital Product Data (VPD) over SMBus & LED Internal / External Power Loss Protection (PLP)

For more information please visit www.fadu.io or email sales@fadu.io.

Gen4 Flash Memory Controller



NVMe 1.4a / PCIe Gen4 x 4

FC4121

NVMe 1.4a / PCIe Gen4 x 4 Single / Dual Port Support

FADU Technology develops and advances Flash storage technology to meet the explosively increasing data storage demands placed on OEM enterprise servers and hyperscale cloud data centers. Our products are based on industry standard specifications, powered by FADU's proprietary Flash Memory Controller architecture, and compatible with multiple NAND suppliers. FADU's storage designs address all aspects of Flash-based storage – very low power, ultra-high performance, rich feature sets, solid reliability and superior QOS.

The **FADU FC4121 Flash Memory Controller** is a next-generation NVMe 1.4a SSD controller designed to take full advantage of NVMe. It also supports the PCIe Gen4 x 4 host interface and a 12 channel NAND interface. It's designed for dual-port and large capacities with low latency. Our error prediction architecture enables high QOS, regardless of Queue depth.

This powerful controller is the most power-efficient and flexible solution in the industry for OEM enterprise servers & storage and hyperscale cloud storage applications. It powers FADU's DELTA SSDs in U.2, E1.S, and M.2 SSD form factors.



The FADU FC4121 is the industry's second controller based on a RISC-V core (following FADU's successful NVMe 1.3a FC3081 controller). It has customizable firmware and joins the DELTA SSDs to form FADU's DELTA Gen4 Platform. It is available as a solution for SSD OEMs and end customers manufacturing their own devices, or as a private labeled SSD manufactured by FADU's contract manufacturers including Unigen, using consigned Flash memory.

Product Family

FC4121

NVMe 1.4a / PCIe Gen4 x 4 Flash Memory Controller for Hyperscale, Enterprise and Cloud Data Center Flash storage devices in a 16x16mm 905-ball FBGA with a 0.5 ball pitch.

Key Parameters

Host Interface

- NVMe 1.4a
- PCIe Gen4 x 4 Lanes
- Dual-Port functionality

NAND Interface

- Up to 12 NAND channels, each supporting up to 16 CE
- Up to 1200MT/s Toggle and ONFI 4.1 specifications
- Supports TLC, QLC, Low Latency SLC NAND (XL-FLASH™)

DRAM Interface

- 32bit DRAM
- Up to 16GB DDR4/LPDDR4/LPDDR4X

Avg. Power

<13W

Seq. Read

7.3 GB/s

Seq. Write

4.6 GB/s

4Kb Random Read

Up to 1490 KIOPS (sustained)

4Kb Random Write

Up to 180 KIOPS (sustained)

Core

RISC-V base controller

Architectural Advantage

Conventionally designed controllers using legacy architectures have complex FTL and heavy RTL with multiple processes. By contrast, the FC4121 controller architecture delivers performance through the introduction of a Flash Acceleration Layer (FAL) which fully automates hardware, and offloads host and controller interfaces, bypasses DRAM host data and adds accelerators and schedulers to remove bottlenecks leading to increased Quality of Service (QOS).

FADU DELTA Gen4 vs. Leading High-End Supplier Lower Power / Higher Throughput

U.2 Form Factor (7% OP)	Leading High-End Supplier	FADU DELTA SSD* FC4121 Controller	
Sequential Read (GB/s)	7.0	7.3	
Sequential Write (GB/s)	3.5	4.6	31% Higher
Random Read (KIOPS)	1500	1490	5% Higher
Random Write (KIOPS)	300	180	
Active Power - Read (W)	20	<13	35% Lower
Performance - Read (KIOPS/Watt)	75	115	53% Higher

FADU BRAVO Gen3 vs. FADU DELTA Gen4 Low Power / Twice the Throughput

U.2 Form Factor (28% OP)	FADU BRAVO SSD FC3018	FADU DELTA SSD* FC4121 Controller	
Sequential Read (GB/s)	3.5	7.3	>2.1x Higher
Sequential Write (GB/s)	2.65	4.6	1.7x Higher
Random Read (KIOPS)	820	1490	>1.8x Higher
Random Write (KIOPS)	230	180	
Active Power - Read (W)	5	<13	
Performance - Read (KIOPS/Watt)	164	115	

*SK hynix V6 TLC NAND

Engagement Models

FADU's engages with hyperscale, edge, and enterprise data center OEMs for their SSD storage needs. We have two engagement models.

