
The Global Leader in Specialized Storage and Memory Solutions
WE BUILD WITH YOU
2026 Product Catalog

About ATP

ATP Electronics was founded in 1991, starting out with just two desks in a Silicon Valley business suite. Today, we have grown to become the industry leaders in memory and storage with an expansive global presence.

ATP is a strategic supplier for more than 60% of companies named as Leaders in Gartner's 2025 Magic Quadrant reports. These reports cover Primary Storage Platforms, Data Center Switching, Secure Access Service Edge (SASE), and Enterprise Wired and Wireless LAN Infrastructure.

Recognized as the "Global Leader in Specialized Storage and Memory Solutions," we remain committed to deliver solutions with exceptional reliability, endurance, and performance.

The Global Leader in Specialized Storage and Memory Solutions

Our solutions are engineered according to your specific and unique needs. We have the capability to develop and customize firmware and hardware to meet your requirements.
WE BUILD WITH YOU.

Your Storage and Memory Partner in the Cyclical Market

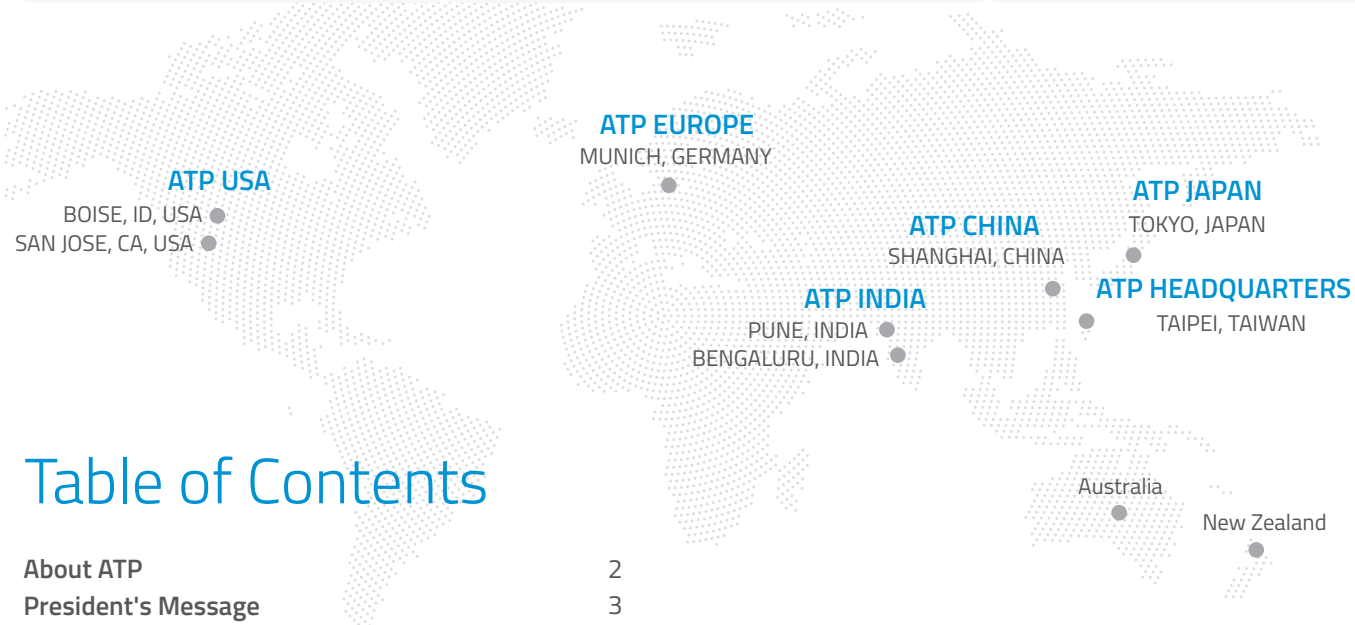
Even though the market can be volatile and unpredictable, we offer a tried-and-tested partnership that ensures stability. You can expect:

- Supply dependability: Dual-sourcing strategy
- Longevity and flexibility: Controlled BOM, long-term planning with supply partners, IC-to-module packaging capabilities
- Smooth qualifications and transitions: 5-year component roadmap

A True Manufacturer with Complete Process Ownership

We take control of every process from NAND/DRAM IC Validation all the way to Testing and Mass Production.

100% of our products are validated and thoroughly tested before leaving our manufacturing facility.



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PRESIDENT'S MESSAGE

2025 was a year of notable achievements for ATP Electronics, all of which were made possible by our collective efforts and collaboration. Your resolute commitment and dedication have been instrumental in shaping our success, and I deeply appreciate your persistent support, trust, and partnership. A big “thank you” to everyone who made it all happen—our employees, partners, suppliers and customers.

Last year, we introduced industry-first-and-only solutions that challenged our hardware and firmware expertise: the 7.2 mm e.MMC in the world’s smallest package, defying constraints in space and power efficiency; highest-endurance pSLC-configured and native TLC SSDs; and new proprietary technologies that break reliability, performance, and endurance limitations.

This year, we officially opened open our new smart facility in Ciaotou Science Park in Kaohsiung. It is a proud testament to our focus on adhering to Environmental, Social, and Governance (ESG) standards and marks a giant step towards ATP's sustainable, eco-friendly operations.

While we acknowledge current strong memory market conditions, the new facility is not a short-term response to the market boom. It embodies over 30 years of ATP’s manufacturing expertise, and our rich history serves as a key foundation for our future. Today, we draw upon generations of memory production to realize our long-term vision using cutting-edge automation, AI-enabled tools, and green, energy-efficient, sustainable technologies. Beyond mere capacity expansion, this facility marks an important milestone that positions ATP for sustained growth, enduring stability, and breakthrough innovation in the years to come.

Despite our accomplishments, we still have compelling reasons not to rest on our laurels.

Further growth paths are being opened, and challenging global dynamics require us to stay focused, driven, and agile.

Let us sustain the momentum by actively leveraging strong pipeline relationships and treading new territories with confidence. We are committed to strategically exploring new opportunities and continually innovating.

As we gear up for another record year, we expect to continue our growth trajectory with increased partnerships, new product configurations, and extended market reach.

Let’s brace ourselves for a stronger, better 2026!

Jeff Hsieh
President

ATP's Complete Process Ownership

Why Are We Unique?

One size does not fit all. ATP recognizes the uniqueness of each customer's requirements, so we go the extra mile to custom-configure our storage and memory solutions according to the needs of our customers.

We begin our Solution and Quality journey at the IC level. This serves as the foundation of all ATP products.

We maintain complete control of our supply chains and take charge of all stages. We are capable of end-to-end management of all the processes to make sure that our solutions meet customers' strictest requirements.

Our Commitment: We Build With You.

Through Process Ownership, we craft the solution for your unique case.
It is your solution, your product.

NAND/DRAM IC Validation	NAND Wafer Management	Package Level Validation	NAND Flash Screening	Design Validation & Testing	Pilot Run	Mass Production

Industry-Standard Product Development

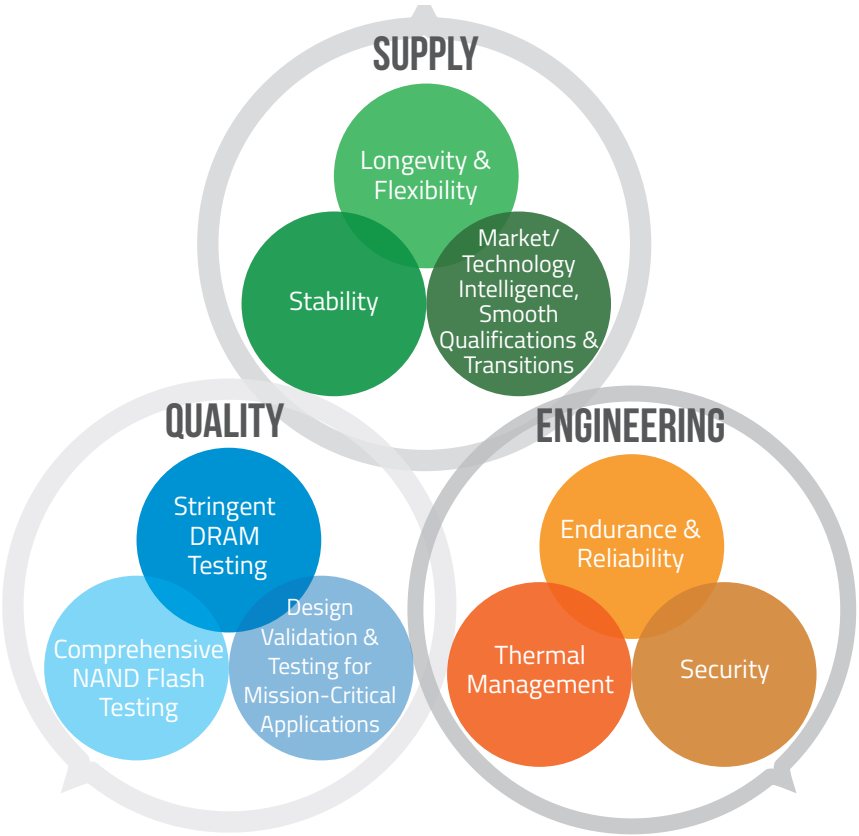
Our quality journey begins here,
at the very basic component level, the ICs.

How Does ATP's Process Ownership Help You?

Longevity & Flexibility
1. Long-term planning with supply partners
2. Controlled BOM
3. IC to module packaging capabilities

Stability
Dual-sourcing strategy

Market/Technology Intelligence
Smooth Qualifications & Transitions
5-year component roadmap from NAND maker, including fab alignment diversification plan



Stringent DRAM Testing
1. Automatic Test Equipment (ATE)
2. 100% system-level burn-in testing
3. 100% test during burn-in (TDBI) with ATP-designed mini chamber

Comprehensive NAND Flash Testing
1. IC to drive-level validation
2. NAND flash production screening with ATP-designed Rapid Diagnostic Test (RDT)

Design Validation & Testing for Mission-Critical Applications
1. Design/product characterization specification validation
2. Mean Time Before Failure (MTBF) & End-Of-Life (EOL) Testing
3. Printed circuit board assembly (PCBA) solderability validation

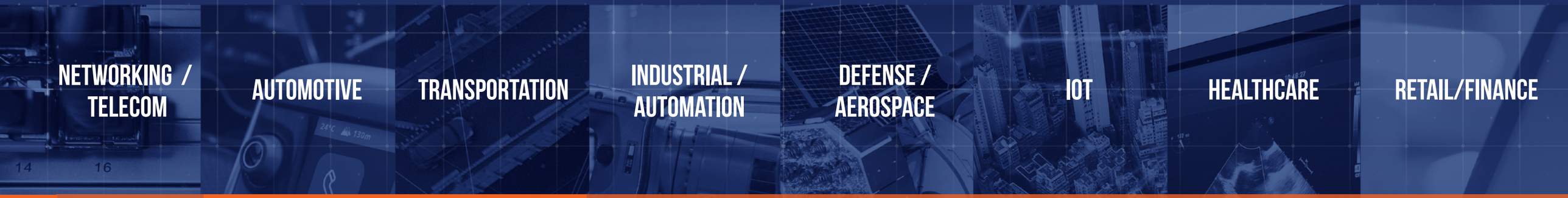
Endurance & Reliability
1. TLC-based drives configured to equal/exceed SLC/MLC endurance at reasonable total cost of ownership
2. Diverse configuration options for optimal cost-per-GB or cost-per-endurance
3. Superior data reliability with hardware-based power loss protection (PLP) technology integrated with a microcontroller unit (MCU)

Thermal Management
1. NAND flash solutions rated for operation under industrial temperature (-40°C to 85°C) and above
2. Wide-temperature DRAM solutions
3. Thermal customization testing, and validation on PCIe Gen4 and Gen3 drives for high-performance applications
4. Heatsink solutions

Security
1. Customized security solutions beyond AES 256-bit encryption, TCG Opal 2.0
2. Self-built HW, API FW, SW for data-at-rest to IoT security solutions
3. Content preload and encryption service

Segment Solutions Overview

Our legacy and latest-generation memory and NAND flash storage solutions meet the diverse reliability, endurance, and longevity requirements of applications in a wide range of segments, such as:



	NETWORKING / TELECOM	AUTOMOTIVE	TRANSPORTATION	INDUSTRIAL / AUTOMATION	DEFENSE / AEROSPACE	IOT	HEALTHCARE	RETAIL/FINANCE
Thermal		Automotive Grade temperature (AG2 & 3)						
		High/Low-temperature reliability validation						
		Tailored thermal solutions						
		Industrial temperature operation						
Endurance	Enterprise Standard Endurance				▪ High-endurance 3D TLC/pSLC/SLC series ▪ Capacity overprovisioning settings ▪ MCU-based power loss protection (PLP)			
Security					▪ AES, TCG Opal 2.0, Self-Encrypting Drive ▪ Secure Erase ▪ Customized encryption security ▪ Write Protection			
Quality	DRAM TDBI extreme low fail rate	▪ IATF 16949 ▪ AEC-Q100 ▪ VDA 6.3			MIL-STD-810G			
		▪ FCC, CE, UKCA, VCCI, BSMI, KCC, RCM, IC, UL, CB, CSA, Morocco, etc. (optional) ▪ ROHS, REACH Collaboration on customer-specific test, qualification, and validation that are beyond JEDEC standards						
	Enterprise Standard Tests							
Supply & Service		5 years+ longevity and BOM control						
		▪ Content Preload service ▪ Joint Validation						

Discover the World's Smallest e.MMC at 6.7 mm to Power Next-Gen Smart Wearables

ATP's 6.7 mm e.MMC redefines the storage standard for smart glasses and wearable devices. This innovation not only shrinks device size, but also slashes power consumption, paving the way for sleek, lightweight AR and XR glasses. With broad system-on-a-chip (SoC) compatibility and flexible development options, ATP e.MMC empowers designers to accelerate innovation and speed up market entry.

Perfect fit for AR/VR/XR, next-gen wearables, and more

- Features a 125-ball design while maintaining JEDEC compatibility
- Ultra-thin 0.65 mm z-height design profile in consideration of smart glasses with slim, rectangular frames
- Seamless pairing with discrete LPDDR and major SoC platforms
- Other small-footprint e.MMC offerings available: 9 x 10, 7.2 x 7.2
- Flexible sample ordering system speeds up prototyping and research and development (R&D)

Up to 70% power savings

Extended wearable usage with ATP's Auto Power-Saving Mode and Power Optimization technologies

67% smaller

than standard e.MMC packages, ideal for space-constrained applications

64 GB Native TLC 20 GB pSLC mode

Optimal for mainstream low- and mid-end positioning wearable devices

Enhanced Data Integrity

Advanced error correction, wear leveling, and Auto/Dynamic Data Refresh for superior data protection against read disturb and other retention issues

ATP Industrial Enterprise SSD Series

The Best of Both Worlds, Engineered for Uncontrolled Environments at the Edge

Information Technology (IT) and Operational Technology (OT) are converging, resulting in the rise of Edge storage/computing that requires enterprise-class quality of service and industrial-grade reliability and endurance.

Enterprise storage/computing is becoming less centralized in data centers and controlled environments and becoming more distributed. Data is being driven to the edge where operating conditions are more extreme, locations are not easy to reach, and often, on the constant move. A new breed of storage solutions is needed, which combines the benefits of industrial solid-state drives (SSDs) and enterprise solutions.

The Industrial Enterprise N651Sie Series SSDs leverage NVMe PCIe Gen4 x4 and are available as M.2, U.2, and E1.S.

They are built for the age of data deluge as centralized computing increasingly moves to the edge, and enterprise operations in uncontrolled environments become more prevalent.

They combine the best of enterprise and industrial features, making them excellent as boot drives, data storage drives, or mixed-use drives.

The Best of Both Worlds

Why choose when you can have the Best of Both Worlds?

BEST ENTERPRISE-CLASS FEATURES

Endurance
- Boot: 1 DWPD
- Read Intensive: 2 DWPD (By Project)
- Mixed Use/Write Intensive: 5 DWPD (By Project)

Data Retention
- 1 year at 55°C (100% P/E cycles)
- Exceeds JESD219A standards for Enterprise-Class SSDs

Consistent Performance for Enterprise Workloads
- Sequential Read/Write: up to 6,450/6,100 MB/s
- High Sustained Sequential/Random Write: up to 1,100/390 MB/s

High Quality of Service (QoS)
- M.2: Read <80µs, Write <30µs
- U.2 and E1.S: Read <80µs, Write <30µs

Reliability
- Very low uncorrectable bit error rate (UBER) of less than 1 in 10^17
- Validated through End-of-Life testing and Reliability Demonstration Testing (RDT)

BEST INDUSTRIAL-GRADE ADVANTAGES

I-Temp Support
- Reliable operation from -40°C to 85°C

Robust Cross-Temp Error Handling Solution
- Maintains data integrity under severe temperature changes
- Ensures reliability even towards the device's end of life

Thermal Management
- Adaptive thermal throttling
- Customizable temperature settings
- Heatsink and graphite options for excellent heat dissipation

Hardware Power Loss Protection (HW PLP)
- Protects stored data and data in transit
- Prevents data loss or corruption
- Essential for high-performance computing environments running 24/7

WE BUILD WITH YOU Firmware Customization Service

Under ATP's WE BUILD WITH YOU program, the following enhanced Firmware Customization Services are available on a project-basis to meet various enterprise customer needs in Server, Storage and Compute.

Power Loss Protection (PLP) Tuning

Optimized Flush Cache Timing. Ensures that the flush cache is completed within the capacitors' hold-up time to ensure the integrity of data in flight and at rest.

PLP Capacitor Monitoring. Performed using the on-board micro-controller unit (MCU), includes regular capacitor health checks during SSD boot-up and operation.

Performance Behavior Tuning

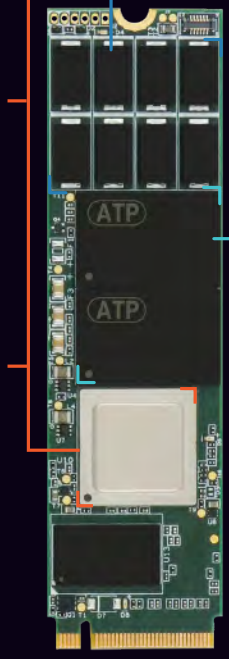
Performance behavior analysis and customization to optimize throughput and latency in a customer host application

Thermal Management Customization

ATP's thermal throttling solution is distinguished by the ability to adjust the temperature settings according to the customer's application-specific requirements.

SMART ID Customization

The firmware includes a range of Self-Monitoring, Analysis and Reporting Technology (SMART) ID attributes which can be customized based on customer requirements.



Download Microcode Capability

This service is part of flexible firmware maintenance, enabling Enterprise customers to rapidly make updates to their specific configurations via field updates, avoiding the hassle of sending SSDs back to ATP for reinitialization.

To ensure smooth DLMC (Download Microcode) operations during firmware verification or updates, especially when there are varying platform requirements during the validation process, ATP can provide multiple firmware binaries, allowing for testing flexibility.

This has resulted in strengthened DLMC Testing for Upload, Sideload, and Download. Building on the FW Field Update service, we perform DLMC testing between the new firmware version and its previous iterations. This includes ensuring successful self-updates for smoother transitions between different firmware versions or configurations during the customer's validation process.

Enhanced Read Disturb Resilience

The FW algorithm ensures data integrity when data is frequently accessed by the host.
ATP firmware will monitor the data and reprogram it to prevent data damage. This is especially important in read-only applications.

Frequent data reads are critical in read-only applications. ATP firmware is optimized to monitor and refresh data by implementing the "early move" (proactive approach) and "read reclaim" (reactive approach) algorithm. "Early move" refers to the moving of data to a different block when the error meets certain criteria of error threshold as defined by ATP. "Read reclaim" is activated by the frequency at which data is read to prevent data damage and ensure data integrity.

This feature validates Enhanced Read Disturb Resilience specifically for the Enterprise customer's script.

The firmware is modified to enhance its ability to withstand Read Disturb events. These modifications are intended exclusively for specific use cases identical to the Enterprise customer's, such as Boot-Up scenarios.

