2019 FMS HIGHLIGHTS

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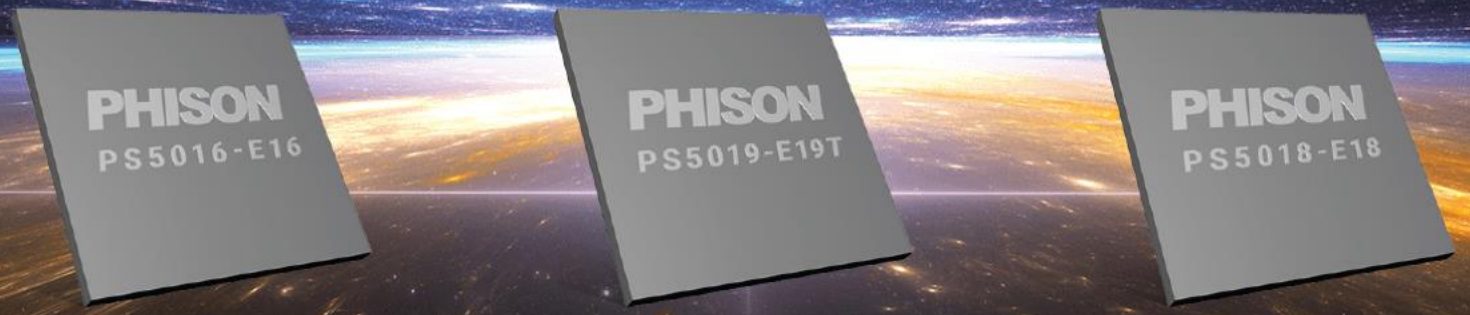
Gen4 Technology is Here

GEN4X4 NVMe SSD CONTROLLERS
PUSHING THE BOUNDARIES OF PERFORMANCE



PUSHING BOUNDARIES OF PERFORMANCE

PUSHING THE BOUNDARIES OF DRAMLESS POWER

THE NEXT GENERATION OF E16

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PS5016-E16

PUSHING BOUNDARIES OF PERFORMANCE

» AVAILABLE NOW

Technology Node	TSMC 28nm	
Capacities	Max: 8TB	
PCIe	Speed & Lane #	Gen 4 x 4L
	NVMe Rev.	1.3
	Others	1. Boot Partition; 2. RPMB
NAND	Channel #	Max: 8
	CE #	Max: 32
	Speed	800 MT/s per channel
DRAM	DDR4	
Performance (FOB)	SR/SW (MBps)	Max: 5000/4400
	RR/RW (IOPS)	Max: 750K/750K
Controller Power	2.6W	
Processor	32-bit ARM Cortex R5 (Two CPUs)	
	CoXProcessor Technology	
Peripheral Interface	GPIO, UART, ICE, I2C, SPI, SMBus	
Data Reliability	4th Gen LDPC engine; End-To-End Data Path Protection; SmartECC	
SRAM Protection	TCM: 1-bit ECC, 2-bit EDC / Other SRAM: 1-bit EDC/parity	
Security	HW	AES 128/256 bit, SHA 160/256/512, RSA 2048
	FW	TCG & Opal 2.0, Pyrite, Sanitize and Crypto Erase
Temperature	Controller: -40 ~ 125°C (Tj)	
Others	Dynamic SLC cache support	
	4KB & 512B support	

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PS5019-E19T

PUSHING BOUNDARIES OF DRAMLESS POWER

» CUSTOMER SAMPLING Q4 2019

Technology Node	TSMC 28nm	
Capacities	Max: 2TB	
PCIe	Speed & Lane #	Gen 4 x 4L
	NVMe Rev.	1.3
	Others	1. HMB; 2. Boot Partition; 3. RPMB
NAND	Channel #	Max: 4
	CE #	Max: 16
	Speed	1200 MT/s per channel
DRAM	DRAM-less	
Performance (FOB; est.)	SR/SW (MBps)	Max: 3750/3750
	RR/RW (IOPS)	Max: 440K/500K
Controller Power (Est.)	1.6W	
Processor	32-bit ARM Cortex R5 (Single CPU)	
	CoXProcessor Technology	
Peripheral Interface	GPIO, UART, ICE, I2C, SPI, SMBus	
Data Reliability	4th Gen LDPC engine; End-To-End Data Path Protection; SmartECC	
SRAM Protection	TCM: 1-bit ECC, 2-bit EDC / Other SRAM: 1-bit EDC	
Security	HW	AES 128/256, SHA 160/256/512, RSA 2048
	FW	TCG & Opal 2.0, Pyrite, Sanitize and Crypto Erase
Temperature	Controller: -40 ~ 125°C (Tj)	
Others	Dynamic SLC cache support	
	4KB & 512B support	