The Turnkey Solution is optimized for large OEMs that want the designs and benefits of FADU technology, but need the flexibility to build their own SSDs. The Private Label Solution enables OEMs to consign memory to FADU and we manufacture private-labeled, ready-to-sell SSDs.

Turnkey Solution

You provide the memory and manufacture your SSDs. The Turnkey Solution is ideal for flexibility. Turnkey is offered direct to datacenter OEMs, SSD vendors, and NAND Flash suppliers with SSD products.

FADU

- SSD Reference Design
- Flash Controller
- Customized Firmware
- Bill-of-Materials
- Technical Support

OEM

- Flash and DRAM memory
- SSD assembly/test
- Sales and marketing
- Customer support

Private Label Solution

You provide the memory and we do the rest, delivering ready-to-sell branded SSDs. The Private Label Solution is perfect for faster time to market. Private Label is offered direct to datacenter large volume OEMs, SSD vendors, and NAND Flash suppliers with SSD products.

- SSD Reference Design
- Flash Controller
- Customized Firmware
- Bill-of-Materials management
- SSD assembly/test
- SSD Private Label/packaging
- Technical Support

- Memory Consigned to FADU
- Sales and marketing
- Customer support

Enterprise Features

Security

- AES 256-bit for User Data Encryption, TCG/OPAL support
- End-to-end data protection with dynamic internal RAID
- Trusted Boundary and Secure Boot

Peripherals

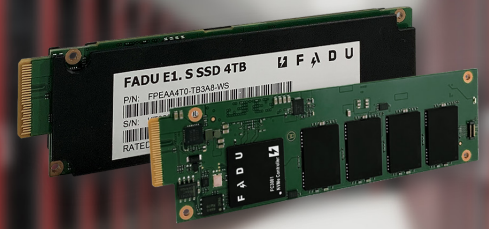
- Temperature sensor support

Flash Memory Controls

- Enterprise and Commercial NAND support
- Dual-port and Large Capacity support
- Micro-code based architecture enables future NAND & NVM support
- Low power and low thermal operation / budget based throttling
- Out of order execution of both flash controller and host controller
- 4KB LDPC engine supports 3D TLC and QLC
- SR-IOV (32VF/Port), Multi-stream (up to 32), Multiple name space (up to 128), Dual port, End-to-end & per stream QOS

For more information please visit www.fadu.io or email sales@fadu.io.

Bravo High-Performance SSD



3D TLC NAND

Bravo E1.S SSD

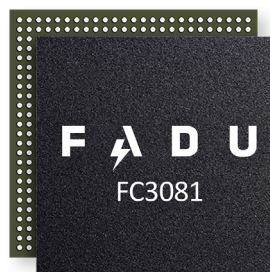
E1.S (5.9 / 9.5 / 15 / 25mm)

NVMe 1.3 / PCIe 3.1

FADU Technology is focused on advancing Flash storage devices. We are dedicated to developing industry standard form factors including the OCP 1.0-compliant E1.S SSDs. FADU controllers and storage products are designed to meet the explosively increasing data demands placed on enterprise data centers, ushering the SSD Era.

We believe that our existing low-power solutions will further enhance the power efficient E1.S designs and meet power requirements to support realtime,cloud based, connected applications. FADU is addressing all aspects of the Flash-based enterprise storage solution – very low power, ultra-high performance, rich feature set, solid reliability and a superior QOS.

The **FADU BRAVO E1.S SSD** is designed to deliver the low power, high performance needed to support today's connected, storage-intensive world. Thermal issues that lead to throttling have been eliminated by this architecture. The BRAVO SSDs are faster and more stable. These drives support the latest features required by Hyperscale data center and enterprise storage applications including Dual-port, CMB, PMR, ZNS, IOD, Multi-stream and SR-IOV.