Product Specifications

Product Line	N651Sie		
			
Interface	Gen4 x4		
Form Factor	M.2	U.2	E1.S
Dimensions (mm)	80 x 22 x 3.85	100 x 69.85 x 15	118.75 x 33.75 x 9.5
Flash Type	TLC		
Capacity	240 GB to 1.92 TB	960 GB to 7.68 TB	
Sequential Read (up to) [1,6,7]	6,450 MB/s	6,000 MB/s	6,400 MB/s
Sequential Write (up to) [1,6,7]	6,050 MB/s	6,000 MB/s	6,100 MB/s
Random Read (up to) [2,6,7]	1,100 KIOPS	870 KIOPS	1,000 KIOPS
Random Write (up to) [2,6,7]	1,250 KIOPS	1,230 KIOPS	1,200 KIOPS
Sustained Sequential Write (up to) [3,6,7]	820 MB/s	1,100 MB/s	
Sustained Random Write (up to) [4,6,7]	100 KIOPS (390 MB/s)		
Endurance [DWPD] [2,8]	1 DWPD ; 2 DWPD and 5 DWPD configurations available upon project support		
QoS 99.9999% [5,6,7]	Read <80µs | Write <30µs		
Data Retention	1 year at 55°C (100% P/E cycles)		
Power Loss Protection	Yes		
End to End Data Path Protection	Yes		
Sustained Read Power (Max) [7]	<9W	<14.5W	<13W
Sustained Write Power (Max) [7]	<11.5W	<17.5W	<15.5W
Supply Voltage	3.3V	12V	
Operating Temperature Tc	-40°C to 85°C (I-Temp)		
Storage Temperature Tc	-40°C to 85°C		
Vibration	Sine 16.4G,10~2,000Hz		
Shock	Half sine 1,500G/0.5ms		
MTBF @ 25°C	> 3,000,000 hours		
UBER	<1 sector per 10^17 bits read		
Warranty	5 years		

Notes:
1. Sequential Burst Performance tested with IOmeter 4MB, QD64
2. Random Burst Performance tested with IOmeter 4KB, QD64
3. Average Sustained Sequential Write Performance tested with IOmeter, 4MB, QD64 for 4 hours in dirty state (24-hour pre-conditioning under 4K random workload)
4. Average Sustained Random Write Performance tested with IOmeter, 4KB, QD64 for 4 hours in dirty state (24-hour pre-conditioning under 4K random workload)
5. 4KB Random QD=1
6. Actual performance may vary depending on user conditions and system environment
7. Parameters tested with highest capacity drive
8. DWPD for 5 years tested with JESD219A Enterprise workload

Radiation-Tolerant SSDs: Bridging the Gap Between Space Ambition and Storage Reality

The Satellite Communication Megatrend

Satellite communication is evolving into an extension of terrestrial digital infrastructure, driven by LEO satellite constellations and Direct-to-Cell connectivity that enable standard smartphones to connect directly to space-based networks.

Advantages of Low Earth Orbit (LEO) Satellites

LEO satellites encompass orbits close to the Earth's surface at altitudes ranging from 160 to 2000 km. Most LEO satellites are concentrated below 800 km and are primarily used for communications and Earth observation. These applications require high-capacity memory to store large volumes of communication and telemetry data, especially for high-resolution imagery or video transmission.

Radiation-Tolerant SSD: The Sweet Spot for LEO Constellations

Perfect alignment with LEO TID/SEE envelope

Altitude of ~1200 km over 5 years yields manageable total ionizing dose (TID) typically in the low-to-moderate range of 15 to 30 Krad (Si), as well as single event effects (SEE) cross-sections where radiation-tolerant designs excel—neither an overkill in radiation hardness assurance (RHA) nor risky like commercial-off-the shelf (COTS) components.

Mission-driven economics

Two- to five-year mission lifecycles with rapid technology refresh over expensive, RHA qualification.

Performance & capacity advantage

Only TLC NAND Flash (512 Gb/die and above) can deliver >1TB+ storage capacities required for modern LEO broadband, imaging, and onboard processing—legacy SLC/MLC processes cannot scale.

Proven risk mitigation

Radiation-tolerant designs convert random in-orbit failures into managed, quantifiable risks.

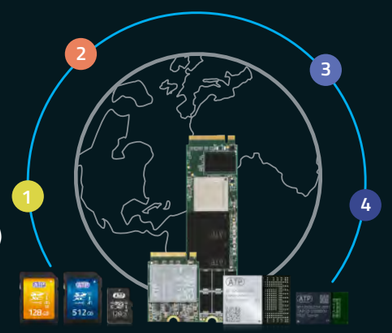
ATP Radiation-Tolerant SSD: Multi-Layered Protection

Data Protection

- Bit Flip Correction
- LDPC, Read Calibration
- End-to-end Engine
- Block Level RAID Parity

Error Prevention

- ATP Rapid Diagnostic Test (RDT)
- Auto Scan & Dynamic Refresh



Function Protection

- SSD becomes Read-only - GPIO erase Pin
- SSD becomes bricked – Watch dog timer to detect abnormality and re-boot drives triggered by 110 nm NOR Flash MCU
- Reflash FW

Monitoring and Analysis

- S.M.A.R.T. tool to monitor SSD status
- Event log analysis
- ECC analysis

Error Prevention

Predictive Screening, Not Just Defect Filtering 100% Rapid Diagnostic Test (RDT): Screens the entire NAND array at extreme temperatures

	Connection	Temp. Test	Testing Area	Test Criteria
NAND Screening RDT	Direct Test Controller ↓ Flash	Industrial Temp. @ -40°C @ 85°C	✓ F/W ✓ User Area ✓ Spare Area	Classification Criteria Defined G1 Excellent G2 Good G3 Standard
Traditional Test	Limited output by Interface bandwidth	@ room temp.	? F/W ✓ User Area ? Spare Area	PASS ✓ FAIL ⊗

Max. FW ECC Coverage

Data Protection

- Radiation-Induced Bit Flip Correction
- Built-in LDPC Error Correction
- ISP Firmware Redundancy
- Block Level (plane based) RAID Parity

Function Recovery (1)*

- Powered by 110 nm NOR Flash-based MCU
- Auto-Reflash: Automatically triggers a firmware reflash to revive a "bricked" drive.

Function Recovery (2)*

Reflash FW tool (software):
The ISP firmware can be restored even after corruption using the dedicated Reflash FW Tool software, reducing system downtime under the "We Build With You" collaboration program.

Monitoring and Analysis

- Post-Irradiation ECC Analysis
- Longevity Prediction

On average, Operation's ECC< Non-Operation's ECC

ATP LEO Services, Testing, and Features*

- Flying heritage
- Longevity and controlled BOM for qualified products
- Self-packaged IC and screening test
- Rapid Diagnostic Test (RDT): 100% Screening for NAND error bits prior delivery
- Industrial Operating Temperature (-40°C to 85°C)
- Error handling: LDPC, End-to-end data path protection, RAID parity, ISP backup
- Auto-reflash powered by NOR-based MCU
- Reflash FW tool (software)
- S.M.A.R.T. Health Report (Command, API, Software)
- Post-radiation test analysis

* Available on selected products. Contact ATP for more details.

“We Build With You” Toolkit Thermal Management Solutions, Power-Saving TuneSuite

Steady Wins the Race: Power-Efficient SSDs Through Smarter Thermal Management

Thermal management has become one of the defining challenges for modern NVMe SSDs. As performance continues to scale, heat is no longer a corner case—it is a marathon that every system must finish, reliably and repeatedly. Winning this race requires more than a heatsink or a firmware throttle. It demands a robust, end-to-end thermal strategy.

WE BUILD WITH YOU

Running the Heat Marathon Together

STEP 1

Assessment

Gaining a clear Understanding of your system environment, workload patterns, and thermal limits.

STEP 2

Mechanical Design (Customized Gear)

From heatsinks to system-level integration, we tailor mechanical designs to match your platform, airflow, and cost targets.

STEP 3

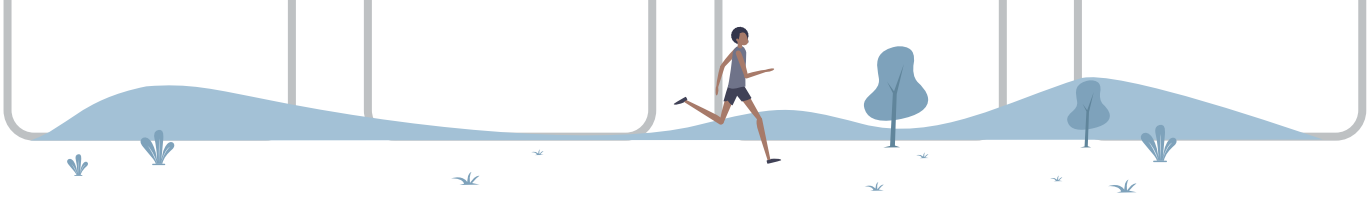
Simulation (Lab Validation)

Through thermal modeling and controlled lab testing, we validate designs under simulation, ensuring the solution is ready for long-distance operations.

STEP 4

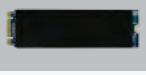
Optimization (Pacing)

With tunable hardware and firmware controls, we balance performance, power, and temperature. This intelligent pacing enables sustained throughput, protects endurance, and ensures long-term stability.



We Build With You — Assessment & Mechanical Design

After analyzing real-world airflow and mechanical constraints, the users can select the suitable thermal "Gear" from our diverse portfolio, ensuring reliable operation within their specific scenario.

Heat Dissipation Solutions						
						
Form Factor	HSBGA	M.2 2280			U.2	E1.S
Capacity	Up to 960 GB	Up to 7,680 GB			Up to 7,680 GB	
Heatsink Type	Copper Foil Heatsink	Copper Foil	4 mm Fin-Type Heatsink	8 mm Fin-Type Heatsink	15 mm Fin-Type Housing	9.5 mm Symmetric Enclosure
Dimension: L x W x H (mm)	16 x 20 x 1.6	80 x 22 x 3.9	80 x 24.4 x 8.3	80 x 24.4 x 12.3	100.5 x 69.85 x 15	118.75 x 33.75 x 9.5
Material	Cu with Ni/Cr plating	Copper	Upper: Aluminum alloy Bottom: Stainless steel		Aluminum alloy	
Suitability	Limited space		Enough space for effective heat dissipation			
Assembly	Molding	Adhesive	Clips design		Screws design	

We Build With You — Simulation

Full-coverage thermal simulation and validation across hardware, firmware, and software, delivering end-to-end evaluation from components to SSD drives.

Full Coverage of Thermal Simulation Test

Component Design Phase

- **IR Drop** Simulation
- **Power Drop** Simulation
- **Temperature Distribution**
- Optimized **PCB layout** and **component placement**
- Improve **signal integrity**
- **NAND Flash IC validation**

Mechanical Design Phase

- **Mechanical Thermal Simulation**
- **Predict airflow, temperature, and heat transfer in IC** packages, PCBs, electronic assemblies/heatsinks/ enclosures, and power electronics.

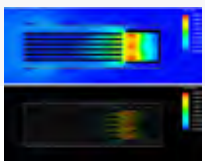
Firmware & S.M.A.R.T. Tool

- Firmware to **optimize performance** based on the temperature reported from **thermal sensors** and **microcontroller unit (MCU)**
- **Thermal-related FW error handling and recovery**
- Temp. information is available via **S.M.A.R.T.** tool

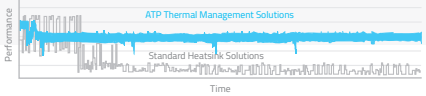
Drive (SSD) Environment Test

- **ATP-built mini chamber**
- Simulate real test environment
- Adjustable **ambient temperature, airflow, and SSD setting**
- Log files of **performance, power consumption, and S.M.A.R.T.** info.

Cadence



Ansys Icepak



We Build With You — Integrated Test Platform

Automated Testing
Robotic Process Automation (RPA)

All-in-One Test Script
Unified Scenario Orchestration
Temp. X Airflow X Workload

AutoPower Tester
Visualized Performance Correlation
Performance X Temp. X Power

Thermal Database Platform
Data at a Glance
Interactive X Smart Filter X Visualization

We Build With You — Optimization

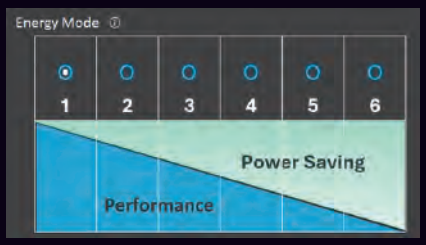
"We Build With You" Toolkit

Helps customers understand, tune, and validate SSDs efficiently across different deployment environments.

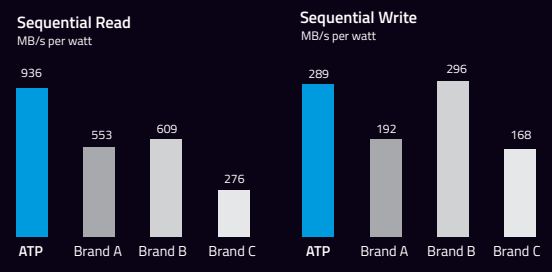
- **InfoSuite**
  Drive info and Health Monitoring
- **TuneSuite**
  Flexible Performance and Power Tuning
- **DiagSuite**
  Deep Diagnosis without accessing user data

Power-Saving TuneSuite

Select preferred energy mode based on the performance and power consumption requirements.



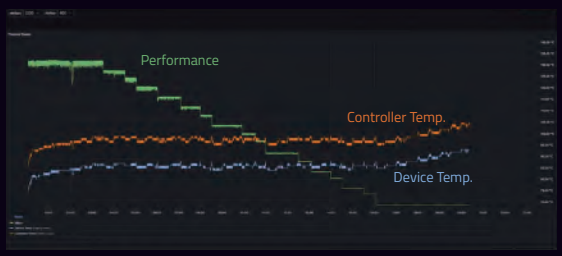
Energy Efficiency (MB/s per watt)



Note: ATP NVMe PCIe Gen4 x2, 960 GB SSD 128K, QD=64, Energy Mode 1

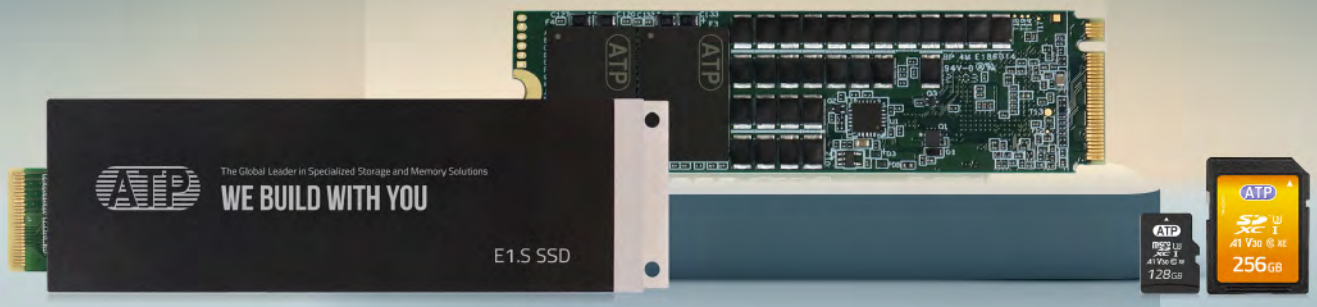
Thermal Management

AceTT FW auto-tunes multi-stage thermal throttling to prevent abrupt performance drops and to maintain a smooth thermal equilibrium.



Highest-Endurance Industrial SSDs & Memory Cards With I-Temp Operating Range

ATP pushes the limits of native TLC technology to deliver some of the highest-endurance storage solutions on the market. We achieve this by combining prime 512 Gb NAND packages with stringent IC characterization and 100% screening. This premium hardware is then paired with our own proprietary firmware to extend reliability through advanced signal integrity, power loss protection, cache optimization, and cross-temperature operational robustness and recovery.



11K P/E Cycles
in Native TLC mode

100K+ P/E Cycles
in pSLC mode*
Configurable to 150K by request

5+ Years
supply longevity and locked BOM

INDUSTRIAL TEMP
-40°C to 85°C* operating temperature range with cross-temp error handling

Hardware-Based Power Loss Protection*

ATP adoption of a power management IC (PMIC) and firmware-programmable MCU in SSDs enhances reliability, performance, and adaptability by enabling advanced power management, data integrity protection, and real-time optimization of drive operations.

ATP Exclusive Technologies*

- AcuCurrent (Innovative Signal Integrity Optimization)
- EcoFlush (Intelligent SSD Flush Cache Management)
- PLP Diag (Proactive PLP Capacitor Health Check)
- Ace Thermal Throttling (Adaptive Multi-Stage Thermal Throttling)
- Pulse Reboot (Intelligent Self-Healing and Recovery)

To learn more about ATP's Exclusive Technologies, please refer to pages 36, 37

* Available on specific models and/or form factors

PCIe Gen4 NVMe SSDs for the Most Demanding Storage Requirements

Setting Unparalleled Endurance Benchmarks

In the most demanding operating environments where storage failure is not an option, ATP Electronics' highest-endurance SSDs set a new industry benchmark for mission-critical storage reliability and long service life.

PCIe® Gen4 NVMe M.2 SSD

ATP NVMe™ M.2 SSDs deliver versatile, high-performance storage solutions for diverse system configurations and write-intensive, mission-critical applications.

Thermally engineered for robust operation across wide temperature ranges, these SSDs feature advanced error handling capabilities.

PLP Diag proactively checks the health and functionality of the polymer tantalum capacitors used in hardware-based power loss protection. This prevents PLP failure and ensures unhampered data integrity and system reliability.

N751Pi, N651Si/N651Sc Model

Please refer to page 38 for complete product specifications

SPECIFICATIONS

- Interface: PCIe Gen4 x4
- Protocol: NVMe 1.4
- Capacity: 80 GB to 7.68 TB
- Endurance: Up to 120,000 TB
- I-Temp Operable*

KEY FEATURES*

- MCU-based HW Power Loss Protection
- Self-Encrypting Drive (SED) with AES 256-bit Encryption, TCG Opal 2.0
- PLP Diag (Proactive PLP Capacitor Health Check)

PERFORMANCE

- Sequential Read (MB/s): Up to 6,450
- Sequential Write (MB/s): Up to 6,100
- Random Reads IOPS: Up to 1,091,000
- Random Writes IOPS: Up to 1,245,000

* Depending on model and configuration.

PCIe® Gen4 NVMe U.2 SSD

ATP U.2 SSDs leverage the NVMe™ protocol over a high-speed PCI Express® (PCIe®) Gen4 x4 interface.

Available in capacities from 320 GB to 7.68 TB, they support both Industrial Temperature (-40°C to 85°C) and Commercial Temperature (0°C to 70°C) ranges. This versatility meets the critical requirements of embedded systems, industrial PCs, and networking infrastructure.

Additionally, a 15 mm fin-type heatsink provides effective heat dissipation to ensure optimal, sustained performance.

N751Pi, N651Si/N651Sc Model

Please refer to page 39 for complete product specifications

SPECIFICATIONS

- Interface: PCIe G4 x4
- Protocol: NVMe 1.4
- Capacity: 320 GB to 7.68 TB
- Endurance: Up to 486,000 TB
- I-Temp Operable*

KEY FEATURES*

- 15 mm Fin-Type Heatsink Design for Optimal Heat Dissipation
- MCU-based HW Power Loss Protection
- Self-Encrypting Drive (SED) with AES 256-bit Encryption, TCG Opal 2.0
- End-to-End Data Path Protection
- Hot-swappable

PERFORMANCE

- Sequential Read (MB/s): Up to 6,100
- Sequential Write (MB/s): Up to 6,000
- Random Reads IOPS: Up to 870,000
- Random Writes IOPS: Up to 1,250,000

* Depending on model and configuration

PCIe® Gen4 NVMe E1.S SSD

Engineered for 1U Edge servers, ATP's E1.S SSDs feature a vertical design that allows for high-density configurations of 6 to 12 drives per chassis. They fully support hot-swapping, enabling seamless maintenance and drive replacement without system downtime.

To ensure reliability, ATP's AcuCurrent Technology delivers dynamic signal optimization. By automatically adjusting to temperature changes, it minimizes read retry errors and ensures stable performance across a wide range of operating conditions.

