

FADU ALPHA / BRAVO NVME SSD SERIES



High performance M.2 / Low power U.2 SSD

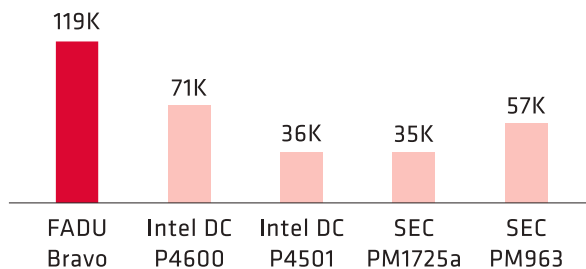


THE BEST IOPS / WATT

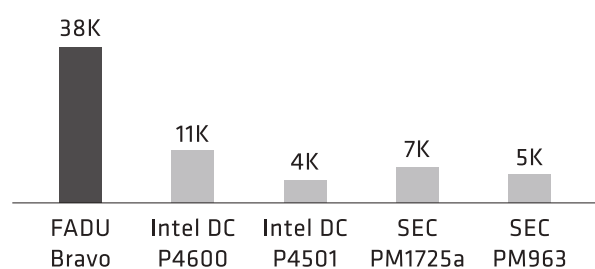
Performance is not enough.

It's easy for anyone to develop just high performing SSD without constraints. FADU also presented an SSD with >400K 4KB sustained random write IOPS in Flash Memory Summit 2016. The key is how to realize the performance with limited power consumption. Now we proudly introduce the real next generation SSD line up with the best performance / power based on FADU's own controller SoC - Annapurna.

IOPS/WATT IN RANDOM READ (U.2)



IOPS/WATT IN RANDOM WRITE (U.2)



THE BEST OFFERINGS

FADU provides full line up of SSD products - M.2 2280 consumer SSD and M.2 22110 enterprise SSD, U.2 low-power enterprise SSD with dual port support, U.2 high-performance enterprise SSD, and AIC hyper-power enterprise SSD. Each products is the best in its segment in terms of performance, power, and supporting features.

IT'S TIME TO CHANGE

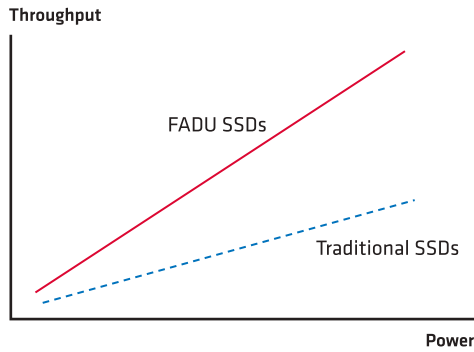


FADU BRAVO

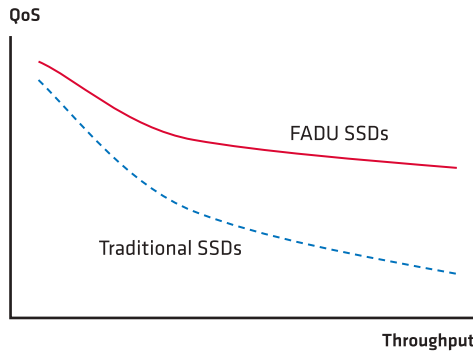
LOW POWER U.2 / M.2 22110 ENTERPRISE SSD

FADU's innovative SSD architecture provides the best performance for any environments

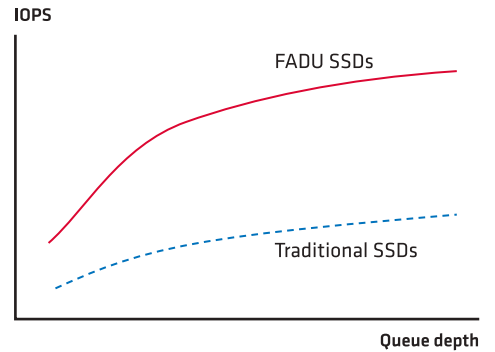
POWER EFFICIENT



RELIABLE QoS



SUPERIOR IOPS



Also FADU promises full flexibility to meet any sophisticated requirements

COMPREHENSIVE FEATURES

- SR-IOV support with proprietary bandwidth allocation to VMs
- multi-stream and up to 32 name space support
- Dual port / VPD / PLP Support

MAXIMIZED RELIABILITY

- 4KB LDPC (FADU's own IP)
- Real end-to-end (Host-to-NAND) full-path data protection
- Powerful NAND defense codes