The BRAVO E1.S SSD design supports a variety of Flash including 3D TLC and low latency SLC. It is powered by the FADU FC3081 NVMe controller, using its breakthrough architecture, to deliver performance at low power. The BRAVO E1.S SSD design is available with the FC3081 controller and customized firmware or as a completed, private-labeled SSD.

www.fadu.io

Product Family

BRAVO E1.S

NVMe Enterprise SSD in an E1.S form factor, powered by the FADU FC3081 RISC-V controller using 3D TLC NAND.

Key Parameters

Host Interface	• NVMe 1.3a
	• PCIe Gen 3.1 x 4 Lanes (x 2 Lanes for Dual Port)
NAND Interface	Supports 3D TLC and Low Latency SLC NAND Flash
Capacity	4TB / 8TB
Controller	FC3081
Reliability	1.3 DWPD Endurance 2 Million Hours MTBF
E1.S 1.92TB	
Seq. Read	3.3 GB/s
Seq. Write	2.6 GB/s
4KB Random	800 KIOPS
Read Max	sustained @2TB
4KB Random	75 KIOPS
Write Max	sustained @2TB
OP	7%
DWPD	1.3
Latency	80µs Read 15µs Write
Avg. Power:	
Active Read	10W
Active Write	10W
Standby	1.5W

** Using SK hynix V6 TLC NAND

BRAVO E1.S SSD Comparison

When comparing the BRAVO E1.S SSD vs other Flash storage devices, the BRAVO drive is significantly faster and lower power, delivering the best KIOPS/W performance.

E1.S



	BRAVO E1.S 1.92TB/5.9mm
Performance (7% OP)	
Seq. Read (GB/s)	3.30
Seq. Write (GB/s)	2.60
Random Read (KIOPS)	800
Random Write (KIOPS)	75
DWPD	See Spec Online
Power	
Active Power-Read (W)	10
Active Power-Write (W)	10
Idle Power (W)	1.5
KIOPS/Watt	
KIOPS/W (Read)	80
KIOPS/W (Write)	7.5

For more information please visit www.fadu.io or email sales@fadu.io.

Support for the BRAVO E1.S SSD

The BRAVO E1.S SSD design is supported by leading NAND manufacturers.

	TLC NAND	Formats	Capacity
KIOXIA	BICS3 / 4	E1.S	4,8TB
Micron	B27A	E1.S	4,8TB
SK hynix	V6	E1.S	4, 8TB

FADU sells its controller as a turnkey solution with customized firmware and the BRAVO E1.S SSD design to OEMs wishing to manufacture their own storage devices or through a private label model using consigned NAND Flash and FADU SSD manufacturers to deliver complete, privately-labeled NVMe SSDs.

Features

This drive is OCP 1.0 Spec Compliant.

Security

- Standard security features AES 256-bit for User Data Encryption, TRNG, and FIPS 140-2 support
- End-to-end data protection with dynamic internal RAID
- Secure Boot support

Peripherals

- Temperature sensor support

Features

- Multi-streams (up to 32), ZNS, IOD
- Multiple NS (128) with 128 Encryption keys
- SR-IOV (15VF/PF/Port) with Virtualization (Dynamic allocations of Queue/Interrupt)
- CMB (Controller Memory Buffer) up to 16MB
- PMR (Persistent Memory Region) up to 16MB
- NVMe-MI 1.0a+ / SMART / Health Log / Telemetry / Atomicity of 512KB
- 10 DIF/DIX Vital Product Data (VPD) over SMBus & LED Internal / External Power Loss Protection (PLP)

Bravo High- Performance SSD



3D TLC NAND

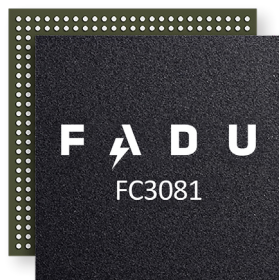
Bravo M.2/U.2 SSDs

M.2 (22110) and U.2 (7mm)

NVMe 1.3 / PCIe 3.1

FADU Technology is focused on advancing Flash storage devices. We are dedicated to developing and deploying new architectures for SSD controllers and storage products that meets the explosively increasing data demands placed on enterprise datacenters, ushering the SSD Era. We believe that existing solutions are unable to meet both performance and power requirements to support real-time, cloud based, connected applications. FADU is addressing all aspects of the Flash-based enterprise storage solution – very lower power, ultra-high performance, rich feature set, solid reliability and a superior QOS.