N651Si Model

Please refer to page 40 for complete product specifications

SPECIFICATIONS

- Interface: PCIe G4 x4
- Protocol: NVMe 1.4
- Capacity: 960 GB to 7.68 TB
- Endurance: Up to 79,000 TB
- I-Temp Operable

KEY FEATURES*

- MCU-based HW Power Loss Protection
- Encryption, TCG Opal 2.0
- End-to-End Data Path Protection
- Hot-pluggable/Hot-swappable
- AcuCurrent (Innovative Signal Integrity Optimization)

PERFORMANCE

- Sequential Read (MB/s): Up to 6,400
- Sequential Write (MB/s): Up to 6,100
- Random Reads IOPS: Up to 1,000,000
- Random Writes IOPS: Up to 1,200,000

* Depending on model and configuration

SATA III SSDs: Sustained, Uninterrupted Availability

Tailored Firmware and Customization Services for the Long Haul

ATP Electronic's Serial ATA SSDs remain the bedrock of countless industrial and embedded systems.

Widely recognized for their dependability, stability, and compatibility, ATP's highest-endurance SATA SSDs are engineered for demanding environments, supporting both I-Temp (-40°C to 85°C) and C-Temp (0°C to 70°C) operating ranges* and hardware/firmware-based power loss protection options.

Brandishing the latest ATP-developed technologies, such as EcoFlush and Pulse Reboot, SATA III SSDs remain ready to deliver the time-tested service it has always been known for.

A750Pi/Pc, A650Si/Sc Model

Please refer to pages 42, 43, 44 for complete product specifications

SPECIFICATIONS

- Interface: SATA III 6 Gb/s
- Form Factors: M.2, 2.5", mSATA
- Capacity: 80 GB to 1,920 GB
- Endurance: Up to 59,250 TB
- I-Temp Operable*

KEY FEATURES*

- MCU-based HW Power Loss Protection
- Self-Encrypting Drive (SED) with AES 256-bit Encryption, TCG Opal 2.0
- EcoFlush (Intelligent SSD Flush Cache Management)
- Pulse Reboot (Intelligent Self-Healing and Recovery)

PERFORMANCE

- Sequential Read (MB/s): Up to 560
- Sequential Write (MB/s): Up to 525
- Random Reads IOPS: Up to 104,000
- Random Writes IOPS: Up to 90,000

* Depending on model and configuration.

PCIe® Gen4 NVMe CFexpress Cards

BEST IN SHOW Embedded COMPUTING DESIGN WINNER

ATP CFexpress cards are trailblazers — they were among the industry's first to adopt NVMe™ protocol utilizing the PCIe® 4.0 x2 interface, surpassing standard PCIe 3.0 x2 configurations. These small but mighty storage devices consume low power, support software RAID 1, 0, support Host Memory Buffer (HMB) to improve read performance, and hardware write-protect security.

N751Pi, N651Si Model

Please refer to page 49 for complete product specifications

SPECIFICATIONS

- Interface: PCIe Gen4 x2
- Protocol: NVMe 1.4
- Capacity: 40 GB to 1,024 GB
- Endurance: Up to 19,010 TB
- I-Temp Operable

KEY FEATURES*

- Firmware-based Power Loss Protection
- Self-Encrypting Drive (SED) with AES 256-bit Encryption, TCG Opal 2.0
- Host Memory Buffer (HMB) support
- Hardware Write Protect*

PERFORMANCE

- Sequential Read (MB/s): Up to 3,500
- Sequential Write (MB/s): Up to 3,200
- Random Reads IOPS: Up to 770,000
- Random Writes IOPS: Up to 768,000

* Depending on model and configuration

SD, microSD Memory Cards

ATP's high-endurance, low-latency memory cards are targeted for growing segments spurred by 5G, artificial intelligence (AI), and edge technologies, such as AI-enabled surveillance, smart homes, mobile monitoring, automotive recorders, remote healthcare, and security surveillance systems requiring heavy write and re-write usage.

Select V30-compliant I-Temp operable SD/microSD cards meet the high data rate requirements of demanding video recording applications.

S750Pi/Pc, S650Si/Sc Model

Please refer to pages 47, 48 for complete product specifications

SPECIFICATIONS

- Interface: UHS-I
- Capacity: 16 GB to 512 GB
- Endurance: Up to 25,000 TB
- I-Temp Operable*

KEY FEATURES*

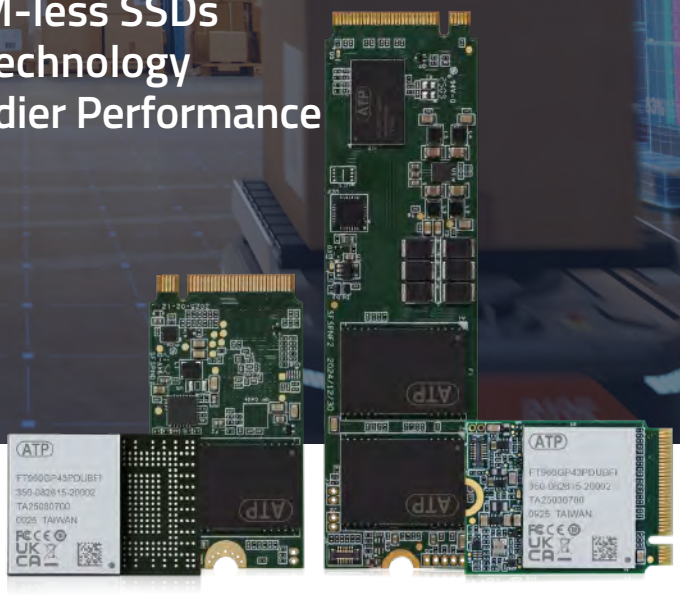
- Low-density parity-check (LDPC) ECC
- ATP SD Life Monitor: Intelligent Workload Inspection
- Low Latency Performance
- Waterproof IPX7 and Dust Proof IPX5 with System-in-Package (SiP) technology

PERFORMANCE

- Sequential Read (MB/s): Up to 95
- Sequential Write (MB/s): Up to 80

* Depending on model and configuration

N701/N601 NVMe PCIe Gen4 DRAM-less SSDs Feature 18-Stage Adaptive AceTT Technology for Enhanced Thermal Control, Steadier Performance



The N701/N601 SSDs are ATP's latest NVMe PCIe Generation 4 compact solid-state drives (SSDs). They are equipped with self-engineered technology that overcomes the limitations of thermal throttling, deliver up to 40% power savings, and protect data with powerful security features.

Ace Thermal Throttling

Unlike standard two- or three-stage configurations, ATP's AceTT technology employs an intelligent 18-stage algorithm to eliminate drastic thermal fluctuations and ensure steady performance.

Energy Efficiency

Maximizes energy efficiency by delivering industry-leading sequential read/write MB/s per watt performance.

Gen4 Performance

PCIe Gen4's faster transfer speed enables a significant performance boost and lower latency.

- Sequential Read up to 6,550 MB/s
- Sequential Write up to 6,050 MB/s

Security Powerhouse

Robust security features offer advanced protection.

- AES-256 Hardware Encryption
- Hardware Write Protect
- Hardware Secure Erase
- Secure Boot
- TCG Opal*

* Optional

ATP Momentum Line SSDs: Fast, Flexible, Industrial-Grade Performance

ATP Momentum Line SSDs are optimized for read-intensive tasks and mixed workloads, offering extended commercial operating temperature range with I-Temp-operable options* and outstanding cost-per-GB value for various industrial applications.

-20°C to 75°C

Extended Commercial operating temperature range

SERVICE

- Rapid lead time
- Full BoM guarantee
- Supply longevity support of up to 3 years

QUALITY

- Wafer-to-finished product process ownership
- Traceability to the production line
- In-house testing/quality process

ATP Momentum Line SSDs

N601Mi/Mw
PCIe® Gen4 NVMe M.2 2280 SSD

- PCIe Gen4 x4, NVMe 1.4
- Capacities: 256 GB to 4 TB
- Operating Temp: -40°C to 85°C / -20°C to 75°C*
- Power loss protection for data at rest
- AutoRefresh mitigates hot zone read disturb errors
- End-to-End Data Path Protection
- Host Memory Buffer (HMB) support
- AES 256-bit Encryption*

N400Mw
PCIe® Gen3 NVMe M.2 2280 SSD

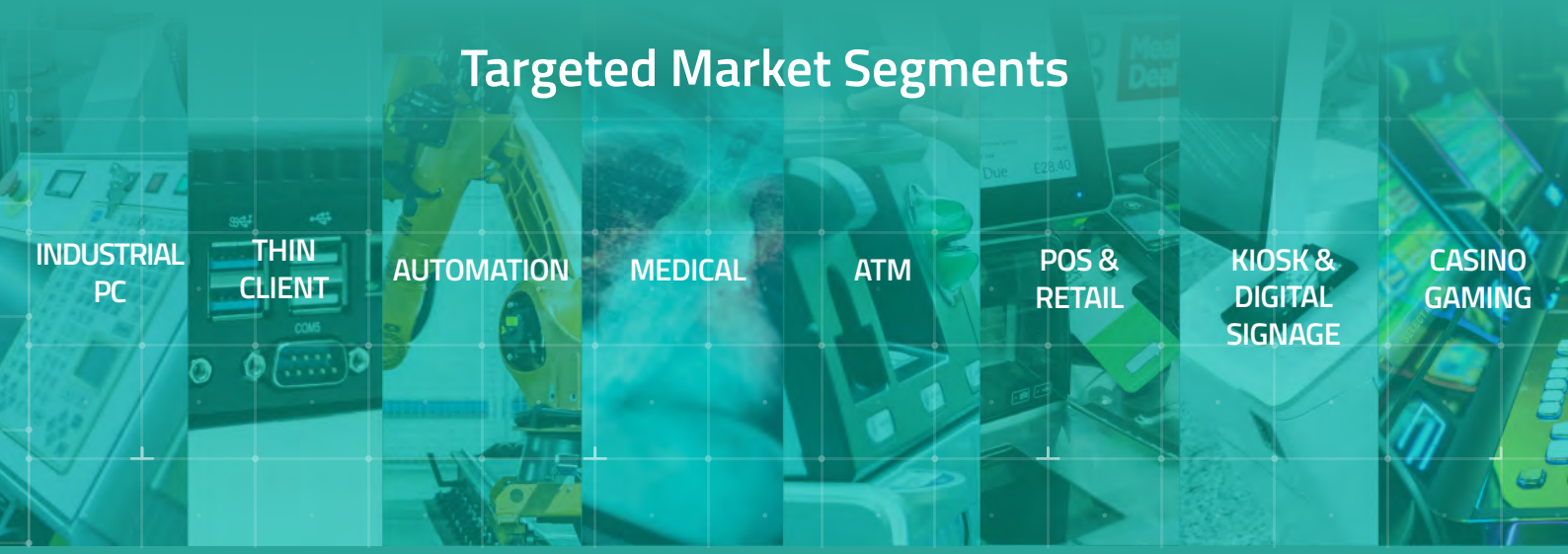
- PCIe Gen3 x4, NVMe 1.3
- Capacities: 128 GB to 1 TB
- Operating Temp: Extended Commercial (-20°C to 75°C)
- Power loss protection for data at rest
- AutoRefresh mitigates hot zone read disturb errors
- Auto-Read Calibration (ARC) for precise voltage adjustment
- End-to-End Data Path Protection
- Host Memory Buffer (HMB) support
- AES 256-bit Encryption*

A400Mw
SATA III M.2 2280 SSD / 2.5" SSD

- SATA III 6 Gb/s
- Capacities: 128 GB to 4 TB
- Operating Temp: Extended Commercial (-20°C to 75°C)
- Power loss protection for data at rest
- Auto-Read Calibration (ARC) for precise voltage adjustment
- Power-efficient DRAM-less design
- AES 256-bit Encryption*

* Optional

Targeted Market Segments

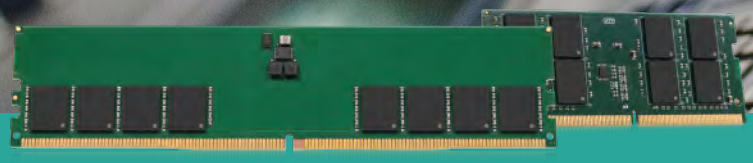


Product Line	PCIe® Gen4 NVMe M.2 2280 SSD			PCIe® Gen3 NVMe M.2 2280 SSD	SATA III M.2 2280		SATA III 2.5" SSD	
	Momentum							
	N601Mi[1]	N601Mw	N401Mw[1]	N400Mw	A400Mw[1]	A400Mw	A400Mw[1]	A400Mw
Interface	PCIe G4 x4			PCIe G3 x4	SATA III 6 Gb/s			
Flash Type	3D TLC							
Form Factor	M.2 2280 S3-M			M.2 2280 S2-M	M.2 2280 S2-B-M		2.5"	
Operating Temperature	-40°C to 85°C	-20°C to 75°C						
Power Loss Protection Options	Firmware Based							
Optional SED Features	AES 256-bit Encryption							
Capacity	256 GB to 4 TB			128 GB to 1 TB	256 GB to 4 TB	128 GB to 1 TB	256 GB to 4 TB	128 GB to 1 TB
Performance								
Sequential Read (MB/s) up to	5,800	7,200	7,200	2,600	550			
Sequential Write (MB/s) up to	5,200	6,500	6,500	1,800	520	500	520	500
Random Reads IOPS up to	800,000	1,000,000	900,000	240,000	65,000	72,000	65,000	72,000
Random Writes IOPS up to	1,000,000	1,200,000	1,000,000	300,000	80,000	86,000	80,000	86,000
Endurance and Reliability								
Endurance (TBW)[2] up to	6,000 TB		3,200 TB	695 TB	750 TB			
Reliability MTBF @ 25°C	>3,000,000 hours							
Others								
Dimensions (mm)	80.0 x 22.0 x 2.2						100 x 69.85 x 7	
Certifications	CE, FCC, BSMI, UKCA, RoHS, REACH							
Warranty	2 years							

1. Product specifications may be subject to change.
2. Under highest Sequential write value. May vary by density, configuration and applications.

ATP Momentum Line DRAM: DDR5

The new Momentum Line industrial DRAM modules offer mainstream data transfer rates combined with a low power consumption, ensuring faster performance and greater power savings. They adhere to all JEDEC standards and utilize top-tier DRAM chips to provide high levels of reliability, compatibility, and stability across various industrial applications. With ATP's commitment to quality control and rigorous verification processes, these modules consistently deliver dependable results.



KEY FEATURES

- Densities: 8 GB* to 32 GB
- JEDEC Compliant
- Top-tier DRAM chips and production traceability
- Decreased voltage for better power efficiency
- Unique ATP TDBI decreases error rate over time
- Designed and validated for confident data integrity and compatibility
- Operating Temperature: -40°C to 85°C / 0°C to 85°C

MOMENTUM DRAM MODULES ARE IDEAL FOR USE IN:

- Industrial PCs
- Retail/point-of-sale systems (POS)
- Kiosks/Digital Signages
- Casino Gaming
- Thin-client PCs
- Automation
- ATM
- Medical & Healthcare

* May vary by product and project support

Product	DIMM Type	Density	Speed (MT/s, up to)	Operating Temp.	PCB Height	ATP TDBI	Wide Temperature
DDR5	Non-ECC UDIMM	8 GB	5600	0°C to 85°C	Low Profile	•	
		16 GB					
		32 GB					
	Non-ECC SO-DIMM	8 GB					
		16 GB					
		32 GB					
	Non-ECC UDIMM	8 GB		-40°C to 85°C			•
		16 GB					•
		32 GB					•
	Non-ECC SO-DIMM	8 GB					•
		16 GB					•
		32 GB					•
	ECC UDIMM	16 GB		0°C to 85°C			
		32 GB					
	ECC SO-DIMM	16 GB					
		32 GB					
	ECC UDIMM	16 GB		-40°C to 85°C			•
		32 GB					•
	ECC SO-DIMM	16 GB					•
		32 GB					•

DRAM SOLUTIONS

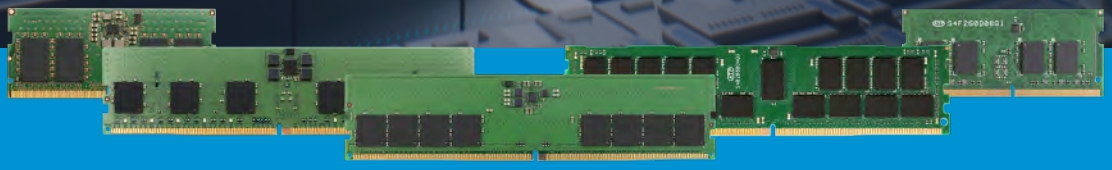
Intense Performance for Intense Workloads

ATP's industrial DRAM modules are built tough and can meet the exacting demands of the growing enterprise. On call 24/7, these hardworking modules are fast, can withstand harsh operating environments, and can handle large bandwidth requirements. ATP's DRAM lineup consists of legacy SDRAM, and a complete range of DDR1, DDR2, DDR3, DDR4, and DDR5 modules. They are available as RDIMM, RDIMM VLP, UDIMM/UDIMM ECC, SO-DIMM/SO-DIMM ECC, Mini-RDIMM, and Mini-UDIMM/Mini-UDIMM ECC.

DRAM Overview with Differentiators

Multi-Generational Accelerated Computing

ATP DRAM modules meet the growing need for accelerated performance in memory-intensive and high-performance computing applications to keep up with intensifying data processing requirements as the Internet of Things (IoT) and industrial IoT (IIoT) inevitably become more pervasive. Multi-generational solutions range from legacy DDR3/DDR2/DDR1, DDR4, and the latest DDR5 solutions, which deliver robust performance, durable build, and the right density for the toughest workloads. ATP's modules consist of major integrated circuits (ICs) exclusively obtained from 100% Tier 1 manufacturers, eliminating reliance on spot market sources.



The ATP Advantage: WE BUILD WITH YOU*

Value-Added Customization Services*

- **Conformal Coating** makes the DRAM module totally pinhole-free and truly conformal, shielding it from dust, chemicals, moisture, and other harmful substances.
- **Chamfering PCB Design** refers to the "beveling or tapering" of connector edges for easier insertion into the memory slots.
- **Anti-Sulfur Resistors.** Ordinary silver resistors corrode and become non-conductive when exposed to sulfur. ATP DRAM modules offer an anti-sulfur resistor option to prevent the corrosive effects of sulfur contamination, guaranteeing continued dependable performance for a long time and lowering the total cost of ownership by preventing unnecessary downtime and expensive component replacements.
- **SPD Write Protect.** Permanent write protection safeguards critical configuration data to prevent accidental or malicious modification of serial presence detect (SPD) data, improving system security, stability, and reliability while supporting manufacturing and maintenance requirements.

Best TCO with Wide-Temp ICs

Wide-temperature ICs supporting -40°C to 85°C operating range offer the best solution to reach industrial grade performance at a lower cost.

Longevity Support for Legacy Modules

Even though DDR5 is poised to become the memory standard, many industrial applications still rely on DDR4 and older memory. ATP Electronics recognizes that legacy deployments cannot easily transition to DDR5; hence, it remains committed to supporting extended lifecycle requirements for DDR4 and older .

System-Level TDBI Screens Out 0.01% Error

Even just 0.01% error on a 99.99% effective device can increase the failure rates at the module level and lead to failure in actual usage. ATP's system-level TDBI can detect and screen out the 0.01% error to ensure utmost reliability.

* Features and services may vary depending on project and customer request.