FULL FLEXIBILITY

- Customizable QoS
- Dynamically configurable In-storage RAID
- Light NVM / Open channel SSD

FADU BRAVO

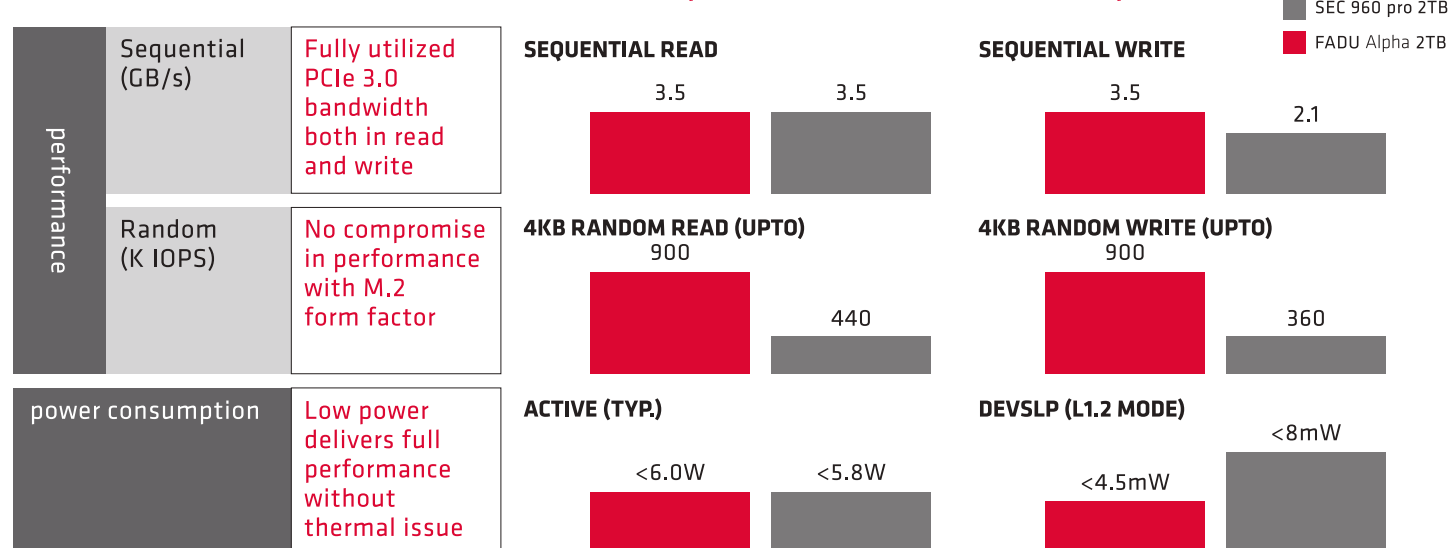
Interface	PCIe Gen 3.0 x4, NVMe 1.3 (3.0 X 2 dual port for U.2)							
Hardware	Controller		FADU Annapurna Controller					
	Dimension				110 x 22 x 2.5/3.9mm (Single/Dual)			
	Form Factor				M.2 22110			
	NAND							
	3D TLC NAND							
	Capacity	800GB	1.6TB	3.2TB	6.4TB	800GB	1.6TB	3.2TB
	Over Provision	28%	28%	28%	28%	28%	28%	28%
Performance	Seq. Read (MB/s)	3,500	3,500	3,500	3,500	3,500	3,500	3,500
	Seq. Write (MB/s)	1,450	2,900	2,900	3,500	1,450	2,900	2,900
	Ran. Read (KIOPS) (Sustained)	580	900	900	900	580	900	900
	Ran. Write (KIOPS) (Sustained)	120	230	230	290	120	230	230
Latency	4K Ran. R/W	80 us / 15 us (QD=1)				80 us / 15 us (QD=1)		
Power Consumption	Standby	Typ. 2.5W						
	Active (AVG.)	Typ. <6W		Typ. <8W		Typ. <6W		Typ. <8W
Data Security	AES 256-bit for User Data Encryption, TCG/Opal							
Supporting Features	S.M.A.R.T, NVMe commands, Power Loss Protect, Hot Plug, NVMe MI SR-IOV (32ea with QoS), Multi-stream (16ea), Multiple namespace (32ea)							
Reliability	MTBF	2 million hours						
Warranty	Period	5 years limited						



FADU ALPHA

BEST PERFORMING M.2 CONSUMER SSD

FADU's efficient controller allows M.2 utilizes the full performance without thermal and power issue