The **FADU BRAVO Family of M.2 and U.2 SSDs** are designed to deliver the low power, high performance needed to support today's connected, storage-intensive world. Thermal issues that lead to throttling have been eliminated by this architecture. The BRAVO SSDs are faster and more stable. These drives support the latest features required by Hyperscale datacenter and enterprise storage applications including Dual-port, CMB, PMR, ZNS, IOD, Multi-stream and SR-IOV.



The BRAVO SSD design supports a variety of Flash including 3D TLC and low latency SLC. It is powered by the FADU FC3081 NVMe controller, using its breakthrough architecture, to deliver performance at low power. The BRAVO SSD design is available with the FC3081 controller and customized firmware or as a completed, private-labeled SSD.

Product Family

BRAVO M.2/U.2 SSDs

NVMe Enterprise SSD in M.2 and U.2 form factors, powered by the FADU FC3081 RISC-V controller using 3D TLC NAND.

Key Parameters

Host Interface	<ul style="list-style-type: none"> NVMe 1.3a PCIe Gen 3.1 x 4 Lanes (x 2 Lanes for Dual Port)
NAND Interface	Supports 3D TLC and Low Latency SLC NAND Flash
Capacity	1TB / 2TB / 4TB / 8TB
Controller	FC3081
Reliability	1 DWPD Endurance 2 Million Hours MTBF

	M.2 1.92TB	U.2 1.6TB
Seq. Read	3.3 GB/s	3.5 GB/s
Seq. Write	1.8 GB/s	1.9 GB/s
4KB Random Read Max	730 KIOPS	730 KIOPS
4KB Random Write Max	83 KIOPS	230 KIOPS
OP	7%	7% / 28%
DWPD	1	1 / TBA
Latency	80µs Read 15µs Write	80µs Read 15µs Write
Avg. Power:		
Active Read	5W	6W
Active Write	7W	7W
Standby	1.5W	2W

** Using Kioxia BICS3 TLC NAND and Micron B27A NAND

BRAVO M.2 and U.2 SSD Comparison

When comparing the BRAVO SSD vs other Flash storage devices, the BRAVO drive is significantly faster and lower power, delivering the best KIOPS/W performance.

M.2



	BRAVO M.2		COMPETITOR
	1.92TB/7mm	Improvement	1.92TB / 7mm
Performance (7% OP)			
Seq. Read (GB/s)	3.30	10%	3.00
Seq. Write (GB/s)	1.80	29%	1.40
Random Read (KIOPS)	730	52%	480
Random Write (KIOPS)	83	77%	47
DWPD	1		1
Power			
Active Power-Read (W)	5	-29%	7
Active Power-Write (W)	7	-13%	8
Idle Power (W)	1.5	-50%	3
KIOPS/Watt			
KIOPS/W (Read)	145	314%	35
KIOPS/W (Write)	11	55%	7

U.2



	BRAVO U.2		COMPETITOR
	1.6 TB	Improvement	1.6 TB
Performance (28% OP)			
Seq. Read (GB/s)	3.50	17%	3.00
Seq. Write (GB/s)	1.90	0%	1.90
Random Read (KIOPS)	730	40%	520
Random Write (KIOPS)	230	11%	180
DWPD	TBA		
Power			
Active Power-Read (W)	6	-31%	9
Active Power-Write (W)	7	-34%	10.6
Idle Power (W)	2	-50%	4
KIOPS/Watt			
KIOPS/W (Read)	122	103%	60
KIOPS/W (Write)	99	2257%	4

Support for the BRAVO SSD

The BRAVO SSD design is supported by leading NAND manufacturers.