ATP DRAM Modules: Tested Rigorously for Maximum Reliability

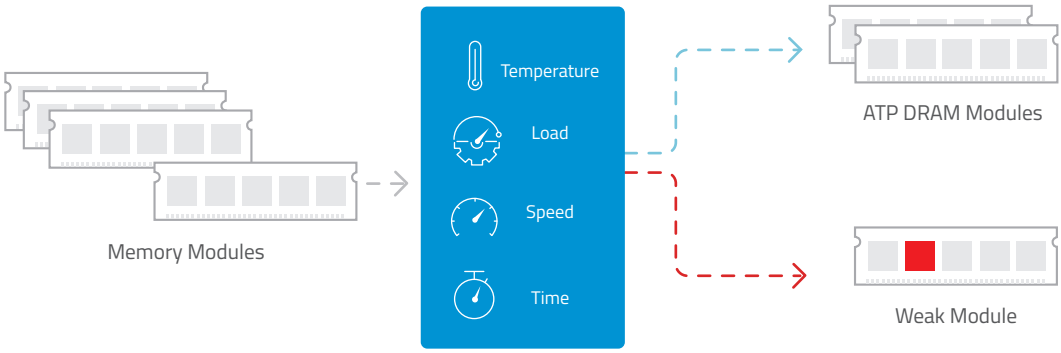
Dynamic Random Access Memory (DRAM) modules perform critical tasks for rigid workloads. Many of them are installed in systems that work non-stop in high-stress environments. They are constantly exposed to thermal, environmental as well as electro-mechanical challenges. Knowing that any vulnerability that can cause unstable system operation can also drastically impact business operations, ATP goes through extra lengths to make sure that its DRAM modules are extremely reliable.

Automatic Test Equipment (ATE)

The ATE detects component defects and structural defects related to the DIMM assembly and screens out marginal timing and signal integrity (SI) sensitivities. ATE provides electrical testing patterns with various parameter settings, such as marginal voltage, signal frequency, clock, command timing and data timing under continuous thermal cycle.

Test During Burn-in (TDBI)

- TDBI at mass production level detects early life failures (ELF) and effectively screens out weak ICs that could fail during the early product life. It combines temperature, load, speed and time to stress test memory modules and expose the weak module.
- Even just 0.01% error on a 99.99% effective device can increase the failure rates at module level and lead to failure in actual usage.
- ATP TDBI can detect and screen out the 0.01% error to ensure utmost reliability.

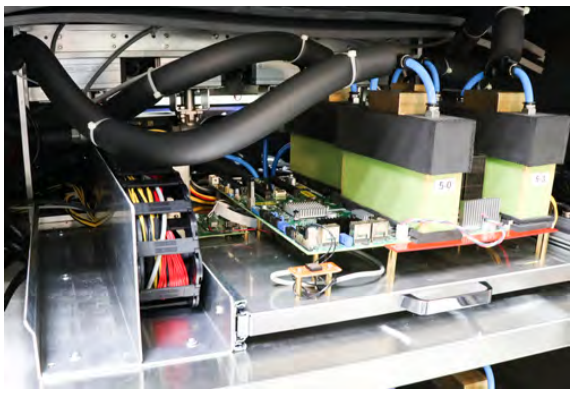


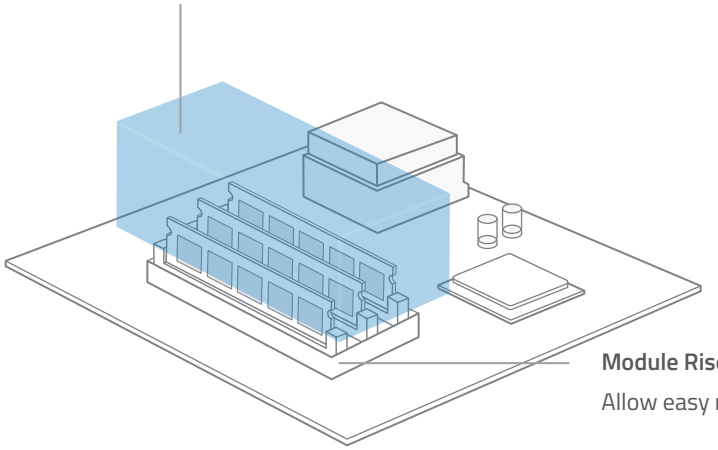
ATP TDBI: What Makes It Unique?

The ATP TDBI system applies extreme high/low temperature, high-low voltage, and pattern testing on DRAM modules. The system consists of:

The Mini Chamber

Isolates temperature cycling only to modules being tested so as not to thermally stress the rest of testing systems. This minimizes the failure of other testing components, such as the motherboards. It also allows faster debug for defects per million (DPM) fallout and reduced false failures. In conventional large thermal chambers, the failures of non-DRAM-related testing components are constant, given that the whole system is thermally stressed.



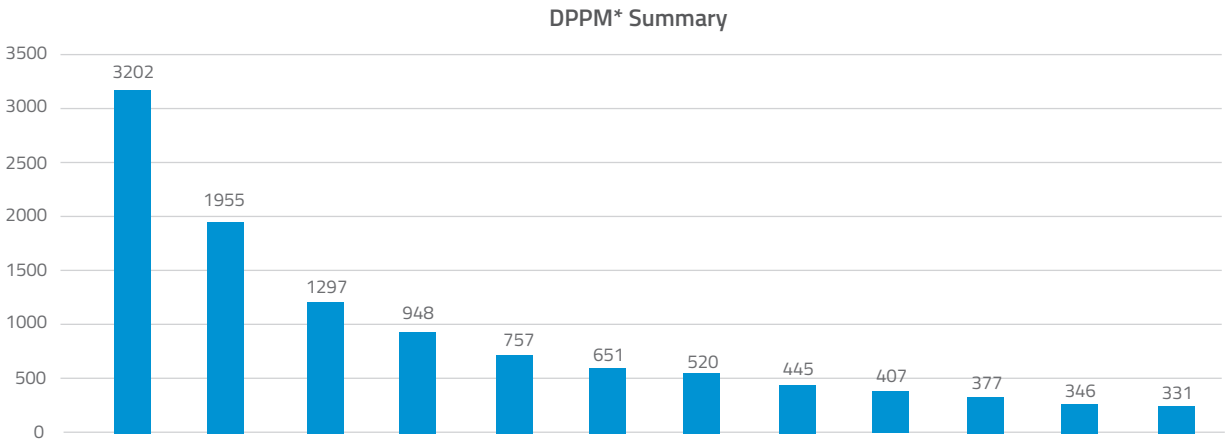


Module Riser Adapters from the Motherboard

Allow easy module insertions in production-level volumes.

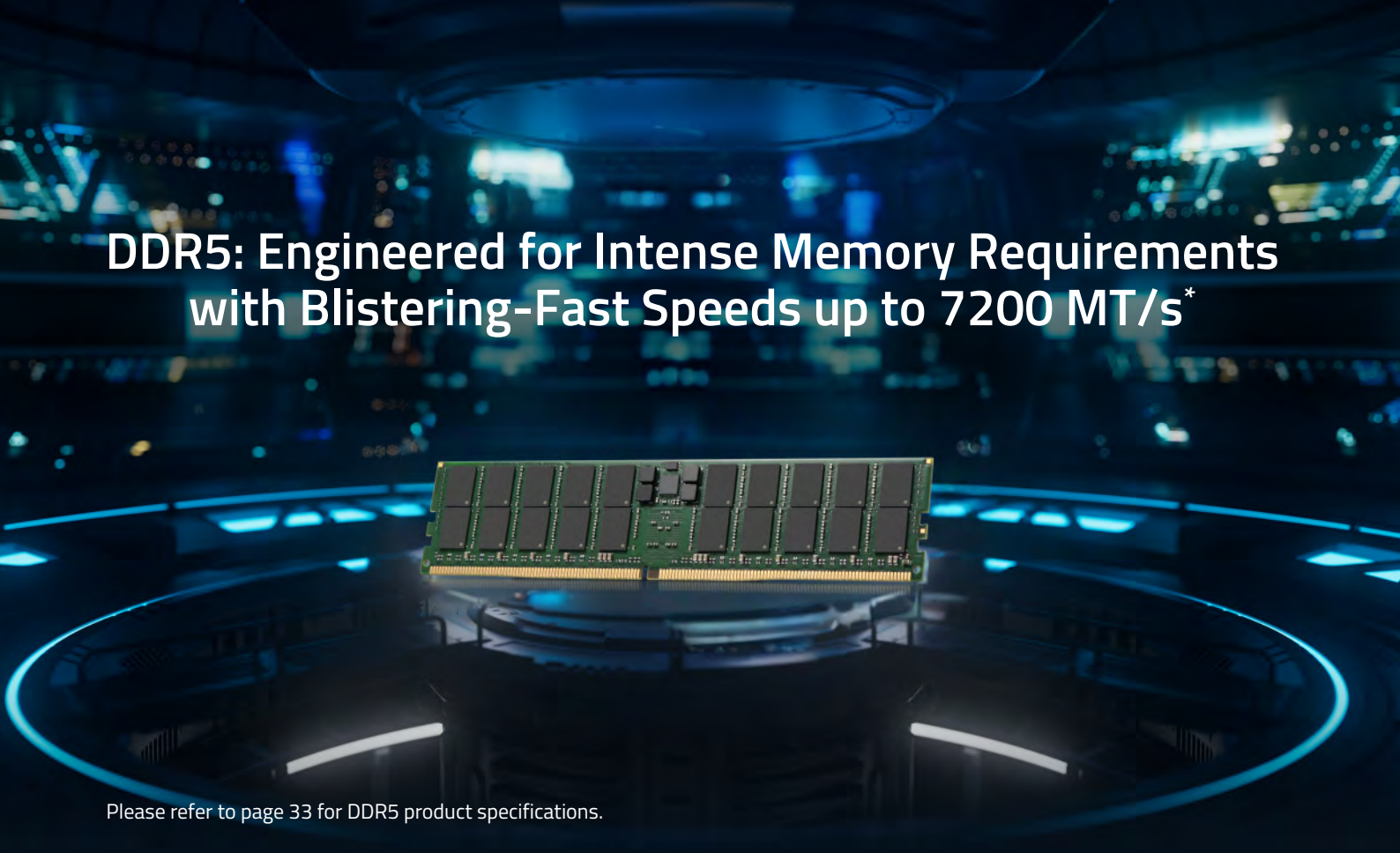
Improvements After TDBI Adoption

The following graph shows that with ATP TDBI, the error rates decrease over time. The acceptable industry limit is 3,500 DPPM,* but with ATP TDBI, the error rate has gone down significantly over the years.



*DPPM = Defective Parts per Million

DDR5: Engineered for Intense Memory Requirements with Blistering-Fast Speeds up to 7200 MT/s*



Please refer to page 33 for DDR5 product specifications.

Next-generation applications require next-generation memory. DDR5 outperforms DDR4 in every aspect, satisfying the insatiable need for larger densities, reduced latency, and quicker data transfer rates, all while providing improved power efficiency.

2.25x : More than Double the Speed

The 7200 MT/s* memory bandwidth represents up to 125% increase over DDR4's maximum speed of 3200 MT/s. DDR5 is expected to scale up to 8000 MT/s channel speed, further exceeding DDR4's and translating to overall higher performance.

Better Power Architecture

DDR5's on-board Power Management Integrated Circuit (PMIC) moves power management from the motherboard to the DIMM. This new power architecture regulates power for better distribution and signal integrity while reducing noise.

4-Layer TSV Enables 128 Gb Density

While DDR4 maxed out at 16 Gb in a single die package (SDP), a single DDR5 DRAM die package has up to 32 Gb.

Better Power Efficiency

Despite running at higher speeds, DDR5 operating voltage is a mere 1.1V, consuming less power and delivering more energy savings compared with DDR4's 1.2V.

Client Clock Driver (CKD)

The client clock driver chip buffers and regenerates clock signals, enhancing signal integrity for stable, high-speed memory performance. With this chip enabled, UDIMM (CUDIMM) and SO-DIMM (CSO-DIMM) modules can reliably reach speeds of up to 7200 MT/s or higher on compatible platforms.

Accurate, Real-Time Temperature Control

Targeted for DDR5 Registered DIMMs (RDIMMs), a temperature sensor on the DIMM provides accurate and real-time temperature monitoring and control.

*Available in 2H 2026

ATP's Own-Built Wide-Temp Modules: Memory Solutions for Critical Environments

DRAM modules are typically installed in systems that operate in harsh environments and extreme temperatures that fluctuate during daytime and the nighttime, as well as in varying weather conditions; thus, memory with a broader range of temperature capabilities is becoming more necessary as most edge computing applications run 24/7, often in challenging environments.

ATP offers cost-effective industrial grade wide-temp DRAM modules to ensure better endurance and redundancy in critical environments where commercial-grade DRAMs do not suffice.

The Competitive Edge

100%
Major ICs sourced from Tier 1 Manufacturers

Lifetime Warranty*
3 years for specific modules*

-40˚C to 85˚C
Operating Temperature range

UTMOST RELIABILITY
ATP's Test During Burn-In (TDBI) can detect and screen out 0.01% error to ensure utmost reliability.

WE BUILD WITH YOU

Optional customization services, including thicker golden finger, anti-sulfur resistors, PCB chamfer, SPD Write Protect, and more.

* Warranty does not cover customized modifications made to the product after its sale.
A 3-year warranty is offered for specific modules, applicable to certain customers starting from the invoice date.

Ensuring Supply Longevity and Mitigating DDR4 Obsolescence

Mainstream DDR4 production is expected to taper off and eventually cease as DDR5 use steadily gains prevalence. Many industrial applications and legacy deployments, however, still rely heavily on DDR4 due to its reliability and broad compatibility.

ATP Electronics will continue supporting extended lifecycle requirements for DDR4 memory through its partnership with trusted DRAM manufacturers with dedicated fabrication facilities to ensure consistent long-term availability, robust technical support for advanced applications, and improved process control to mitigate supply risks. ATP is committed to meeting extended lifecycle requirements for DDR4 memory with a transparent, future-ready product roadmap, as the following table shows.

Product Information

Module Type	DDR4 SO-DIMM	DDR4 UDIMM
Capacity	4 GB / 8 GB / 16 GB	
Function	ECC/NON-ECC	
Frequency	3200 MHz	

Note
Modules based on 4 Gb density packages are currently available.
Other density packages will roll out in phases:
- 8 Gb-based: 2026
- 16 Gb-based: 2027

ATP Meets Continued Demand for DDR3 Modules

With DDR4 and DDR5 as the current mainstream memory, major memory makers are slowing down the production of DDR3 or phasing it out. However, systems that have been running for a long time supporting DDR3 remain widely in use for industrial, networking, and other embedded applications. Through its partnership with key suppliers, ATP is committed to supporting the continued demand for DDR3 SO-DIMM and UDIMM.

Product Information

Module Type	DDR3 SO-DIMM	DDR3 UDIMM
Capacity	4 GB / 8 GB	
Function	ECC/NON-ECC	
Frequency	1866 MHz	

Complete DRAM Portfolio

Product	DIMM Type	Capacity	Speed (MT/s, up to)	VLP/ ULP**	30μ" Golden Finger	ATP TDBI	Wide Temperature	Anti-Sulfur Resistors	Conformal Coating	PCB Chamfer	SPD Write Protect
DDR5	RDIMM	16 GB to 256 GB	7200*	●	●	●	▲	▲	-	▲	▲
	ECC CUDIMM	16 GB to 64 GB	7200*	●	●	●	▲	▲	▲	▲	▲
	Non-ECC CUDIMM	8 GB to 64 GB	7200*	●	-	●	▲	▲	▲	▲	▲
	ECC CSO-DIMM	16 GB to 64 GB	7200*	-	●	●	▲	▲	▲	▲	▲
	Non-ECC CSO-DIMM	8 GB to 64 GB	7200*	-	-	●	▲	▲	▲	▲	▲
	RDIMM	16 GB to 256 GB	5600	●	●	●	▲	▲	-	▲	▲
	ECC UDIMM	16 GB to 64 GB	5600	●	●	●	▲	▲	▲	▲	▲
	Non-ECC UDIMM	8 GB to 64 GB	5600	●	-	●	▲	▲	▲	▲	▲
	ECC SO-DIMM	16 GB to 64 GB	5600	-	●	●	▲	▲	▲	▲	▲
	Non-ECC SO-DIMM	8 GB to 64 GB	5600	-	-	●	▲	▲	▲	▲	▲
DDR4	RDIMM	4 GB to 128 GB	3200	●	●	●	▲	▲	-	▲	▲
	ECC UDIMM	4 GB to 32 GB	3200	●	●	●	▲	▲	▲	▲	▲
	Non-ECC UDIMM	2 GB to 32 GB	3200	●	▲	●	▲	▲	▲	▲	▲
	ECC SO-DIMM	4 GB to 32 GB	3200	-	●	●	▲	▲	▲	▲	▲
	Non-ECC SO-DIMM	2 GB to 32 GB	3200	-	▲	●	▲	▲	▲	▲	▲
	Mini-RDIMM	4 GB to 16 GB	2400	●	●	●	▲	▲	-	-	▲
	Mini-UDIMM	4 GB to 16 GB	2400	●	●	●	▲	▲	-	-	▲
DDR3	ECC UDIMM	1 GB to 16 GB	1866	●	●	●	▲	▲	▲	▲	-
	Non-ECC UDIMM	1 GB to 16 GB	1866	●	●	●	▲	▲	▲	▲	-
	ECC SO-DIMM	1 GB to 16 GB	1866	●	●	●	▲	▲	▲	▲	-
	Non-ECC SO-DIMM	1 GB to 16 GB	1866	-	●	●	▲	▲	▲	▲	-
	Mini-UDIMM	1 GB to 8 GB	1600	●	●	●	▲	▲	-	-	-
DDR2	ECC UDIMM	1 GB to 2 GB	800	-	●	●	▲	-	-	-	-
	Non-ECC UDIMM	1 GB to 2 GB	800	-	●	●	▲	-	-	-	-
	Non-ECC SO-DIMM	256 MB / 1 GB to 4 GB	800	-	●	●	▲	-	-	-	-
DDR1***	Non-ECC UDIMM	256 MB	400	-	●	●	-	-	-	-	-
	Non-ECC SO-DIMM	128 MB to 512 MB / 1 GB	400	-	●	●	▲	-	-	-	-
SDRAM***	Non-ECC SO-DIMM	64 MB to 256 MB	133	-	●	●	-	-	-	-	-

* Available in 2H 2026
** VLP: height=0.74", ULP: height below=0.74"
*** Longevity Support to 2027
▲: Optional

FLASH SOLUTIONS

Specialized Storage Solutions for Mission-Critical Applications

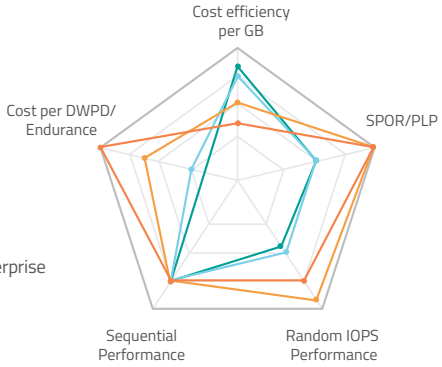
ATP's industrial flash products deliver dependable performance, efficient responsiveness, and long usage life to accomplish mission-critical tasks. Customizable* to customers' configurations, they come in different form factors, such as U.2, 2.5" SSDs, M.2 embedded modules, mSATA, CFexpress, CFast, CompactFlash, SD/microSD memory cards, USB drives, and E1.S drives for enterprise and industrial applications.

They support high-speed interfaces such as SATA 6 Gb/s and the latest NVMe™ protocol on PCIe® interface for reliable, blazing-fast, and future-ready performance. Managed NAND offerings include the automotive/industrial grade e.MMC and NVMe HSBGA SSD, which integrate flash memory and controller into a single package.

* By project support.

Flash Products Naming Rule

N	65	1	S	i	a
Interface Uppercase	**Endurance** Numeral	**Technology Iterations** Numeral	**Product Line** Uppercase	**Temperature** Lowercase	**Series** Lowercase
N: PCIe (NVMe) A: SATA B: USB I: PATA/IDE (CF) S: SD/microSD E: e.MMC/eMCP U: UFS	80: SLC 75: Enhanced SLC mode 70: SLC mode 65: Enhanced TLC 60: Native TLC/MLC 50: Native QLC 40: Read-Intensive NAND	Reserved to define Core technology/ interface generation change	P: Premium S: Superior V: Value M: Momentum	c: Commercial w: Extended-Commercial i: Industrial a: Automotive / Extended-Industrial	a: Automotive s: SecurStor e: Industrial Enterprise



Premium Line

The ATP Premium Line consists of mass storage solutions built for uncompromising performance, maximum dependability, and exceptional endurance. Outfitted with best-in-class technologies ensuring the highest levels of reliability, these solutions are hardwired for the most demanding mission-critical applications where system failures or interruptions can significantly impact operations. Unparalleled usage life and brisk write speeds set the Premium Line a cut above the rest. High input/output operations per second (IOPS) ensure consistently high performance, and ATP's power loss protection technology guarantees that data in transit are safely stored to the flash chip in the event of a power loss, thus safeguarding data integrity, averting data loss or corruption, and preventing device damage.