M.2 SSD is very common and useful form factor. However, many existing products didn't solve the issue of thermal and power. Thanks to its innovative architecture, FADU Annapurna controller consumes >30% less power and deliver the unmatched performance without any thermal and power issue. Also even in absolute performance, FADU Alpha achieves the totally different level of IOPS. FADU Alpha will define the standard of M.2 SSD

FADU ALPHA

Interface	PCIe Gen 3.0 x4, NVMe 1.3					
Hardware	Controller	FADU Annapurna Controller				
	Dimension	80 x 22 x 2.5/3.9mm (Single/Dual)				
	Form Factor	M.2 2280				
	NAND	3D TLC NAND				
	Capacity	256GB	512GB	1TB	2TB	4TB
Performance (up to)	Seq. Read (MB/s)	2,200	3,500	3,500	3,500	3,500
	Seq. Write (MB/s) (SLC buffer)	800	1,600	3,200	3,500	3,500
	Ran. Read (K IOPS)	150	290	580	900	900
	Ran. Write (K IOPS)	200	410	820	900	900
	Active(R/W, Avg.)	Typ. < 5W		Typ. <6W		Typ. < 7.5W
	Idle (PS3)	Typ. <50mW				
	L 1.2 DEVSLP (PS4)	Typ. < 3mW		Typ. <4.5mW		Typ. < 7.5mW
Data Security	AES 256-bit for User Data Encryption, TCG/Opal					
Key features	TRIM(Required OS support), S.M.A.R.T, NVMe command, NVMe MI					
Reliability	MTBF	1.5 million hours				
Warranty	Total Bytes Written	100	200	400	800	1,600
	Period	3 years limited				



PRODUCT ROADMAP

WE PLAN TO LAUNCH PRODUCTS COVERING EVERY SSD SEGMENTS, AND ARE CONFIDENT TO LEAD THE MARKET WITH OVERWHELMING PERFORMANCE

		1st PHASE PRODUCTS				
		FADU Free	FADU Alpha	FADU Bravo	FADU Charlie	FADU Delta
		FPGA based AIC	High-performance consumer SSD	Low-power enterprise SSD	High-performance enterprise SSD	Hyper-performance enterprise SSD
From factor	AIC HHHH	M.2 2280	M.2 22110 U.2 7mm	U.2 7mm/15mm M.3	AIC HHHH	
Interface	PCIe 3.0 x 8	PCIe 3.0 x 4	PCIe 3.0 x 4 (dual port)	PCIe 4.0 x 4 (dual port)	PCIe 4.0 x 8	
Volume	4TB	256GB - 4TB	1 - 8TB	2 - 16TB	4 - 32TB	
Controller	FPGA	FADU Annapurna	FADU Annapurna	FADU Everest	FADU Everest	
NAND	3D MLC	3D TLC	3D TLC	3D TLC/QLC	3D TLC/QLC	
Seq. R/W	5.0 / 5.1 GB/s	3.5 / 3.5 GB/s (SLC Buffer on)	3.5 / 3.5 GB/s	6.3 / 6.3 GB/s	9.6 / 9.6 GB/s	
Ran. R/W (28% O.P)	1,100 / 400 K IOPS (Sustained)	900 / 900 K IOPS (Up to @ 0% O.P)	900 / 290 K IOPS (Sustained)	1,625 / 500 K IOPS (Sustained)	2,100 / 800 K IOPS (Sustained)	
Power	<35W	<6W (3mW @ L1.2)	< 8W	< 18W (+ low power version)	< 22W	
Endurance	N/A	3 DWPD	3 DWPD	3 DWPD	3 DWPD	
Key Features	N/A	<ul style="list-style-type: none"> NVME 1.3 L 1.2 support TCG Opal 2.0/ T10 DIF 	<ul style="list-style-type: none"> NVME 1.3 Dual Port Multi stream(16 ea) SR-IOV (32 ea w/ QoS) VPD Multiple N.S(32 ea) E2E data protection 	<ul style="list-style-type: none"> NVME 1.3(or later) Dual port Muti stream SR-IOV(w/ QoS) Key value store (object-based storage) 	<ul style="list-style-type: none"> NVME 1.3(or later) Dual port Muti stream SR-IOV(w/ QoS) NVMe over fabric 	
Schedule	2016 FMS	2018 1H	2018 1H	2019 1H	2019 1H	

FLEXIBLE BUSINESS MODEL

FADU CAN PROVIDE FULL FLEXIBILITY TO MEET YOUR SOPHISTICATED NEEDS

SSD TURN KEY SOLUTION

READY-MADE CONTROLLER SOC

CUSTOMIZED CONTROLLER SOC

