



World's First PCIe Gen 5 Mainstream SSD

Phison E31T is the world's-first DRAM-less PCIe Gen5 SSD controller IC solution that pushes for true PCIe Gen5 bandwidth above 10GB/s while taking cost-centric SSD performance to new heights. On top of its refined power efficiency and advanced cost-effective DRAM-less design, Phison E31T practically eliminates the need to choose between high-performance and affordable pricing for PC builders and consumers.



Application

High-performance PCs and workstations
Gaming PCs/gaming consoles

Product Features

Market-leading Performance

Manufactured using TSMC's 7nm process technology, the E31T is optimized for a PCIe Gen5x4 interface, enabling SSDs with maximized bandwidths and link efficiency. Paired with state-of-the-art 3D NAND flash memory chips, the PS5031-E31T handles application payloads immaculately with minimal latency.

Superb Power Efficiency

Through its DRAM-less configuration and a range of design enhancements, the E31T offers a tremendous reduction in power consumption compared to DRAM-equipped solutions. With advanced power management measures such as support of the L1.2 low power state, E31T is able to effectively help motherboards with power reduction during idle periods.

Outstanding Cost-effectiveness

As a cutting-edge DRAM-less solution, the E31T not only saturates the PCIe Gen5 interface bandwidth as well as any DRAM-boosted solution does, but it does so while retaining compelling cost-savings, creating invaluable design-in opportunities in cost-sensitive consumer markets.

Phison 7th Generation LDPC ECC Engine

Phison's proprietary seventh-generation ECC engine based on the LDPC coding scheme effectively maintains NAND flash data reliability. Relative to the prior generation, the 7th Gen engine is added with multiple advanced features for increased performance and flexibility to accommodate state-of-the-art NAND flash memory devices.



CONTROLLER

PS5031-E31T

Features	Specifications
Host Interface	<ul style="list-style-type: none">- PCIe 5.0 x4 (Bandwidth: 32GT/s x4)- Backward compatible with existing PCIe generation transfer rates- Compliance with PCI Express Base Specification Revision 5.0- Compliance with NVMe 2.0- Host Memory Buffer (HMB) support
Processor	<ul style="list-style-type: none">- Single-CPU architecture with built-in 32-bit microcontroller- TSMC 7nm process technology
Flash Controller	<ul style="list-style-type: none">- Up to 4 Channels with 16 chip enable (CE) counts- Flash transfer rate up to 3600MT/s- Capacity up to 8TB- Support 3D TLC and QLC NAND flash memory- Compliance with Toggle 5.1 and ONFi 5.1- Flash I/O operating voltage supply 1.2V
Data Reliability	<ul style="list-style-type: none">- Phison 7th generation LDPC ECC & RAID ECC engine- End-To-End Data Path Protection
Security	<ul style="list-style-type: none">- AES256- SHA384- SHA512- RSA4096- TCG OPAL 2.01- Pyrite 2.01
Performance	<ul style="list-style-type: none">- Sequential Read up to 10,600 MB/s- Sequential Write up to 9,500 MB/s- 4K Random Read up to 1,500K IOPS- 4K Random Write up to 2,200K IOPS
Power Management	<ul style="list-style-type: none">- ASPM + APST Supported
Temperature Range	<ul style="list-style-type: none">- Operating range: 0~70 °C- Storage range: -40~85 °C
Package	<ul style="list-style-type: none">- 228-ball FCCSP, 8.0mm x 12.5mm
Peripheral	<ul style="list-style-type: none">- Built-in internal thermal sensor- GPIO pins- Built-in UART function- I3C, I2C and SPI for external ROM- Support of SMBus

PHISON



ES France - Mobilité & Systèmes Embarqués
127 rue de Buzenval BP 26 - 92380 Garches



Tél. 01 47 95 99 80



e-mail : mse@es-france.com
Site Web : www.es-france.com

Solutions

PS5031-E31T

Capacity ⁽¹⁾	512GB	1TB	2TB	4TB
Interface	PCIe Gen 5.0 x4 NVMe 2.0			
Form Factor	M.2 2280 / 2242 / 2230			
NAND Flash	3D TLC / QLC			
Performance ^{(2) (3)}				
Sequential Read	9300 MB/s	10200 MB/s	10300 MB/s	9200 MB/s
Sequential Write	6000 MB/s	8300 MB/s	8600 MB/s	8100 MB/s
4K Random Read	650K IOPS	1300K IOPS	1300K IOPS	1200K IOPS
4K Random Write	1400K IOPS	1500K IOPS	1500K IOPS	1400K IOPS
Power Consumption ⁽⁴⁾				
Supply Voltage	M.2 3.3V ± 5%			
Active (Average)	5000 mW	5350 mW	5350 mW	TBD
Idle	50 mW	50 mW	50 mW	50 mW
Low Power PS4 (L1.2)	3.5 mW	3.5 mW	3.5 mW	3.5 mW
Environmental				
Operating Temperature	0°C - 70°C			
Non-Operating Temperature	-40°C - 85°C			
Reliability & Warranty				
TBW ⁽⁵⁾	300 TB	600 TB	1200 TB	TBD
MTBF	1.5 million hours			
UBER	<10 ⁻¹⁶ bits			
Advanced Features				
<ul style="list-style-type: none">- End-to-End Data Protection- TCG OPAL/Pyrite Support- Thermal Monitoring				

⁽¹⁾ 1 GB = 1,000,000,000 bytes

⁽²⁾ Sequential Performance is based on CrystalDiskMark 8.0.4, 1 GB range, QD=8, Thread=1, and test drive set as secondary

⁽³⁾ Random Performance is based on IOMeter, 1 GB range, 4K data size, QD=32, 16 worker, 4K aligned

⁽⁴⁾ Power consumption is measured during the sequential read and write operations performed by CrystalDiskMark with the conditions described in (2)

⁽⁵⁾ TBW is Total Bytes Written and the results are obtained in compliance with JESD218 Standards

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e-mail : mse@es-france.com
Site Web : www.es-france.com