Superior Line

The ATP Superior Line brings together powerful and proven features and technologies for rigorous operations in diverse industries, capably handling mixed workloads with high IOPS requirements. Generous storage densities make these products ideal for data-hungry and write-intensive applications; mid-density drive options offer a wider range of choices for cost efficiency; and configurable over-provisioning gives users flexibility to make adjustments based on actual workloads for the optimal balance between drive performance and endurance.

Value Line

The ATP Value Line integrates advanced essential solutions to the growing needs of enterprises and industries, offering sustained, reliable performance and consistent reliability. Superb choices as embedded boot or boot image devices, they are ideally suited for Internet of Things (IoT) applications, spurring greater connectivity for homes, cars, medical equipment, and other smart devices. Ample storage capacity is available for installing an operating system with space to spare for other applications.

Momentum Line

Emphasizing rapid time-to-market, broad compatibility, and cost-efficient storage, the ATP Momentum Line combines cutting-edge technology with essential solutions tailored to meet the diverse needs of the industrial market. With ATP's commitment to quality control and rigorous verification processes, our products consistently deliver dependable results. Offering a range of mainstream specifications and storage capacities, the ATP Momentum Line provides versatile options for various industrial applications.

Industrial Enterprise Series

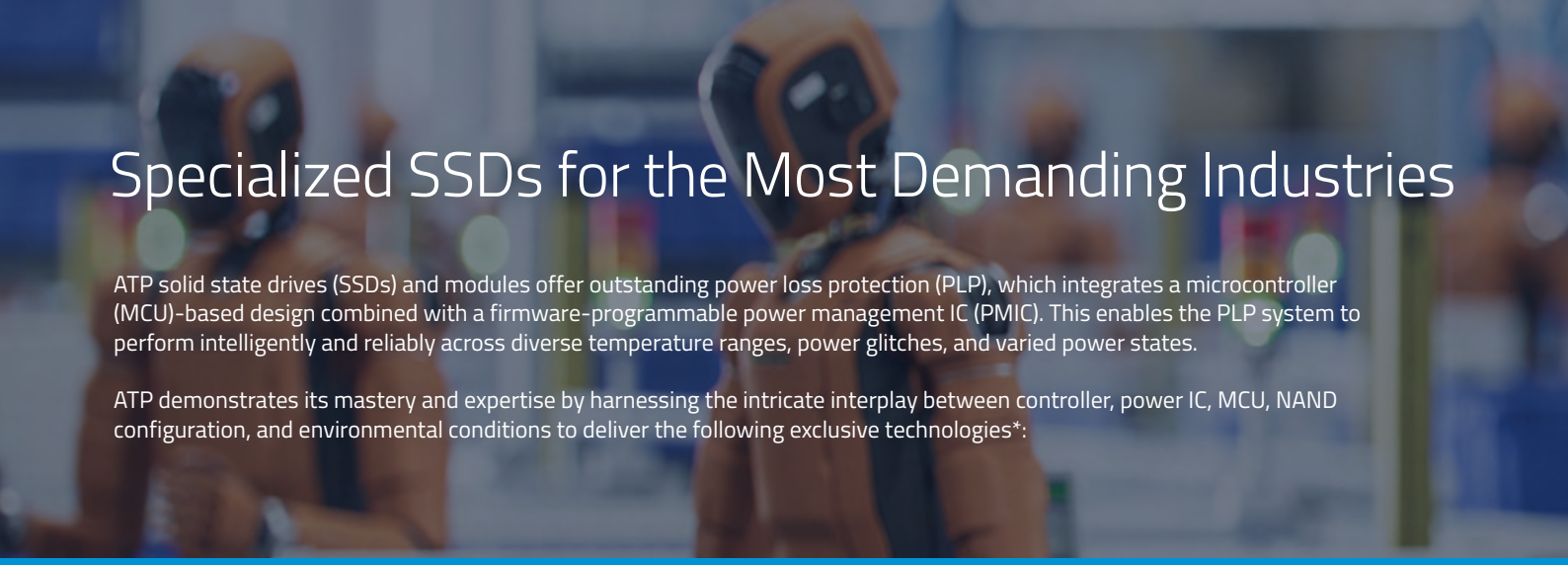
The Industrial Enterprise Series consists of comprehensive flash storage solutions that are designed, built, and tested/validated according to rigid standards for reliable operation and long product lifetime with high-quality service. They comply with ATP's Enterprise Readiness Standards (ERS), including stringent testing and enhanced firmware features, to meet edge computing requirements of reduced latency, better cost-effectiveness, real-time analytics, and accessibility. They are ideal as boot drives but are also suitable for storage and hybrid usage. They are capable of handling higher endurance and reliability requirements while working in harsher environmental conditions for extended periods without supervision.

Automotive Series

The ATP Automotive Series consists of tailor-made solutions to meet automotive customers' requirements for maximum data reliability. These solutions undergo the strictest levels of testing and are certified according to automotive-industry standards, including but not limited to IATF-16949 Certification, APQP, PPAP, IMDS, AEC-Q100, product selection/features and joint validation tests depending on project support and according to customer request.

SecurStor Series

SecurStor is ATP's answer to the growing data security concerns in the industry and is integrated into most of ATP's new or upcoming industrial only flash storage solutions. Its feature set can be customized to the individual requirements of an application or a system and with that helps protect mission-critical applications against unauthorized access to data or systems. SecurStor's feature range includes, but goes far beyond, conventionally available data at rest protection mechanisms such as encryption or TCG Opal to assure protection not only of data that is stored in the NAND but can also be used as the foundation for protecting data that is being processed inside a system or sent across a network.



Specialized SSDs for the Most Demanding Industries

ATP solid state drives (SSDs) and modules offer outstanding power loss protection (PLP), which integrates a microcontroller (MCU)-based design combined with a firmware-programmable power management IC (PMIC). This enables the PLP system to perform intelligently and reliably across diverse temperature ranges, power glitches, and varied power states.

ATP demonstrates its mastery and expertise by harnessing the intricate interplay between controller, power IC, MCU, NAND configuration, and environmental conditions to deliver the following exclusive technologies*:

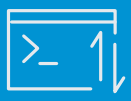
ATP AcuCurrent Technology
Innovative Signal Integrity Optimization

Signal integrity is crucial for SSD performance and reliability, particularly in industrial settings with temperature fluctuations where conventional, static SSD settings no longer suffice. ATP's AcuCurrent Technology is an innovative signal optimization technology that:

- Fortifies SSD product lifetime and reliability through dynamic, temperature-responsive adjustments that minimize errors and unnecessary read retries, thus potentially reducing bad block counts and preserving spare blocks.
- Ensures stable performance across a wide range of operating ranges up to 125°C, enhancing the SSD's resilience to environmental and temperature variations.

ATP EcoFlush Technology
Intelligent SSD Flush Cache Management

Frequent and excessive flush cache commands from the host to SSDs to prevent data corruption during power loss events can increase write amplification and compromise NAND endurance.



The EcoFlush technology is built upon ATP's HW PLP mechanism. It intelligently bypasses excessive flush commands and optimizes flush intervals based on SSD workload, reducing unnecessary writes and improving overall system efficiency.

- **10X Lower WAI** translates to fewer write cycles and prolongs the SSD's operational lifespan.
- **11X higher 4K Random Write Performance.** Based on specific test patterns, the SSD can better handle demanding workloads without compromising data integrity.

* Technology availability may vary based on model and configuration

ATP PLP Diag Technology
Proactive PLP Capacitor Health Check

Unmonitored capacitor degradation poses a silent risk that can compromise data safety during power outages. ATP's PLP Diag feature builds upon ATP's robust HW-PLP system, ensuring continued protection and user awareness of the system's integrity.

- Proactively checks the functionality and health status of the polymer tantalum capacitors, averting PLP failure resulting from defective capacitors.
- If capacitors fail, the SSD switches to Direct TLC mode, bypassing DRAM caching for writes. Users can also verify the PLP status through SMART commands, ensuring continuous data protection and system reliability.

ATP Pulse Reboot Technology
Intelligent Self-Healing and Recovery

This self-healing technology enables SSDs to perform constant self-checks and autonomously reboot itself when it detects a freeze event. This ensures uninterrupted operation and quick responsiveness.

- Fixes minor issues without requiring remote support or human intervention, thus preventing losses and minimizing costs arising from remote maintenance and service interruptions.
- Uses fail-safe logic with multi-step handshake and reboot logic to minimize the risks of infinite loops and prevent unnecessary downtime.

ATP Ace Thermal Throttling
Adaptive Multi-Stage Thermal Throttling Technology

This intelligent thermal throttling algorithm ensures steadier performance behavior by managing heat in increments of up to 18-stages instead of the typical two- or three-stage throttling configuration.

- Implements a gradual, multi-stage approach that minimizes the rapid swings between high and low performance, sudden temperature spikes followed by drastic large drops, and inconsistent performance that degrades user experience during thermal throttling.
- Delivers optimal performance under sustained workloads and high-temperature operating conditions
- Protects the SSD from the damage of overheating, thus ensuring longer device life.

PCIe® Gen4 NVMe M.2 SSD

KEY FEATURES

- Endurance: 1 DWPD (5 years Enterprise workload)
- Sustained Write Performance: Up to 3,000 MB/s
- Data Retention: Up to 10 years at 55°C (pSLC)*
- Power Loss Protection: MCU-based* with data-at-rest and in-flight protection
- PLP Diag* (Self-Diagnosing Capacitor Check)
- Security: Self-Encrypting Drive (SED) with AES 256-bit Encryption, TCG Opal 2.0*
- Hardware Secure Erase / Write Protect*
- End-to-End Data Path Protection
- Thermal heatsink solutions**

* May vary by product and project support **Customization available on a project basis

Product Line	Premium	Superior		Value	Momentum
	N751Pi[1]	N651Si / N651Sc	N601Sw / N601Sc [1]	N601Vi / N601Vc	N601Mi / N601Mw
Interface	PCIe G4 x4				
Flash Type	3D TLC (pSLC mode) [2]	3D TLC			
Form Factor	M.2 2280-D6-M / M.2 2280-D2-M [3]		M.2 2280-D2-M	M.2 2280-S3-M	M.2 2280 S3-M
Operating Temperature	-40°C to 85°C	-40°C to 85°C / 0°C to 70°C	-20°C to 75°C / 0°C to 70°C	-40°C to 85°C / 0°C to 70°C	-40°C to 85°C / -20°C to 75°C
Power Loss Protection Options	Hardware + Firmware Based / Firmware Based			Firmware Based	
Optional SED Features	AES 256-bit Encryption, TCG Opal 2.0				AES 256-bit Encryption
Capacity	80 GB to 1.28 TB	240 GB to 7.68 TB [4]	480 GB to 3.84 TB	240 GB to 1.92 TB	256 GB to 4 TB
Performance					
Sequential Read (MB/s) up to	6,450		6,550	5,000	7,200
Sequential Write (MB/s) up to	6,100	6,050	6,050	4,300	6,500
Random Reads IOPS up to	1,090,000	1,091,000	780,000	800,000	1,000,000
Random Writes IOPS up to	1,200,000	1,245,000	1,045,000	1,100,000	1,200,000
Endurance and Reliability					
Endurance (TBW) [5] up to	120,000 TB	76,000 TB	11,480 TB	4,170 TB	6,000 TB
Reliability MTBF @ 25°C	>3,000,000 hours				
Others					
Dimensions (mm)	80 × 22 × 3.85 80 × 22 × 3.6 Optional 8 mm heatsink		80.0 x 22.0 x 3.6	80.0 x 22.0 x 2.4	80.0 x 22.0 x 2.2
Certifications	CE, FCC, BSMI, UKCA, RoHS, REACH	CE, FCC, BSMI, UKCA, RoHS, REACH, UL			CE, FCC, BSMI, UKCA, RoHS, REACH
Warranty	5 years	3 years			2 years

Product Line	Momentum	Superior	Premium	Superior
	N401Mw [1]	N601Sw / N601Sc [1]	N701Pi / N701Pc	N601Si / N601Sc
Interface	PCIe G4 x4		PCIe G4 x2 [6]	
Flash Type	3D TLC		3D TLC (pSLC mode)	3D TLC
Form Factor	M.2 2280 S3-M	M.2 2242-D2-M	M.2 2230-S4-M	M.2 2230-S4-M
Operating Temperature	-20°C to 75°C	-20°C to 75°C / 0°C to 70°C	-40°C to 85°C / 0°C to 70°C	
Power Loss Protection Options	Firmware Based	Hardware + Firmware Based / Firmware Based	Firmware Based	
Optional SED Features	AES 256-bit Encryption	AES 256-bit Encryption, TCG Opal 2.0		
Capacity	256 GB to 4 TB	480 GB to 1.92 TB	80 GB to 320 GB	240 GB to 960 GB
Performance				
Sequential Read (MB/s) up to	7,200	6,525	3,565	3,565
Sequential Write (MB/s) up to	6,500	6,170	3,280	3,280
Random Reads IOPS up to	900,000	820,000	630,000	630,000
Random Writes IOPS up to	1,000,000	1,030,000	755,000	755,000
Endurance and Reliability				
Endurance (TBW) [5] up to	3,200 TB	5,075 TB	29,235 TB	2,810 TB
Reliability MTBF @ 25°C	>3,000,000 hours			
Others				
Dimensions (mm)	80.0 x 22.0 x 2.2	42.0 x 22.0 x 3.6	30.0 x 22.0 x 2.75	
Certifications	CE, FCC, BSMI, UKCA, RoHS, REACH	CE, FCC, BSMI, UKCA, RoHS, REACH		
Warranty	2 years	3 years	5 years	3 years

1 Product specifications may be subject to change.
2 150K P/E cycle configuration drive available on a project basis.
3 M.2 2280-D6-M (max height: 3.85 mm) offers hardware-based power loss protection, while M.2 2280-D2-M (max height: 3.6 mm) provides firmware-based power loss protection.
4 The 7,680 GB capacity is rated for commercial temperature operation only (0°C to 70°C)
5 Under highest Sequential write value. May vary by density, configuration and applications.
6 Gen4 x4 configuration available on a project basis.

Technologies		S.M.A.R.T./ Life Monitor	PLP Diag	Ace Thermal Throttling	AcuCurrent	Industrial Temperature	Firmware-Based Data-At-Rest Power Loss Protection	Hardware-Based In-Flight-Data Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	SED	Software Secure Erase	Hardware Secure Erase	Hardware Write Protect
Premium	N751Pi	○	○			○	○	○	○	○	○	○	○	○	○	○	○
Superior	N651Si / N651Sc	○	○			○	○	○	○	○	○	○	○	○	○	○	○
	N601Sw / N601Sc	○	▲	○	○	▲	○	▲	○	○	○		○	▲	○	○	○
Value	N601Vi / N601Vc	○				○	○		○	○	○		○		○		
Momentum	N601Mi / N601Mw	○				○	○		○	○	○		○	▲	○		
	N601Mw	○					○		○	○	○	○	○	▲	○		

▲: Customization option available on a project basis.

PCIe® Gen4 NVMe U.2 SSD

KEY FEATURES

- Endurance: 1 DWPD (5 years Enterprise workload)
- Sustained Write Performance: Up to 3,000 MB/s
- Data Retention: Up to 10 years at 55°C (pSLC)*
- Power Loss Protection: MCU-based with data-at-rest and in-flight protection
- PLP Diag*(Self-Diagnosing Capacitor Check)
- Security: Self-Encrypting Drive (SED) with AES 256-bit Encryption, TCG Opal 2.0*
- End-to-End Data Path Protection
- 15 mm integrated fin-type heatsink enclosure

* May vary by product and project support

Product Line	Premium	Superior
	N751Pi	N651Si / N651Sc
Interface	PCIe G4 x4	
Flash Type	3D TLC (pSLC mode)	3D TLC
Form Factor	U.2	
Operating Temperature	-40°C to 85°C	-40°C to 85°C / 0°C to 70°C
Power Loss Protection Options	Hardware + Firmware Based	
Optional SED Features	AES 256-bit Encryption, TCG Opal 2.0	
Capacity	320 GB to 2.56 TB	960 GB to 7.68 TB
Performance		
Sequential Read (MB/s) up to	6,100	6,000
Sequential Write (MB/s) up to	6,000	6,000
Random Reads IOPS up to	870,000	
Random Writes IOPS up to	1,250,000	1,230,000
Endurance and Reliability		
Endurance (TBW)[1] up to	486,000 TB	76,000 TB
Reliability MTBF @ 25°C	>3,000,000 hours	
Others		
Dimensions (mm)	100 x 69.85 x 15	
Certifications	RoHS, VCCI, CE, FCC, UKCA	CE, FCC, UKCA, VCCI, RoHS, REACH
Warranty	5 years	3 years

1. Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	PLP Diag	Industrial Temperature	Firmware-Based Data-At-Rest Power Loss Protection	Hardware-Based In-Flight-Data Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	SED	Software Secure Erase
Premium	N751Pi	O	O	O	O	O	O	O	O	O	O	O	O
Superior	N651Si / N651Sc	O	O	O	O	O	O	O	O	O	O	O	O

▲: Customization option available on a project basis.

PCIe® Gen4 NVMe E1.S SSD

KEY FEATURES

- Endurance: 1 DWPD (5 years Enterprise workload)
- Sustained Write Performance: Up to 3,000 MB/s
- Power Loss Protection: MCU-based with data-at-rest and in-flight protection
- PLP Diag* (Self-Diagnosing Capacitor Check)
- AcuCurrent (Signal Optimization Technology)
- Security: Self-Encrypting Drive (SED) with AES 256-bit Encryption, TCG Opal 2.0*
- End-to-End Data Path Protection
- 9.5 mm symmetric enclosure

* May vary by product and project support

Product Line	Superior
	N651Si
Interface	PCIe G4 x4
Flash Type	3D TLC
Form Factor	E1.S
Operating Temperature	-40°C to 85°C
Power Loss Protection Options	Hardware + Firmware Based
Optional SED Features	AES 256-bit Encryption, TCG Opal 2.0
Capacity	960 GB to 7.68 TB
	Performance
Sequential Read (MB/s) up to	6,400
Sequential Write (MB/s) up to	6,100
Random Reads IOPS up to	1,000,000
Random Writes IOPS up to	1,200,000
	Endurance and Reliability
Endurance (TBW)[1] up to	79,000 TB
Reliability MTBF @ 25°C	>3,000,000 hours
	Others
Dimensions (mm)	118.75 x 33.75 x 9.5
Certifications	CE, FCC, BSMI, UKCA, RoHS, REACH
Warranty	5 years

1. Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	PLP Diag	AcuCurrent	Industrial Temperature	Firmware-Based Data-At-Rest Power Loss Protection	Hardware-Based In-Flight-Data Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	SED	Software Secure Erase
Superior	N651Si	○	○	○	○	○	○	○	○	○	○	○	○	○

▲: Customization option available on a project basis.