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PS5018-E18

THE NEXT GENERATION OF E16

» CUSTOMER SAMPLING Q2 2020

Technology Node	TSMC 12nm	
Capacities	Max: 8TB	
PCIe	Speed & Lane #	Gen 4 x 4L
	NVMe Rev.	1.4
	Others	1. Boot Partition; 2. RPMB
NAND	Channel #	Max: 8
	CE #	Max: 32
	Speed	1200 MT/s per channel
DDR	DDR4/LPDDR4	
Performance (FOB, est.)	SR/SW (MBps)	Max: 7000/7000
	RR/RW (IOPS)	Max: 1000K/1000K
Controller Power (Est.)	3.0W	
Processor	32-bit ARM Cortex R5 (Three CPUs)	
	CoXProcessor Technology	
Peripheral Interface	GPIO, UART, ICE, I2C, SPI, SMBus	
Data Reliability	4th Gen LDPC engine; End-To-End Data Path Protection; SmartECC	
SRAM Protection	Internal SRAM ECC/parity protection	
Security	HW	AES 128/256 bit, SHA 160/256/512, RSA 4096
	FW	TCG & Opal 2.0, Pyrite, Sanitize and Crypto Erase
Temperature	Controller: -40 ~ 125°C (Tj)	
Others	Dynamic SLC cache support	
	4KB & 512B support	

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PS5013 - E13T

1113 PCIe NVMe BGA SSD

PUSHING BOUNDARIES OF SIZE, POWER AND PERFORMANCE

Capacities		64GB, 128GB, 256GB, 512GB
Interface		PCIe Gen 3.1 x 2, NVMe 1.3c
Form Factor		1113 BGA SSD
Dimensions	1 or 2 Die	13 x 11.5 x 1 mm
	4 or 8 Die	13 x 11.5 x 1.2 mm
NAND Flash		BICS4 TLC 256Gb/512Gb
Performance (Up to)[123]		
Sequential Read		1700 MB/s
Sequential Write		1100 MB/s
Random Read (Burst)		50K
Random Write (Burst)		70K
Random Read (Burst, with HMB)		110K
Random Write (Burst, with HMB)		80K

1) 1MB/s = 1,000,000 bytes / second
2) Sequential performance is measured with CDM 6.0, 1GB range, QD=32
3) Random performance is measured with IOMeter, 8GB range, 4K data size, QD=32

For more information please contact us directly by emailing BGA-SSD@phison.com.

Power	
Input Supply Rails	P0=2.5V; P1=1.2V; P2=0.9V
Mode0	≤1.8W
Mode1	≤1.5W
Mode2	≤1.0W
PS3	Idle <10mW
PS4 (L1.2)	Idle <1mW
Other Features	
Operating	0°C ~ 70°C
Non-Operating	-40°C ~ 85°C
Security	• TCG Opal/Pyrite w/ AES-XTS 256 • RPMB
Advanced Features	• LDPC + RAID ECC • SmartRefresh™ • Thermal throttling • End-to-End Data Protection • Drive log • Boot Partition • Supports NVMe 1.3C • HMB Support • TCG OPAL Support • TCG Pyrite Support • Three speed mode Support • RPMB • Telemetry Support • Namespace Support

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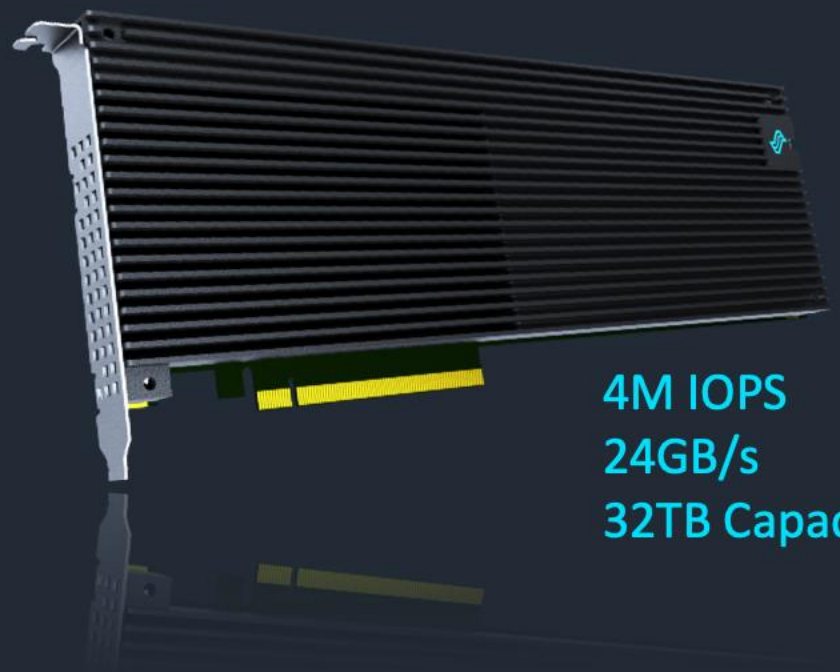
LQD4500: Honey Badger (feat. Phison NVMe)