	TLC NAND	Formats	Capacity
KIOXIA	BICS3 / 4	M.2 / U.2	8TB

Micron	B27A / B	M.2 / U.2	8TB
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FADU sells its controller as a turnkey solution with customized firmware and the BRAVO SSD design to OEMs wishing to manufacture their own storage devices or through a private label model using consigned NAND Flash and FADU SSD manufacturers to deliver complete, privately-labeled NVMe SSDs.

Features

This drive is NVMe 1.3 and OCP 1.0 Spec Compliant

Security

- AES 256-bit for User Data Encryption, TCG OPAL, eDrive, Secure Boot, TRNG, and FIPS 140-2 support
- End-to-end data protection with dynamic internal RAID

Peripherals

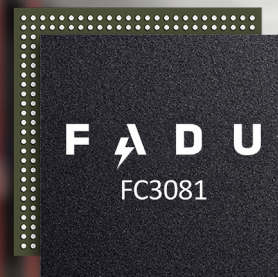
- Temperature sensor support

Features

- Multi-streams (up to 32), ZNS, IOD
- Multiple NS (128) with 128 Encryption keys
- SR-IOV (15VF/PF/Port) with Virtualization (Dynamic allocations of Queue/Interrupt)
- CMB (Controller Memory Buffer) up to 16MB
- PMR (Persistent Memory Region) up to 16MB
- NVMe-MI 1.0a+ / SMART / Health Log / Telemetry / Atomicity of 512KB
- 10 DIF/DIX Vital Product Data (VPD) over SMBus & LED Internal / External Power Loss Protection (PLP)

For more information please visit www.fadu.io or email sales@fadu.io.

Flash Memory Controller

**NVMe 1.3a/PCIe 3.1 Controller**

FADU FC3081

NVMe 1.3a / PCIe 3.1(2/4 Lanes)

FADU is focused on advancing Flash storage devices. We are dedicated to developing and deploying a new architecture for SSD controllers and storage products that meet the explosively increasing data demands placed on enterprise data centers, ushering in the SSD Era. We believe that existing solutions, with their legacy ties to the past, are unable to meet both performance and power requirements to support real-time, cloud based, connected applications. FADU is addressing all aspects of the Flash-based enterprise storage solution – very lower power, ultra-high performance, rich feature set, solid reliability and a superior QOS.

The **FADU FC3081 Flash Memory Controller** is a groundbreaking NVMe SSD controller designed to take full advantage of NVMe. It provides support for PCIe host interface and 8 channel NAND interface.

This powerful controller is the most power efficient and flexible solution in the industry today for enterprise server, storage, and data center applications, including SSDs in E1.S, M.2, and U.2 form factors.



The FADU FC3081, the industry's first based on a RISC-V core, with customizable firmware and the Bravo SSD design, is available as a solution for SSD OEMs and end customers manufacturing their own devices, or as a private labeled SSD manufactured by FADU's contract manufacturers using consigned Flash memory.

Product Family

FC3081

Flash Memory Controller for Enterprise Server, Storage, and Data Center devices in a 17x17mm 556-ball FBGA with a 0.56 ball pitch.

Key Parameters

Host Interface	• NVMe 1.3a
	• PCIe Gen 3.1 x 4 Lanes
NAND Interface	• Up to 8 NAND channels, each supporting up to 8 CE
	• Up to 800MT/s Toggle and ONFI standards
	• Supports TLC, Low Latency SLC NAND (XLNAND)
DRAM Interface	• 32bit DRAM
	• Up to 8GB DDR4/LPDDR4
Avg. Power	< 1.7W Typical (controller) 3.5
Seq. Read	3.5 GB/s
Seq. Write	3.0 GB/s
4Kb Random Read	Up to 830 KIOPS (sustained)
4Kb Random Write	Up to 440 KIOPS (sustained @ 28% OP)
Core	RISC-V base controller

Architectural Advantage

Conventionally designed controllers using legacy architectures have complex FTL and heavy RTL with multiple processes. By contrast, the FC3081 controller architecture delivers performance through the introduction of a Flash Acceleration Layer (FAL) which fully automates hardware, and offloads host and controller interfaces, bypasses DRAM host data and adds accelerators and schedulers to remove bottlenecks leading to increased Quality of Service (QOS).