PCIe® Gen3 NVMe M.2 SSD

KEY FEATURES

- Power Loss Protection: MCU-based* with data-at-rest and in-flight protection
- Security: Self-Encrypting Drive (SED) with AES 256-bit encryption, TCG Opal 2.0*
- End-to-End Data Path Protection
- Thermal heatsink solutions**

* May vary by product and project support
** Customization available on a project basis

Product Line	Value	Momentum	Value	Premium	Value
	N650Vi / N650Vc	N400Mw	N650Vi / N650Vc	N700Pi / N700Pc	N600Vi / N600Vc
Interface	PCIe G3 x4				
Flash Type	3D TLC			3D TLC (pSLC mode)	3D TLC
Form Factor	M.2 2280 S2-M	M.2 2280 S2-M	M.2 2242 D5-M	M.2 2230-S4-M	
Operating Temperature	-40°C to 85°C / 0°C to 70°C	-20°C to 75°C	-40°C to 85°C / 0°C to 70°C		
Power Loss Protection Options	Firmware Based				
Optional SED Features	AES 256-bit Encryption, TCG Opal 2.0	AES 256-bit Encryption	-	AES 256-bit Encryption, TCG Opal 2.0	-
Capacity	120 GB to 960 GB	128 GB to 1 TB	120 GB to 960 GB	40 GB to 160 GB	120 GB to 480 GB
Performance					
Sequential Read (MB/s) up to	2,600	2,600	2,600	2,000	2,050
Sequential Write (MB/s) up to	1,880	1,800	1,880	1,600	1,550
Random Reads IOPS up to	250,800	240,000	250,800	135,600	138,000
Random Writes IOPS up to	276,000	300,000	276,000	112,000	112,600
Endurance and Reliability					
Endurance (TBW)[1] up to	4,800 TB	695 TB	4,800 TB	4,280 TB	765 TB
Reliability MTBF @ 25°C	>3,000,000 hours			>2,000,000 hours	
Others					
Dimensions (mm)	80.0 x 22.0 x 2.2		42.0 x 22.0 x 3.6	30.0 x 22.0 x 2.5	
Certifications	CE, FCC, BSMI, UKCA, RoHS, REACH				
Warranty	3 years	2 years	3 years	5 years	3 years

1. Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	Industrial Temperature	Firmware-Based Data-At-Rest Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	SED	Software Secure Erase
Value	N650Vi / N650Vc	○	○	○	○	○	○	○	○	▲	○
Momentum	N400Mw	○		○	○	○	○	○	○	▲	○
Premium	N700Pi / N700Pc	○	○	○	○	○	○	○	○	○	○
Value	N600Vi / N600Vc	○	○	○	○	○	○	○	○		○

▲: Customization option available on a project basis.

SATA III M.2 SSD

KEY FEATURES

- Endurance: 1 DWPD (5 years Enterprise workload)
- Data Retention: Up to 10 years at 55°C (pSLC)
- Power Loss Protection: MCU-based* with data-at-rest and in-flight protection
- PLP Diag* (Self-Diagnosing Capacitor Check)
- EcoFlush* (Flush Cache Optimization Technology)
- Security: Self-Encrypting Drive (SED) with AES 256-bit encryption, TCG Opal 2.0*
- End-to-End Data Path Protection

* May vary by product and project support

Product Line	Premium	Superior	Value	Momentum	
	A750Pi / A750Pc	A650Si / A650Sc	A600Vi / A600Vc	A400Mw[1]	A400Mw
Interface	SATA III 6 Gb/s				
Flash Type	3D TLC (pSLC mode)	3D TLC		3D TLC	
Form Factor	M.2 2280 D2-B-M		M.2 2280 S2-B-M		
Operating Temperature	-40°C to 85°C / 0°C to 70°C			-20°C to 75°C	
Power Loss Protection Options	Hardware + Firmware Based		Firmware Based		
Optional SED Features	AES 256-bit Encryption, TCG Opal 2.0		-	AES 256-bit Encryption	
Capacity	80 GB to 320 GB	240 GB to 960 GB	128 GB to 1,024 GB	256 GB to 4 TB	128 GB to 1 TB
Performance					
Sequential Read (MB/s) up to	560			550	
Sequential Write (MB/s) up to	510	520	525	520	500
Random Reads IOPS up to	92,000	103,000	70,000	65,000	72,000
Random Writes IOPS up to	83,000	86,000	92,000	80,000	86,000
Endurance and Reliability					
Endurance (TBW)[2] up to	29,620 TB	10,240 TB	1,530 TB	750 TB	
Reliability MTBF @ 25°C	>3,000,000 hours		>2,000,000 hours	>3,000,000 hours	
Others					
Dimensions (mm)	80 x 22 x 3.35		80 x 22 x 2.2		
Certifications	CE, FCC, BSMI, UKCA, RoHS, REACH				
Warranty	5 years	3 years		2 years	

Product Line	Premium		Superior	Value
	A800Pi	A750Pi / A750Pc	A650Si / A650Sc	A600Vi / A600Vc
Interface	SATA III 6 Gb/s			
Flash Type	SLC	3D TLC (pSLC mode)	3D TLC	
Form Factor	M.2 2242 D6-B-M			M.2 2242 D2-B-M
Operating Temperature	-40°C to 85°C	-40°C to 85°C / 0°C to 70°C		
Power Loss Protection Options	Hardware + Firmware Based			Firmware Based
Optional SED Features	-	AES 256-bit Encryption, TCG Opal 2.0		-
Capacity	8 GB to 64 GB	80 GB to 320 GB	240 GB to 960 GB	128 GB to 1,024 GB
Performance				
Sequential Read (MB/s) up to	535	560		
Sequential Write (MB/s) up to	400	515	525	525
Random Reads IOPS up to	76,000	92,000	104,000	70,000
Random Writes IOPS up to	76,000	86,000	92,000	92,000
Endurance and Reliability				
Endurance (TBW)[2] up to	5,330 TB	29,620 TB	10,240 TB	1,530 TB
Reliability MTBF @ 25°C	>2,000,000 hours	>3,000,000 hours		>2,000,000 hours
Others				
Dimensions (mm)	42 x 22 x 3.5			
Certifications	CE, FCC, BSMI, UKCA, RoHS, REACH			
Warranty	5 years		3 years	

1. Product specifications may be subject to change.
2. Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T./ Life Monitor	PLP Diag	Ace Thermal Throttling	AcuCurrent	EcoFlush	Industrial Temperature	Pulse Reboot	Firmware-Based Data-At-Rest Power Loss Protection	Hardware-Based In-Flight-Data Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	SED	Software Secure Erase	Hardware Secure Erase	Hardware Write Protect
Premium	A750Pi / A750Pc	○	○	○	▲	○	○	▲	○	○	○	○	○	○	○	○	○	▲	▲
Superior	A650Si / A650Sc	○	○	○	▲	○	○	▲	○	○	○	○	○	○	○	○	○	▲	▲
Value	A600Vi / A600Vc	○					○		○		○	○	○	○					
Momentum	A400Mw	○							○		○	○	○	○	○	▲	○		

▲: Customization option available on a project basis.

SATA III 2.5" SSD

KEY FEATURES

- Endurance: 1 DWPD (5 years Enterprise workload)
- Data Retention: Up to 10 years at 55°C (pSLC)
- Power Loss Protection: MCU-based* with data-at-rest and in-flight protection
- PLP Diag* (Self-Diagnosing Capacitor Check)
- EcoFlush* (Flush Cache Optimization Technology)
- Security: Self-Encrypting Drive (SED) with AES 256-bit encryption, TCG Opal 2.0*
- End-to-End Data Path Protection

* May vary by product and project support

Product Line	Premium		Superior	Value	Momentum	
	A800Pi	A750Pi / A750Pc	A650Si / A650Sc	A600Vi / A600Vc	A400Mw[1]	A400Mw
Interface	SATA III 6 Gb/s					
Flash Type	SLC	3D TLC (pSLC mode)	3D TLC			
Form Factor	2.5"					
Operating Temperature	-40°C to 85°C	-40°C to 85°C / 0°C to 70°C			-20°C to 75°C	
Power Loss Protection Options	Hardware + Firmware Based			Firmware Based		
Optional SED Features	-	AES 256-bit Encryption, TCG Opal 2.0		-	AES 256-bit Encryption	
Capacity	8 GB to 256 GB	80 GB to 640 GB	240 GB to 1,920 GB	128 GB to 1,024 GB	256 GB to 4 TB	128 GB to 1TB
Performance						
Sequential Read (MB/s) up to	520	560			530	550
Sequential Write (MB/s) up to	420	510	525	525	520	500
Random Reads IOPS up to	76,000	92,000	103,000	70,000	65,000	72,000
Random Writes IOPS up to	74,000	85,000	90,000	92,500	80,000	86,000
Endurance and Reliability						
Endurance (TBW)[2] up to	21,330 TB	59,250 TB	20,480 TB	1,530 TB	750 TB	
Reliability MTBF @ 25°C	>2,000,000 hours	>3,000,000 hours		>2,000,000 hours	>3,000,000 hours	
Reliability Number of Insertions	10,000 minimum					
Others						
Dimensions (mm)	100 x 69.85 x 9.2	100 x 69.85 x 7/9.2			100 x 69.85 x 7	
Certifications	CE, FCC, BSMI, UKCA, RoHS, REACH					
Warranty	5 years		3 years		2 years	

1. Product specifications may be subject to change.
2. Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	PLP Diag	Ace Thermal Throttling	AcuCurrent	EcoFlush	Industrial Temperature	Pulse Reboot	Firmware-Based Data-At-Rest Power Loss Protection	Hardware-Based In-Flight-Data Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	SED	Software Secure Erase	Hardware Secure Erase	Hardware Write Protect
Premium	A750Pi / A750Pc	○	○	○	▲	○	○	▲	○	○	○	○	○	○	○	○	○	▲	▲
Superior	A650Si / A650Sc	○	○	○	▲	○	○	▲	○	○	○	○	○	○	○	○	○	▲	▲
Value	A600Vi / A600Vc	○					○		○		○	○	○	○					
Momentum	A400Mw	○							○		○	○	○	○	○	▲	○		

▲: Customization option available on a project basis.

SATA III mSATA SSD

KEY FEATURES

- Endurance: 1 DWPD (5 years Enterprise workload)
- Data Retention: Up to 10 years at 55°C (pSLC)
- Power Loss Protection: MCU-based* with data-at-rest and in-flight protection
- PLP Diag* (Self-Diagnosing Capacitor Check)
- EcoFlush* (Flush Cache Optimization Technology)
- Security: Self-Encrypting Drive (SED) with AES 256-bit encryption, TCG Opal 2.0*
- End-to-End Data Path Protection

* May vary by product and project support

Product Line	Premium		Superior	Value
	A800Pi	A750Pi / A750Pc	A650Si / A650Sc	A600Vi / A600Vc
Interface	SATA III 6 Gb/s			
Flash Type	SLC	3D TLC (pSLC mode)	3D TLC	
Form Factor	MO-300A			
Operating Temperature	-40°C to 85°C	-40°C to 85°C / 0°C to 70°C		
Power Loss Protection Options	Hardware + Firmware Based			Firmware Based
Optional SED Features	-	AES 256-bit Encryption, TCG Opal 2.0		-
Capacity	8 GB to 128 GB	80 GB to 320 GB	240 GB to 960 GB	128 GB to 1,024 GB
Performance				
Sequential Read (MB/s) up to	530	560		
Sequential Write (MB/s) up to	430	510	525	
Random Reads IOPS up to	77,000	92,000	104,000	70,000
Random Writes IOPS up to	75,000	85,000	90,000	92,000
Endurance and Reliability				
Endurance (TBW)[1] up to	10,666 TB	29,620 TB	10,240 TB	1,530 TB
Reliability MTBF @ 25°C	>2,000,000 hours	>3,000,000 hours		>2,000,000 hours
Others				
Dimensions (mm)	50.8 x 29.85 x 3.5			
Certifications	CE, FCC, UKCA, RoHS, REACH	CE, FCC, BSMI, UKCA, RoHS, REACH		
Warranty	5 years		3 years	

1. Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	PLP Diag	Ace Thermal Throttling	AcuCurrent	EcoFlush	Industrial Temperature	Pulse Reboot	Firmware-Based Data-At-Rest Power Loss Protection	Hardware-Based In-Flight-Data Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	SED	Software Secure Erase	Hardware Secure Erase	Hardware Write Protect
Premium	A750Pi / A750Pc	○	○	○	▲	○	○	▲	○	○	○	○	○	○	○	○	○	▲	▲
Superior	A650Si / A650Sc	○	○	○	▲	○	○	▲	○	○	○	○	○	○	○	○	○	▲	▲
Value	A600Vi / A600Vc	○					○		○		○	○	○	○					

▲: Customization option available on a project basis.

USB 2.0 NANODURA

Product Line	Premium	Superior
	B800Pi	B600Sc
Interface	USB 2.0 (480 Mbps)	
Flash Type	SLC	MLC
Form Factor	USB Type-A	
Operating Temperature	-40°C to 85°C	0°C to 70°C
Power Loss Protection Options	Firmware Based	
Optional SED Features	-	
Capacity	512 MB to 8 GB	4 GB to 8 GB
Performance		
Sequential Read (MB/s) up to	21	25
Sequential Write (MB/s) up to	17	18
Endurance and Reliability		
Endurance (TBW)[1] up to	192 TB	19 TB
Reliability MTBF @ 25°C	>5,000,000 hours	>2,000,000 hours
Reliability Number of Insertions	10,000 minimum	
Others		
Dimensions (mm)	26.55 x 12 x 4.5	34 x 12.2 x 4.5
Certifications	CE, FCC, UKCA, RoHS	
Warranty	5 years	3 years

1. Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	Industrial Temperature	SiP	Firmware-Based Data-At-Rest Power Loss Protection	Advanced Wear Leveling
Premium	B800Pi	○	○	○	○	○
Superior	B600Sc	○		○	○	○

KEY FEATURES

- Global wear leveling
- Bad block management algorithm
- High reliability
- Plug and Play with hot-swappable connection supported

USB 2.0 eUSB

Product Line	Premium		Superior
	B800Pi	B800Pi	B600Sc
Interface	USB 2.0 (480 Mbps)		
Flash Type	SLC		MLC
Form Factor	Pitch 2.54 mm / 2.00 mm		
Operating Temperature	-40°C to 85°C		0°C to 70°C
Power Loss Protection Options	Firmware Based	Hardware + Firmware Based	
Optional SED Features	-		
Capacity	1 GB to 16 GB	1 GB to 32 GB	8 GB to 32 GB
Performance			
Sequential Read (MB/s) up to	37	30	25
Sequential Write (MB/s) up to	23	25	19
Endurance and Reliability			
Endurance (TBW)[1] up to	1,580 TB	640 TB	19 TB[2]
Reliability MTBF @ 25°C	>5,000,000 hours		>2,000,000 hours
Reliability Number of Insertions	10,000 minimum		
Others			
Dimensions (mm)	36.9 x 26.6 x 9.5		
Certifications	CE, FCC, UKCA, RoHS		
Warranty	5 years		3 years

1. Under highest Sequential write value. May vary by density, configuration and applications.
2. Measured with Random Write. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	Industrial Temperature	Firmware-Based Data-At-Rest Power Loss Protection	Advanced Wear Leveling	Hardware Write Protect
Premium	B800Pi	○	○	○	○	▲
Superior	B600Sc	○		○	○	

▲: Customization option available on a project basis.

KEY FEATURES

- Superior Random Write Performance
- Global wear leveling
- Power Loss Protection
- Hardware Write Protect*

* May vary by product and project support

Robust, Removable Data Storage Solutions*

ATP memory cards are meticulously built and tested for diverse applications. They are available in different form factors with custom-configurable endurance, reliability, and security specifications for dependable operation even in extreme environments.

ATP-Developed Firmware, Hardware, and Value-Added Service**

Custom-Configurable SD/microSD Memory Cards

WE BUILD WITH YOU

ATP SD Life Monitor: Intelligent Workload Inspection
Provides visual representation of write operations and file sizes by the host system during pre-qualification.

ATP Joint Validation Service
Compatibility and function tests are conducted using the client's host devices and systems.

Advanced Card Analysis
ATP's uniquely designed substrate and debug tool make system-in-package (SiP) component post-analysis possible.

ATP Robust Data Integrity Technology

Read Disturb Protection

AutoRefresh Technology for Hot Zone Disturbance
Enhances data integrity in read-only areas by monitoring error bit levels and read counts. It prevents uncorrectable data damage and ensures data integrity by copying frequently read data in the affected blocks to healthy blocks before the error threshold limit is reached.

Dynamic Data Refresh Technology for Cold Zone Disturbance
Reduces read disturb and maintains integrity in seldom-accessed "cold" areas, sequentially scanning those with "flag" records. Data is moved to healthy blocks before reaching the error threshold to prevent data loss and ensure long-term data integrity.

SecurStor AES-Protected microSD

Tailored, Secure Storage

SecurStor

Multi-Layer Authentication
Privilege control for up to 10 users offers high levels of protection.

SecurBoot
Ensures the boot partition's integrity and validity by either securing it when permitted by the operating system or safeguarding the stored configuration of the Raspberry Pi system's BIOS.

Hardware AES-256 XTS Encryption (SecurEncrypt)
Secures the User Data area through robust hardware AES-256 XTS encryption, providing the highest level of encryption without compromising performance.

Secure Erase
Deletes the encryption key to prevent unauthorized retrieval or recovery of the user data.

* Technology availability may vary based on model and configuration.
** Value-added services may vary depending on project and customer request.

SD/SDHC/SDXC Card

KEY FEATURES

- High endurance
- Compliant with Video Speed Class V30*
- Robust data integrity* (AutoRefresh and Dynamic Data Refresh)
- Power Loss Protection for data at rest
- I-Temp operable* (-40°C to 85°C)
- Continuous supply of SLC NAND to support existing (legacy) platforms
- Water/Dustproof and ESD-resistant System-in-Package design
- SD Life Monitor*

* May vary by product and project support

Product Line	Premium		Superior
	S800Pi	S750Pi / S750Pc	S650Si / S650Sc
Interface	512 MB to 2 GB, HS mode 4 GB to 8 GB, UHS-I	UHS-I	
Flash Type	SLC	3D TLC (pSLC mode)	3D TLC
Form Factor	SD Card		
Operating Temperature	-40°C to 85°C	-40°C to 85°C / -25°C to 85°C	
Power Loss Protection Options	Firmware Based		
Optional SED Features	-		
Capacity	512 MB to 8 GB	16 GB to 256 GB	32 GB to 512 GB
	Performance		
Sequential Read (MB/s) up to	81	95	95
Sequential Write (MB/s) up to	39	80	70
	Endurance and Reliability		
Endurance (TBW)[1] up to	192 TB	25,000 TB	5,500 TB
Reliability MTBF @ 25°C	>5,000,000 hours	>3,000,000 hours	>2,000,000 hours
Reliability Number of Insertions	20,000 (SDA spec minimum 10,000)		
	Others		
Dimensions (mm)	32.0 x 24.0 x 2.1		
Certifications	CE, FCC, UKCA, RoHS		
Warranty	5 years		3 years

1. Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	Industrial Temperature	SiP	Firmware-Based Data-At-Rest Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	Content Preload	Joint Validation and Test
Premium	S750Pi / S750Pc	▲	○	○	○	○	○	○	○	▲	▲
Superior	S650Si / S650Sc	▲	○	○	○	○	○	○	○	▲	▲

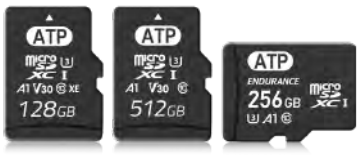
▲: Customization option available on a project basis.

microSD/microSDHC/microSDXC Card

KEY FEATURES

- High endurance
- Compliant with Video Speed Class V30*
- Robust data integrity* (AutoRefresh and Dynamic Data Refresh)
- Power Loss Protection for data at rest
- I-Temp operable* (-40°C to 85°C)
- Continuous supply of SLC NAND to support existing (legacy) platforms
- Water/Dustproof and ESD-resistant System-in-Package design
- SD Life Monitor*

* May vary by product and project support



Product Line	Premium		Superior
	S800Pi	S750Pi / S750Pc	S650Si / S650Sc
Interface	512 MB to 2 GB, HS mode 4 GB to 8 GB, UHS-I	UHS-I	
Flash Type	SLC	3D TLC (pSLC mode)	3D TLC
Form Factor	microSD Card		
Operating Temperature	-40°C to 85°C	-40°C to 85°C / -25°C to 85°C	
Power Loss Protection Options	Firmware Based		
Optional SED Features	-		
Capacity	512 MB to 8 GB	16 GB to 128 GB	32 GB to 512 GB
	Performance		
Sequential Read (MB/s) up to	81	95	95
Sequential Write (MB/s) up to	39	80	70
	Endurance and Reliability		
Endurance (TBW)[1] up to	192 TB	12,670 TB	5,500 TB
Reliability MTBF @ 25°C	>5,000,000 hours	>3,000,000 hours	>2,000,000 hours
Reliability Number of Insertions	20,000 (SDA spec minimum 10,000)		
	Others		
Dimensions (mm)	15.0 x 11.0 x 1.0		
Certifications	CE, FCC, UKCA, RoHS		
Warranty	5 years		3 years

1. Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	Industrial Temperature	SiP	Firmware-Based Data-At-Rest Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	Content Preload	Joint Validation and Test
Premium	S750Pi / S750Pc	▲	○	○	○	○	○	○	○	▲	▲
Superior	S650Si / S650Sc	▲	○	○	○	○	○	○	○	▲	▲

▲: Customization option available on a project basis.