4M IOPS
24GB/s
32TB Capacity

Key Design Features

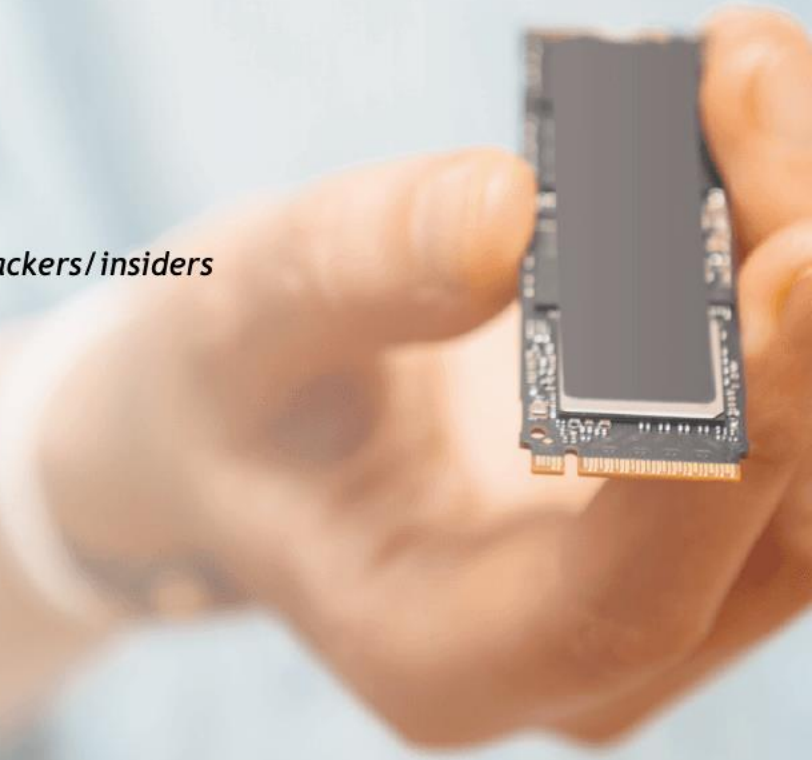
- High Performance PCIe SSD
- Ultra Fast PCIe 4.0 x16 Interface
- NVMe 1.3.1 Protocol Supported
- High Capacity Design up to 32TB
- Standard Form Factor SSD
- Single Width FHFL Card
- Plug-n-Play Compatibility
- UEFI Boot Support
- Power Loss Data Protection
- Active Thermal Throttling
- Enterprise Grade Reliability
- Active Power Management
- Advanced ECC Data Protection
- Advanced Error Recovery
- Active Telemetry Monitoring
- Low Overhead Architecture
- No Host CPU or DRAM Off Load
- Optional Enhanced Driver

Highest Performance & Capacity Enterprise-Grade PCIe Flash

Bare Metal

Cyber Secure SSD

Cigent's proprietary firmware-based protections embedded in SSD



Industry-first cyber-secure SSD

- *when paired with Cigent's D³E ® Windows 10 agent, provides utmost protection vs. ransomware/malware/hackers/insiders*
- *threats trigger instant firmware file locking - critical data becomes inaccessible / invisible during attack*
- *firmware easily updated to counter new threats*
- *available in NVMe or SATA*

Real-time command logging

- *continuous log of all data access*

Secure erase validation

- *securely remove data and run embedded validation*
- *saved validation cert for audit purposes*

Tethered Protection

- *protections tethered to 3rd party partners (e.g. EDR / AV) via API*
- *protected data instantly locked if any tethered agent becomes disabled*

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