FADU vs. Leading High Performance SSDs ~3x Lower Power with Comparable Throughput

U.2 Form Factor (28% OP)	Leading High-End Supplier	FADU Bravo SSD*
Sequential Read (GB/s)	3.5	3.5
Sequential Write (GB/s)	3.1	2.85
Random Read (KIOPS)	800	820
Random Write (KIOPS)	190	230
Active Power - Read (W)	14	5 2.8 Times Lower
Active Power - Write (W)	21	8 2.6 Times Lower
Performance - Read (KIOPS/Watt)	57	164 2.8x Higher
Performance - Write (KIOPS/Watt)	9	29 3.2x Higher

*SK hynix V5 TLC NAND

FADU vs. Leading Low Power SSDs ~2x Higher Throughput with Comparable Power

M.2 Form Factor (7% OP)	Leading High-End Supplier	FADU Bravo SSD*
Sequential Read (GB/s)	3	3.5 1.2x Higher
Sequential Write (GB/s)	1.4	2.5 2.0x Higher
Random Read (KIOPS)	480	820 1.7x Higher
Random Write (KIOPS)	47	100 2.1x Higher
Active Power - Read (W)	7.6	5
Active Power - Write (W)	8	8
Performance - Read (KIOPS/Watt)	63	164 2.6x Higher
Performance - Write (KIOPS/Watt)	6	13 2.1x Higher

*SK hynix V5 TLC NAND

FADU Solution Ecosystem

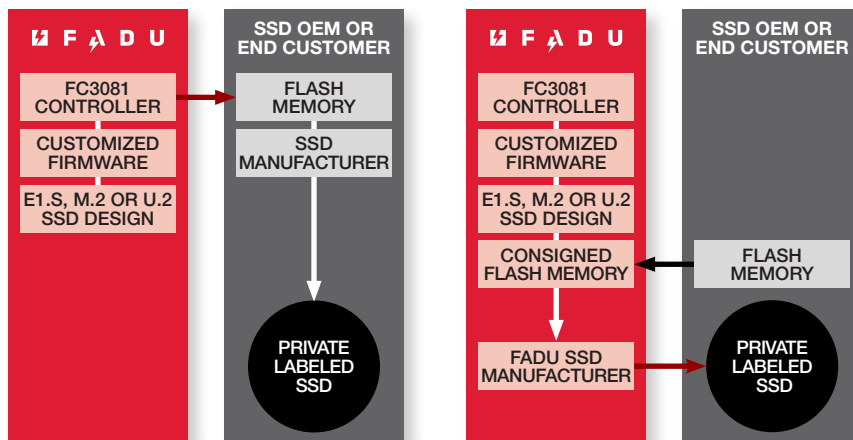
FADU has a solution ecosystem of Flash component suppliers including Kioxia, SK hynix, Micron and SSD manufacturers ready to deliver a solution to our customers. We offer solutions to Flash memory OEMs, storage device suppliers and end customers that want to incorporate our technology into their branded products. We don't sell finished FADU storage devices — we enable others to usher in the era of SSD with our technology. There are two ways to engage with FADU.

Turnkey

We provide the FC3081 controller, custom firmware and SSD design. You provide the Flash memory and manufacture your own SSDs.

Private Label

You consign Flash memory and leave the rest to us. We'll manufacture your private labeled SSD with FADU technology inside.



Enterprise Features

Security

- AES 256-bit for User Data Encryption, TCG/OPAL support
- End-to-end data protection with dynamic internal RAID

Peripherals

- Temperature sensor support

Flash Memory Controls

- Micro-code based architecture enables future NAND & NVM support
- Low power and low thermal operation / budget based throttling
- Out of order execution of both flash controller and host controller
- 4KB LDPC engine supports 3D TLC and QLC
- Low power features – ASPM L0s / L1 / L1.2 Latency Tolerance Reporting (LTR)
- SR-IOV (15VF/PF/Port), Multi-stream (up to 32), Multiple name space (up to 128), Dual port, End-to-end & per stream QOS

For more information please visit www.fadu.io or email sales@fadu.io.