PCIe® Gen4 NVMe CFexpress Card

KEY FEATURES

- High endurance
- High Read/Write performance
- Self-Encrypting Drive (SED) with AES 256-bit Encryption, TCG Opal 2.0*
- DRAM-less configuration supporting Host Memory Buffer (HMB)*
- Hardware Write Protect*
- Anti-sulfur resistor support*

* May vary by product and project support

Product Line	Premium	Superior
	N751Pi	N651Si
Interface	PCIe G4 x2	
Flash Type	3D TLC (pSLC mode)	3D TLC
Form Factor	CFexpress Type B	
Operating Temperature	-40°C to 85°C	
Power Loss Protection Options	Firmware Based	
Optional SED Features	AES 256-bit Encryption, TCG Opal 2.0	
Capacity	40 GB to 320 GB	128 GB to 1,024 GB
Performance		
Sequential Read (MB/s) up to	3,500	
Sequential Write (MB/s) up to	3,100	3,200
Random Reads IOPS up to	770,000	632,000
Random Writes IOPS up to	735,000	768,000
Endurance and Reliability		
Endurance (TBW)[1] up to	19,010 TB	10,830 TB
Reliability MTBF @ 25°C	>3,000,000 hours	
Reliability Number of Insertions	10,000 minimum	
Others		
Dimensions (mm)	29.6 x 38.5 x 3.8	
Certifications	CE, FCC, RoHS, UKCA	
Warranty	5 years	3 years

1. Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	Industrial Temperature	Firmware-Based Data-At-Rest Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	SED	Software Secure Erase	Hardware Write Protect
Premium	N751Pi	O	O	O	O	O	O	O	O	O	O	▲
Superior	N651Si	O	O	O	O	O	O	O	O	O	O	▲

▲: Customization option available on a project basis.

CFast Card

Product Line	Premium
	A800Pi
Interface	SATA III 6 Gb/s
Flash Type	SLC
Form Factor	CFast Type I
Operating Temperature	-40°C to 85°C
Power Loss Protection Options	Hardware + Firmware Based
Optional SED Features	-
Capacity	8 GB to 32 GB
Performance	
Sequential Read (MB/s) up to	500
Sequential Write (MB/s) up to	310
Random Reads IOPS up to	128 GB to 1,024 GB
Random Writes IOPS up to	-
Endurance and Reliability	
Endurance (TBW)[1] up to	2,665 TB
Reliability MTBF @ 25°C	>2,000,000 hours
Reliability Number of Insertions	10,000 minimum
Others	
Dimensions (mm)	36.4 x 42.8 x 3.6
Certifications	CE, FCC, UKCA, RoHS
Warranty	5 years

1. Under highest Sequential write value. May vary by density, configuration and applications.

KEY FEATURES

- Advanced wear leveling algorithm
- Bad block management
- AutoRefresh technology
- Power Loss Protection
- S.M.A.R.T support

Technologies		S.M.A.R.T/ Life Monitor	Industrial Temperature	Firmware-Based Data-At-Rest Power Loss Protection	Hardware-Based In-Flight-Data Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh
Premium	A800Pi	O	O	O	O	O	O	O

CompactFlash Card

Product Line	Premium		Superior
	I800Pi	I700Pc	I600Sc
Interface	UDMA 0~4	UDMA 0~7	
Flash Type	SLC	Pseudo SLC	MLC
Form Factor	CF Type I		
Operating Temperature	-40°C to 85°C	0°C to 70°C	
Power Loss Protection Options	Firmware Based		
Optional SED Features	-		
Capacity	512 MB to 32 GB	8 GB to 16 GB	16 GB to 32 GB
Performance			
Sequential Read (MB/s) up to	61	110	108
Sequential Write (MB/s) up to	55	80	46
Endurance and Reliability			
Endurance (TBW)[1] up to	1,280 TB	255 TB	38 TB
Reliability MTBF @ 25°C	>5,000,000 hours	>2,000,000 hours	
Reliability Number of Insertions	10,000 minimum		
Others			
Dimensions (mm)	36.4 x 42.8 x 3.3		
Certifications	CE, FCC, RoHS, UKCA		
Warranty	5 years		3 years

1. Under highest Sequential write value. May vary by density, configuration and applications.

KEY FEATURES

- Global wear leveling and bad block management
- AutoRefresh technology
- Power Loss Protection
- Power saving mode
- S.M.A.R.T support

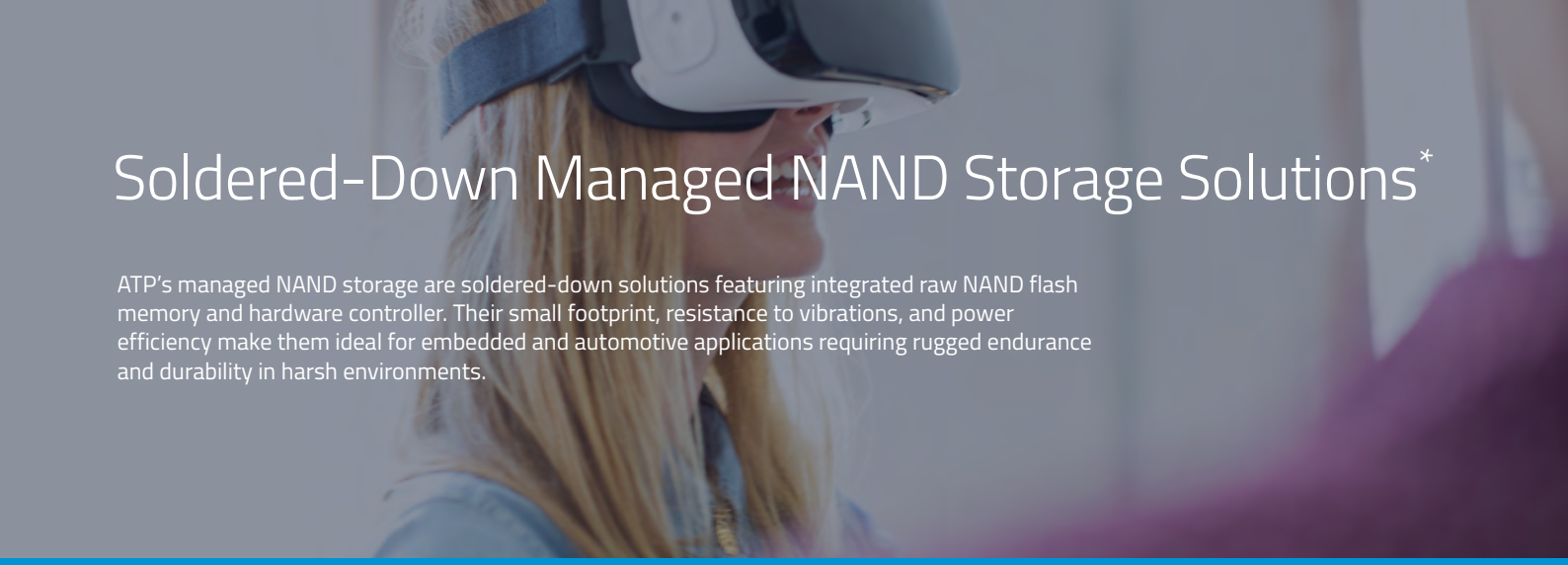
Technologies		S.M.A.R.T/ Life Monitor	Industrial Temperature	Firmware-Based Data-At-Rest Power Loss Protection	Hardware-Based In-Flight-Data Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh
Premium	I800Pi	O	O	O	O	O	O	O
Premium	I700Pc	O		O		O	O	O
Superior	I600Sc	O		O		O	O	O

SecurStor microSD Card

SECURITY FEATURES

- Multi-Layer Authentication: Manages access privileges for up to 10 users, adding an extra layer of security control.
- SecurBoot: Safeguards the boot partition and verifies BIOS configuration integrity for reliable system startup.
- Hardware AES-256 XTS Encryption (SecurEncrypt): Delivers powerful, hardware-based data protection without compromising speed.
- Secure Erase: Instantly removes encryption keys to ensure complete and irreversible data deletion.
- Compliance Ready: Supports US Air Force AFSSI 5020 or equivalent security standards upon request.
- Platform/OS Support: Compatible with x86 Windows 11, Linux (x86 and ARM), and Android systems.

Product Line	Premium	Superior	
	S700Pcs	S600Scs	S600Scs
Interface	UHS-I	HS mode	
Flash Type	3D TLC (pSLC mode)	MLC	
Capacity	80 GB	4 GB to 16 GB	8 GB to 16 GB
Security	AES 256-bit Encryption		
SecurStor Feature	SecurStor V1.0 with Full Read / Write Access Control		SecurStor V2.0 with Plug & Write, Read Access Control
Performance			
Sequential Read (MB/s) up to	35	10	
Sequential Write (MB/s) up to	35	5	
Endurance and Reliability			
Operating Temperature	-25°C to 85°C		
Reliability MTBF @ 25°C	>2,000,000 hours		
Reliability Number of Insertions	10,000		
Others			
Dimensions (mm)	15.0 x 11.0 x 1.0		



Soldered-Down Managed NAND Storage Solutions*

ATP's managed NAND storage are soldered-down solutions featuring integrated raw NAND flash memory and hardware controller. Their small footprint, resistance to vibrations, and power efficiency make them ideal for embedded and automotive applications requiring rugged endurance and durability in harsh environments.

e.MMC Storage Solutions

Energy-Efficient, Reliable, and Compact Storage

11.5 x 13 mm e.MMC

6.7 x 7.2 mm e.MMC

7.2 x 7.2 mm e.MMC

9 x 10 mm e.MMC

Full Range of Temperature Grades Available

- Commercial (C-Temp: -25°C to 85°C)
- Industrial (I-Temp: -40°C to 85°C)
- AEC-Q100 Automotive Grade 3 (AG3: -40°C to 85°C)
- AEC-Q100 Automotive Grade 2 (AG2: -40°C to 105°C)

Smaller Packages Available

- A 6.7 x 7.2 mm package offers 67% space savings compared to the standard 11.5 x 13 mm size.
- A 7.2 x 7.2 mm package offers 65% space savings compared to the standard 11.5 x 13 mm size.
- A 9 x 10 mm package offers 40% space savings compared to the standard 11.5 x 13 mm size.

Up to 70% Power Savings

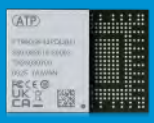
e.MMC tuning cuts power consumption by up to 70% , extending battery life during key user activities.

Enhanced Data Integrity Features

Advanced error correction and wear leveling algorithms ensure data integrity and longevity. AutoRefresh averts read disturbance and data corruption in often-read areas (hot zone), while Dynamic Data Refresh sustains data integrity in seldom-accessed areas (cold zone).

PCIe® Gen4 NVMe M.2 1620 HSBGA SSD

Powerful Performance in a Tiny Package



Up to 40% Lower Power Consumption

By using PCIe Gen4 x2 lanes instead of x4, ATP N701/601 SSDs deliver similar performance at configured capacities while cutting power by up to 20% in typical use and up to 40% at idle, making them ideal for battery-powered, energy-sensitive devices.

Steadier Performance with Ace Thermal Throttling

AceTT technology applies up to 18 stages to minimize the drastic performance and heat swings commonly seen in two- or three-stage throttling configurations of NVMe drives.

Security Powerhouse

AES-256 Encryption, HW Write Protect, HW Secure Erase, Secure Boot and TCG Opal 2.0 (Optional).

* Technology availability may vary based on model and configuration.
** Value-added service

e.MMC Automotive

Product Line	Automotive Grade 2		Automotive Grade 3	
	Premium	Superior	Premium	Superior
	E700Paa[1]	E600Saa[1]	E700Pia[1]	E600Sia[1]
Flash Type	3D MLC (pSLC mode)	3D TLC	3D TLC (pSLC mode)	3D TLC
IC Package	153-ball FBGA			
JEDEC Specification	v5.1, HS400			
Power Loss Protection Options	Firmware Based			
Operating Temperature	-40°C to 105°C		-40°C to 85°C	
Capacity	20 GB to 80 GB	64 GB to 256 GB	20 GB to 80 GB	64 GB to 256 GB
Performance				
Sequential Read/ Write up to (MB/s) (Max.)	310 / 240			
Bus Speed Modes	x1 / x4 / x8			
ICC (Typical RMS in Read/Write) mA (Max.)	90 / 145			
ICCQ (Typical RMS in Read/Write) mA (Max.)	105 / 150	100 / 150	105 / 150	100 / 150
Endurance and Reliability				
Endurance TBW (Max.) [2]	2,000 TB	280 TB	2,000 TB	280 TB
Reliability MTBF @ 25°C	>3,000,000 hours			
Others				
Dimensions (mm)	11.5 x 13.0 x 1.2			
Certifications	AEC-Q100, RoHS, REACH			
Warranty	One Year			

1 Product specifications may be subject to change.
2 All performance is collected or measured using ATP proprietary test environment, without file system overhead.

KEY FEATURES

- AEC-Q100 Grade 2 (-40°C to 105°C), and Grade 3 (-40°C to 85°C) compliant*
- Robust Data Integrity* (AutoRefresh and Dynamic Data Refresh)
- Extra-high endurance: 2-3X higher than standard e.MMC*
- Complies with JEDEC e.MMC v5.1 Standard (JESD84-B51)
- 153-ball FBGA (RoHS compliant, "green package")
- LDPC ECC engine

* May vary by product and project support

Smaller Footprint e.MMC

Product Line	Smaller Footprint e.MMC					
	Premium	Value	Premium	Value		
	E700Pc	E600Vc	E700Pc	E600Vc	E600Vi	E600Vc
Flash Type	3D TLC (pSLC mode)	3D TLC	3D TLC (pSLC mode)	3D TLC		
IC Package	125-ball FBGA		153-ball FBGA			
JEDEC Specification	v5.1, HS400					
Power Loss Protection Options	Firmware Based					
Operating Temperature	-25°C to 85°C				-40°C to 85°C	-25°C to 85°C
Capacity	20 GB	64 GB	20 GB to 40 GB	64 GB to 128 GB	32 GB to 64 GB	
Performance						
Sequential Read/ Write up to (MB/s) (Max.)	240 / 210		240 / 220		290 / 225	
Bus Speed Modes	x1 / x4 / x8					
ICC (Typical RMS in Read/Write) mA (Max.)	30 / 40		35 / 45		100 / 110	
ICCQ (Typical RMS in Read/Write) mA (Max.)	60 / 50		60 / 55		105 / 100	
Endurance and Reliability						
Endurance TBW (Max.) [1]	680 TB	12 TB	1,360 TB	24 TB	55 TB	
Reliability MTBF @ 25°C	>3,000,000 hours				>2,000,000 hours	
Others						
Dimensions (mm)	6.7 x 7.2 x 0.65		7.2 x 7.2 x 0.8		9.0 x 10.0 x 0.8	
Certifications	RoHS, REACH					
Warranty	One Year					

1 All performance is collected or measured using ATP proprietary test environment, without file system overhead.

KEY FEATURES

- Smaller footprint package size*
- Auto Power-Saving Mode and Power Optimization technologies*
- Robust Data Integrity* (AutoRefresh and Dynamic Data Refresh)
- Complies with JEDEC e.MMC v5.1 Standard (JESD84-B51)
- 153-ball / 125-ball FBGA (RoHS compliant, "green package")
- LDPC ECC engine

* May vary by product and project support

Technologies		S.M.A.R.T/ Life Monitor	Industrial Temperature	SiP	Vibration-Proof BGA Package	Firmware-Based Data-At-Rest Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	Content Preload	Joint Validation and Test
Premium	E700Paa / E700Pia	○	○	○	○	○	○	○	○		○	▲	▲
Superior	E600Saa / E600Sia	○	○	○	○	○	○	○	○		○	▲	▲
Premium	E700Pc	○		○	○	○	○	○	○	○		▲	▲
Value	E600Vi	○	○	○	○	○	○	○	○	○	○	▲	▲
	E600Vc	○		○	○	○	○	○	○	○	○	▲	▲

▲: Customization option available on a project basis.

e.MMC Standard

KEY FEATURES

- Robust Data Integrity* (AutoRefresh and Dynamic Data Refresh)
- Extra-high endurance: 2-3X higher than standard e.MMC*
- Complies with JEDEC e.MMC v5.1 Standard (JESD84-B51)
- 153-ball FBGA (RoHS compliant, "green package")
- LDPC ECC engine*

* May vary by product and project support

Product Line	Industrial Grade				Commercial Grade			
	Premium		Superior		Premium		Superior	
	E700Pi[1]	E700Pi	E600Si[1]	E600Si	E700Pc[1]	E700Pc	E600Sc[1]	E600Sc
Flash Type	3D TLC (pSLC mode)		3D TLC		3D TLC (pSLC mode)		3D TLC	
IC Package	153-ball FBGA							
JEDEC Specification	v5.1, HS400							
Power Loss Protection Options	Firmware Based							
Operating Temperature	-40°C to 85°C				-25°C to 85°C			
Capacity	20 GB to 80 GB	10 GB to 40 GB	64 GB to 256 GB	32 GB to 128 GB	20 GB to 80 GB	10 GB to 40 GB	64 GB to 256 GB	32 GB to 128 GB
Performance								
Sequential Read/ Write up to (MB/s) (Max.)	310 / 240	290 / 225	310 / 240	290 / 225	310 / 240	290 / 225	310 / 240	290 / 225
Bus Speed Modes	x1 / x4 / x8							
ICC (Typical RMS in Read/Write) mA (Max.)	90 / 145	100 / 110	90 / 145	100 / 110	90 / 145	100 / 110	90 / 145	100 / 110
ICCQ (Typical RMS in Read/Write) mA (Max.)	105 / 150	105 / 100	100 / 150	105 / 100	105 / 150	105 / 100	100 / 150	105 / 100
Endurance and Reliability								
Endurance TBW (Max.)[2]	2,000 TB	1,360 TB	280 TB	110 TB	2,000 TB	1,360 TB	280 TB	110 TB
Reliability MTBF @ 25°C	>3,000,000 hours	>2,000,000 hours	>3,000,000 hours	>2,000,000 hours	>3,000,000 hours	>2,000,000 hours	>3,000,000 hours	>2,000,000 hours
Others								
Dimensions (mm)	11.5 x 13.0 x 1.2							
Certifications	RoHS, REACH							
Warranty	One Year							

1 Product specifications may be subject to change.
2 All performance is collected or measured using ATP proprietary test environment, without file system overhead.

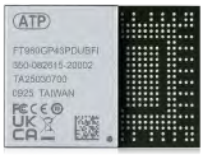
Technologies		S.M.A.R.T/ Life Monitor	Industrial Temperature	SiP	Vibration-Proof BGA Package	Firmware-Based Data-At-Rest Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	Content Preload	Joint Validation and Test
Premium	E700Pi / E700Pc	○	○	○	○	○	○	○	○	▲	▲	▲	▲
Superior	E600Si / E600Sc	○	○	○	○	○	○	○	○	▲	▲	▲	▲

▲: Customization option available on a project basis.

PCIe® NVMe M.2 Type 1620 HSBGA SSD

KEY FEATURES

- Steadier performance with Ace Thermal Throttling / Heatsink (HSBGA)
- Optimized Power Consumption
- AES-256 Hardware Encryption
- Hardware Write Protect / Secure Erase
- Secure Boot
- TCG-Opal*



* May vary by product and project support

Product Line	Premium	Superior	Premium	Value
	N701Pi / N701Pc	N601Si / N601Sc	N700Pi / N700Pc	N600Vi / N600Vc
Interface	PCIe G4 x 2[1]		PCIe G3 x4	
Flash Type	3D TLC (pSLC mode)	3D TLC	3D TLC (pSLC mode)	3D TLC
Form Factor	M.2 1620, HSBGA, 291-Ball			
Operating Temperature	-40°C to 85°C / 0°C to 70°C			
Power Loss Protection Options	Firmware Based			
Optional SED Features	AES 256-bit Encryption, TCG Opal 2.0			-
Capacity	80 GB to 320 GB	240 GB to 960 GB	40 GB to 160 GB	120 GB to 480 GB
Performance				
Sequential Read (MB/s) up to	3,565	3,560	2,000	2,050
Sequential Write (MB/s) up to	3,280		1,600	1,550
Random Reads IOPS up to	630,000		135,600	138,000
Random Writes IOPS up to	755,000		112,000	112,600
Endurance and Reliability				
Endurance (TBW)[2] up to	29,235 TB	2,810 TB	4,280 TB	765 TB
Reliability MTBF @ 25°C	>3,000,000 hours		>2,000,000 hours	
Others				
Dimensions (mm)	16.0 x 20.0 x 1.6			
Certifications	RoHS, REACH			
Warranty	1 year			

1 The N701/N601 is configured with x2 lanes by default, but x4 lanes may be available by project or customer request.
2 Under highest Sequential write value. May vary by density, configuration and applications.

