

#### EMBEDDED



## Gen4-ward with DRAM-less Diversity

Phison PS5021-E21TI (Phison E21TI) is a cutting-edge DRAM-less PCIe Gen4 SSD controller IC solution that is taking cost-centric SSD performance to new heights. As a robust adaptation of the E21TI solution with highquality components and advanced error correction capability, Phison E21TI is born for challenges from mission-critical environments. With rich options in form factor deployment, the E21TI is a versatile solution designed to elevate industrial, automotive, and medical applications.

Applications IPCs / Rugged Notebooks Factory Automation Applications Medical-use Tablets/Devices Edge Logging Endpoints Embedded Automotive Technologies PHISON PS5021-E21TI

### **Product Features**

#### Wide-range Temperature Durability

Paired with selected premium NAND flash and dexterous firmware mechanisms, the E21TI operates smoothly in extreme temperatures from -40°C to 105°C. Its reliable performance in demanding environments makes it a dependable choice for applications that require an all-in-one package of ruggedness, consistency, and reliability.

#### **Triple-threat Data Protection**

Phison's triple-layered data protection combines NAND flash ECC protection, SmartECC<sup>™</sup> engine, and End-toend Data Protection to ensure secure data transmission with reliable performance. This advanced data protection technology safeguards against data corruption and ensures data integrity in even the most challenging environments.

#### **Deployment Versatility**

Meant for storage in multifarious electronic devices and subsystems from the PCIe Gen4 era, the E21TI is enabled on multiple form factors for flexible utility and adaptability. With options available from generic M.2 modules to BGA packages, the E21TI fits in diverse solution use cases like rugged notebooks and medical-use tablets.

#### **Extensive Compliance**

Phison E21TI solutions portfolio is accredited by various certification programs and compliance verifications from renowned third-party institutions such as UNH-IOL and Automotive Electronics Council(AEC). Specific standards, including the IATF 16949 and JESD-22 testing conformance, ensure the E21TI solutions match industrial-grade working conditions, putting it among the most qualified solutions by industry standards.

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# CONTROLLER

## PS5021-E21TI

Features	Specifications		
Host Interface	- PCIe Gen 4x4 (Bandwidth: 16GT/s x4) - Backward compatible with existing PCIe generation transfer rates - Compliance with PCI Express Base Specification Revision 4.0 - Compliance with NVMe 1.4		
Processor	- Single-CPU architecture with built-in Arm Cortex-R5 - TSMC 12nm process technology		
Flash Controller	- Up to 4 Channels with 16 Chip Enable (CE) counts - Flash transfer rate up to 1600 MT/s - Capacity up to 4TB - Support 3D TLC NAND flash memory - Flash I/O operating voltage supply 1.2V		
Data Reliability	- Phison 4th generation LDPC ECC & RAID ECC - End-To-End Data Path Protection		
Security	- NVMe Format - Physical Presence SID (PSID) - Manufacturer's Secure ID (MSID) - Sanitize Operation - TCG Opal - TCG Pyrite - AES 256		
Performance	- Sequential Read up to 4900MB/s - Sequential Write up to 3700MB/s - 4K Random Read up to 700K IOPS - 4K Random Write up to 900K IOPS		
Power Management	- L1.2 < 5mW (Optional)		
Temperature Range	- Operating range: -45~125 °C (Tj) - Storage range: -45~125 °C (Tj)		
Package	- 198-ball HSFCCSP, 7.5 mm x 12 mm		
Peripheral	- Built-in internal thermal sensor - GPIO pins - Built-in UART function - I2C and SPI for external ROM		



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# **SOLUTIONS**

### PS5021-E21TI

	Product Series	MPT563		MPT560		
	Interface	PCIe 4.0 x4 NVMe 1.4				
	Form Factor	M.2 2280	M.2 2230	BGA SSD (Type 1620), BGA mounted on M.2 2230		
NAND Flash		3D TLC	3D TLC	3D TLC		
	Capacity (1)	256 GB to 2048 GB	256 GB to 512 GB	256GB to 1024GB		
	Performance (2.3)					
Sequential Read		4900 MB/s	4900 MB/s	3700 MB/s		
Sequential Write		3700 MB/s	3300 MB/s	3000 MB/s		
4K Random Read		700K IOPS	320K IOPS	380K IOPS		
4K Random Write		900K IOPS	600K IOPS	500K IOPS		
		Power Consumption (4)				
Supply Voltage		+ 3.3V ± 5%	+ 3.3V ± 5%	BGA SSD: P1=2.5V , P2=1.2V , P3=0.85V		
Active (Average)		5.3W	5.2W	BGA SSD: 3.5W M.2: 4.0W		
Idle		1500mW	1500mW	1500mW (M.2)		
Low Power PS4 (L1.2)(Optional)		5 mW	5 mW	5 mW (BGA SSD)		
			Environmental			
Operating Temperature	Industrial	0°C - 70°C (Normal Temp.) -40°C - 85°C (Wide Temp.)		-40°C - 85°C (Wide Temp.)		
	Automotive	N/A		-40°C - 105°C		
Non-Operating	Non-Operating Temperature -40°C - 85°C		-40°C - 105°C			
	Certification - RoHS					
		Reliability & Warranty				
TBW (Max) (5)		2876 TB	661 TB	1341 TB		
Warranty		3 years		5 years		
MTBF 1.5 million h		1.5 million hours				
	UBER	UBER <10 <sup>-16</sup> bits				
- Self Encrypting Function(Optional) : AES, TCG Opal, TCG Pyrite - SamrtECC™ : LDPC + RAID ECC - Thermal Protection Mechanism - Security Function (Optional) : Write Protect, Quick Erase						

(1) 1 GB = 1,000,000,000 bytes.

 (a) Equipological performance is based on CrystalDiskMark 7.0, 1 GB range, QD=8, Thread=1, and test drive set as secondary
(a) Random performance is based on IOMeter, 1 GB range, 4K data size, QD=32, 16 worker, 4K aligned
(b) Power consumption is measured during the sequential read and write operations performed by CrystalDiskMark with the conditions described in (2) <sup>(5)</sup> TBW is Total Bytes Written and the results are obtained in compliance with JEDEC219A Standards.



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