Technologies		S.M.A.R.T/ Life Monitor	Ace Thermal Throttling	Industrial Temperature	SiP	Vibration-Proof BGA Package	Firmware-Based Data-At-Rest Power Loss Protection	Advanced Wear Leveling	AutoRefresh	Dynamic Data Refresh	Auto-Read Calibration	ETEDP	SED	Software Secure Erase	Hardware Secure Erase	Hardware Write Protect
Premium	N701Pi / N701Pc	O	O	O	O	O	O	O	O	O		O	▲	O	O	O
Superior	N601Si / N601Sc	O	O	O	O	O	O	O	O	O		O	▲	O	O	O
Premium	N700Pi / N700Pc	O		O	O	O	O	O	O	O	O	O	O	O		
Value	N600Vi / N600Vc	O		O	O	O	O	O	O	O	O	O		O		

▲: Customization option available on a project basis.

Solutions & Technologies

As a technology-driven company, ATP is committed to developing innovative solutions and harnessing the most advanced technologies to ensure that our products deliver the highest levels of data integrity, reliability and retention for mission-critical applications.

Reliability (Drive-Level)

Ensuring Consistent, Dependable Performance in Extreme Environments

PLP Diag

Building upon ATP's Hardware-based power loss protection in high-quality Polymer Tantalum capacitors, a microcontroller unit, and a power IC to safeguard data during power loss events, the ATP PLP Diag feature proactively checks the functionality and health status of the polymer tantalum capacitors, averting PLP failure resulting from defective capacitors. The innovative PLP Diag feature actively monitors capacitor health, If capacitors fail, the SSD reacts by switching to Direct TLC mode, bypassing DRAM caching for writes. Users can also verify PLP status through SMART commands, ensuring continuous data protection and system reliability.

Ace Thermal Throttling

Ace Thermal Throttling (AceTT) Technology is an intelligent thermal throttling algorithm that ensures steadier performance behavior by managing heat in increments of up to 18-stages instead of the typical two- or three-stage throttling configuration. This gradual, multi-stage approach minimizes the rapid swings between high and low performance, sudden temperature spikes followed by drastic large drops, and inconsistent performance that degrades user experience during thermal throttling.

EcoFlush

ATP's EcoFlush feature enhances SSD performance and longevity by optimizing flush cache commands. While certain host systems are designed to often issue frequent flush commands to prevent data loss during power failures, this can lead to excessive writes and increased wear on NAND flash memory. EcoFlush, integrated into ATP's hardware-based power loss protection SSDs, can be activated during initialization from the SSD production process upon request. It intelligently manages flush cache commands by executing them at the SSD's optimal intervals rather than responding to every host request. This approach results in better SSD endurance with 10 times lower Write Amplification Index (WAI) and 10 times better 4K random write performance at certain conditions.

Pulse Reboot

As checking one's pulse rate is essential in determining heart health, ATP solid state drives (SSDs) with Pulse Reboot perform periodic self-checks to monitor their health. When an SSD detects that its "pulse" has stopped, meaning, it has become unresponsive, it auto-reboots to recover from the freeze. This self-healing technology fixes minor issues without requiring remote support or human intervention, thus preventing losses and minimizing costs arising from remote maintenance and service interruptions. If, after several attempts, the SSD remains frozen, this signifies that it requires physical repair or replacement. The function is Enabled by default but may be Disabled depending on the customer's preference.

AcuCurrent

AcuCurrent combines ATP Electronics' proprietary firmware and microcontroller technology to dynamically fine-tune the SSD in real time. This ensures optimal signal integrity across all current routes amidst diverse environments, operational usages and conditions, and NAND flash intricacies — ultimately delivering enhanced performance, fortified lifespan and reliability, and operational consistency. AcuCurrent minimizes unnecessary read retries, resulting in low latency, minimized errors, and greater data precision. Additionally, temperature-responsive current adjustments strengthen resilience to extreme temperature deviations within operating ranges of up to 125°C.

SiP (System in Package)

Manufacturing process that encapsulates all exposed components to provide protection and shielding.

Industrial Temperature

Operational stability in extreme temperatures from -40°C to 85°C.

Life Monitor/S.M.A.R.T.*

Provides a user-friendly interface for monitoring the health status and life expectancy of a flash product.

* Compatibility and support may vary by platform or operating system.

Vibration-Proof BGA Package

Soldered-down solutions can withstand vigorous shaking and are resistant against vibrations for reliable performance even during grueling operations.

Data Integrity (NAND-Level)

Maintaining Data Accuracy & Quality Over Extended Use

Firmware-Based Data-At-Rest Power Loss Protection

The firmware-based power failure protection effectively protects data written to the device prior to power loss. After the host receives a signal from the device that the WRITE operation has been successfully completed, newly written as well as previously written data are protected even if a sudden power loss occurs.

Hardware-Based In-Flight-Data Power Loss Protection

This hardware-based power failure protection prevents data loss during a power loss event by ensuring that the last read/write/erase command is completed and data is stored safely in non-volatile flash memory. Select NVMe modules and SATA SSDs feature a new microcontroller unit (MCU)-based design that allows the PLP array to perform intelligently in various temperatures, power glitches and charge states to protect both device and data.

Advanced Wear Leveling

Manages the reads and writes across blocks evenly to optimize the overall life expectancy of a flash product.

AutoRefresh

Monitors the error bit level in every operation. Before the error bit in a block reaches or exceeds the preset threshold value, AutoRefresh moves the data to a healthy block, thus preventing the controller from reading blocks with too many error bits and averting read disturbance and data corruption.

Dynamic Data Refresh

Runs automatically in the background to reduce the risk of read disturbance and sustain data integrity in seldom-accessed areas by sequentially scanning the user area flag record without affecting the read/write operation. The data that has been completely moved to another block will be read and compared with the source data to ensure data integrity.

Auto-Read Calibration

As program/erase (P/E) cycles increase, memory cells age and cause voltage shifts that lead to high bit error rates (BER) when predefined read thresholds are fixed.
The Auto-Read Calibration (ARC) function reduces BER and enhances reliability by adjusting/calibrating the read thresholds. ARC is supported by the TLC LDPC controller.

End-to-End Data Path Protection

Ensures error checking and correction as data moves from the host to the storage device controller and vice versa.
By covering the entire data path, end-to-end protection guarantees integrity at any point during data transfer.

Data Security

Keeping Data Protected Against Threats

SED (AES 256-bit Encryption, TCG Opal 2.0)

TCG Opal Security Subsystem Class (SSC) 2.0 is a set of specifications for self-encrypting drives that present a hierarchy of security management standards to secure data from theft and tampering. Security features include hardware-based data encryption, pre-boot authentication (PBA) and AES-128/256 data encryption to protect the confidentiality of data at rest.

Software Secure Erase

Software Secure Erase wipes out all user data, overwrites all locations, and prevents the retrieval or recovery of erased data. This feature is activated using an ATA/NVM command to trigger a Fast Erase or Fast Erase + Purge (overwrite) for all flash physical blocks containing user data, such as user data, spare, wear leveling, and bad blocks, as well as all flash blocks containing metadata. Overwriting makes data unrecoverable by replacing all data (user data as well as areas that are not accessible to the user) with patterns or non-sensitive data.

Hardware Secure Erase

Hardware Secure Erase wipes out all user data, overwrites all locations, and prevents the retrieval or recovery of erased data. This feature is activated using the general-purpose input/output (GPIO) connector to trigger a Fast Erase or Fast Erase + Purge (overwrite) for all flash physical blocks containing user data, such as user data, spare, wear leveling, and bad blocks, as well as all flash blocks containing metadata. Overwriting makes data unrecoverable by replacing all data (user data as well as areas that are not accessible to the user) with patterns or non-sensitive data.

Hardware Write Protect

Hardware Write Protect safeguards stored data by preventing modifications and deletions. This feature is enabled by putting a jumper on specific pins on the printed circuit board (PCB). Depending on the NAND flash product, the SSD will either deny write commands from the host or render the SSD in “Read Only” mode to thwart write access and data tampering.

Customization & Services

Unique Solutions for Unique Requirements

Thermal Management Solution

ATP recognizes the unique thermal challenges for different use cases and scenarios, and thus offers holistic and customizable solutions that combine firmware and hardware technologies to meet customers' specific thermal requirements.

Anti-Sulfur Resistors

ATP NAND flash storage products offer an anti-sulfur resistor option to prevent the corrosive effects of sulfur contamination, guaranteeing continued dependable performance for a long time..

Conformal Coating

Protects electronic circuits with a coating of the chemical compound Parylene to resist dust, chemical contaminants, extreme temperature, moisture and corrosion.

SPD Write Protect

Ensures optimal performance and compatibility by protecting the memory module's Serial Presence Detect (SPD) from being altered. SPD contains configuration information such as speed, size, timing, and voltage parameters. SPD Write Protect maintains the integrity and reliability of the module and guarantees that it operates according to ATP's tested and validated specifications.

Joint Validation and Test

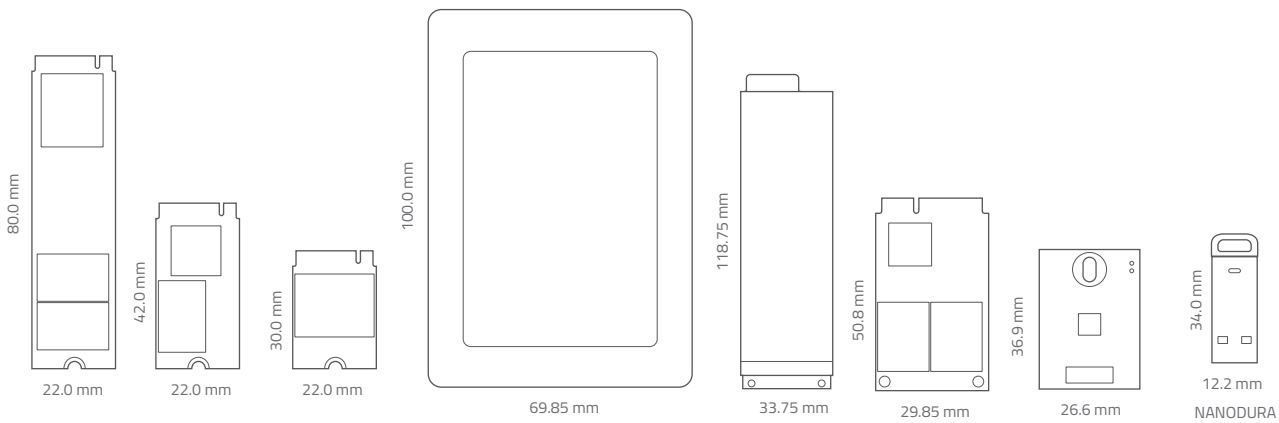
ATP conducts compatibility/function tests with client-supplied host devices and systems, to proactively detect and minimize failures that may not be caught in production tests, thus improving overall quality.

Content Preload

This is a value-added service of preloading digital resources such as map data for navigation, special file systems, operating systems, application programs, and more to selected storage devices.

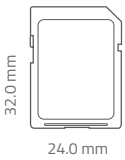
Complete Flash Portfolio

Form Factor	Interface	Product Line	Capacity	NAND	Sequential Performance MB/s (up to)		Reliability TBW (max) [1]	Operating Temperature (°C)
					Read	Write		
M.2 2280 SSD	PCIe G4 x4	N751Pi	80 GB to 1.28 TB	3D TLC (pSLC mode)	6,450	6,100	120,000	-40 to 85
		N651Si / N651Sc	240 GB to 7.68 TB[2]	3D TLC	6,450	6,050	76,000	-40 to 85 / 0 to 70
		N601Sw / N601Sc[3]	480 GB to 3.84 TB	3D TLC	6,550	6,050	11,480	-20 to 75 / 0 to 70
		N601Vi / N601Vc	240 GB to 1.92 TB	3D TLC	5,000	4,300	4,170	-40 to 85 / 0 to 70
		N601Mi / N601Mw	256 GB to 4 TB	3D TLC	7,200	6,500	6,000	-40 to 85 / -20 to 75
		N401Mw[3]	256 GB to 4 TB	3D TLC	7,200	6,500	3,200	-20 to 75
	PCIe G3 x4	N650Vi / N650Vc	120 GB to 960 GB	3D TLC	2,600	1,880	4,800	-40 to 85 / 0 to 70
		N400Mw	128 GB to 1TB	3D TLC	2,600	1,800	695	-20 to 75
	SATA 6 Gb/s	A750Pi / A750Pc	80 GB to 320 GB	3D TLC (pSLC mode)	560	510	29,620	-40 to 85 / 0 to 70
		A650Si / A650Sc	240 GB to 960 GB	3D TLC	560	520	10,240	-40 to 85 / 0 to 70
		A600Vi / A600Vc	128 GB to 1,024 GB	3D TLC	560	525	1,530	-40 to 85 / 0 to 70
		A400Mw[3]	256 GB to 4 TB	3D TLC	550	520	750	-20 to 75
		A400Mw	128 GB to 1 TB	3D TLC	550	500	750	-20 to 75
M.2 2242 SSD	PCIe G4 x4	N601Sw / N601Sc[3]	480 GB to 1.92 TB	3D TLC	6,525	6,170	5,075	-20 to 75 / 0 to 70
	PCIe G3 x4	N650Vi / N650Vc	120 GB to 960 GB	3D TLC	2,600	1,880	4,800	-40 to 85 / 0 to 70
	SATA 6 Gb/s	A800Pi	8 GB to 64 GB	SLC	535	400	5,330	-40 to 85
		A750Pi / A750Pc	80 GB to 320 GB	3D TLC (pSLC mode)	560	515	29,620	-40 to 85 / 0 to 70
		A650Si / A650Sc	240 GB to 960 GB	3D TLC	560	525	10,240	-40 to 85 / 0 to 70
		A600Vi / A600Vc	128 GB to 1,024 GB	3D TLC	560	525	1,530	-40 to 85 / 0 to 70
M.2 2230 SSD	PCIe G4 x2	N701Pi / N701Pc	80 GB to 320 GB	3D TLC (pSLC mode)	3,565	3,280	29,235	-40 to 85 / 0 to 70
		N601Si / N601Sc	240 GB to 960 GB	3D TLC	3,565	3,280	2,810	-40 to 85 / 0 to 70
	PCIe G3 x4	N700Pi / N700Pc	40 GB to 160 GB	3D TLC (pSLC mode)	2,000	1,600	4,280	-40 to 85 / 0 to 70
		N600Vi / N600Vc	120 GB to 480 GB	3D TLC	2,050	1,550	765	-40 to 85 / 0 to 70
U.2 SSD	PCIe G4 x4	N751Pi	320 GB to 2.56 TB	3D TLC (pSLC mode)	6,100	6,000	486,000	-40 to 85
		N651Si / N651Sc	960 GB to 7.68 TB	3D TLC	6,000	6,000	76,000	-40 to 85 / 0 to 70
2.5" SSD	SATA 6 Gb/s	A800Pi	8 GB to 256 GB	SLC	520	420	21,330	-40 to 85
		A750Pi / A750Pc	80 GB to 640 GB	3D TLC (pSLC mode)	560	510	59,250	-40 to 85 / 0 to 70
		A650Si / A650Sc	240 GB to 1.92 TB	3D TLC	560	525	20,480	-40 to 85 / 0 to 70
		A600Vi / A600Vc	128 GB to 1,024 GB	3D TLC	560	525	1,530	-40 to 85 / 0 to 70
		A400Mw[3]	256 GB to 4 TB	3D TLC	550	520	750	-20 to 75
		A400Mw	128 GB to 1 TB	3D TLC	550	500	750	-20 to 75
E1.S SSD	PCIe G4 x4	N651Si	960 GB to 7.68 TB	3D TLC	6,400	6,100	79,000	-40 to 85
mSATA SSD	SATA 6 Gb/s	A800Pi	8 GB to 128 GB	SLC	530	430	10,665	-40 to 85
		A750Pi / A750Pc	80 GB to 320 GB	3D TLC (pSLC mode)	560	510	29,620	-40 to 85 / 0 to 70
		A650Si / A650Sc	240 GB to 960 GB	3D TLC	560	525	10,240	-40 to 85 / 0 to 70
		A600Vi / A600Vc	128 GB to 1,024 GB	3D TLC	560	525	1,530	-40 to 85 / 0 to 70
USB 2.0 NANODURA	USB 2.0 (480 Mbps)	B800Pi	512 MB to 8 GB	SLC	21	17	190	-40 to 85
		B600Sc	4 GB to 8 GB	MLC	25	18	19	0 to 70
USB 2.0 eUSB	USB 2.0 (480 Mbps)	B800Pi	1 GB to 32 GB	SLC	37	25	1,580	-40 to 85
		B600Sc	8 GB to 32 GB	MLC	25	19	19[4]	0 to 70



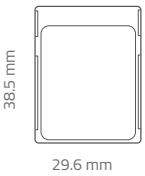
M.2 2280 SSD | M.2 2242 SSD | M.2 2230 SSD | U.2 SSD / 2.5" SSD | E1.S SSD | mSATA SSD | eUSB | USB Drive

Form Factor	Interface	Product Line	Capacity	NAND	Sequential Performance MB/s (up to)		Reliability TBW (max) [1]	Operating Temperature (°C)
					Read	Write		
SD/ SDHC/ SDXC Card	HS mode / UHS-I	S800Pi	512 MB to 8 GB	SLC	81	39	192	-40 to 85
	UHS-I	S750Pi / S750Pc	16 GB to 256 GB	3D TLC (pSLC mode)	95	80	25,000	-40 to 85 / -25 to 85
		S650Si / S650Sc	32 GB to 512 GB	3D TLC	95	70	5,500	-40 to 85 / -25 to 85
microSD/ microSDHC/ microSDXC Card	HS mode / UHS-I	S800Pi	512 MB to 8 GB	SLC	81	39	192	-40 to 85
	UHS-I	S750Pi / S750Pc	16 GB to 128 GB	3D TLC (pSLC mode)	95	80	12,670	-40 to 85 / -25 to 85
		S650Si / S650Sc	32 GB to 512 GB	3D TLC	95	70	5,500	-40 to 85 / -25 to 85
CFexpress Card	PCIe G4 x2	N751Pi	40 GB to 320 GB	3D TLC (pSLC mode)	3,500	3,100	19,010	-40 to 85
		N651Si	128 GB to 1,024 GB	3D TLC	3,500	3,200	10,830	-40 to 85
CFast Card	SATA 6 Gb/s	A800Pi	8 GB to 32 GB	SLC	500	310	2,665	-40 to 85
CompactFlash Card	UDMA 0~4	I800Pi	512 MB to 32 GB	SLC	61	55	1,280	-40 to 85
	UDMA 0~7	I700Pc	8 GB to 16 GB	Pseudo SLC	110	80	256	0 to 70
		I600Sc	16 GB to 32 GB	2D MLC	108	46	38	0 to 70

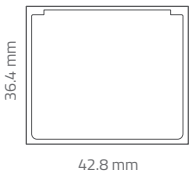


SD Card

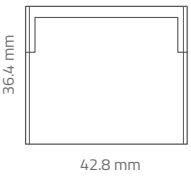
microSD Card



CFexpress Card



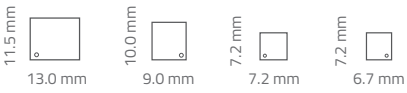
CompactFlash Card



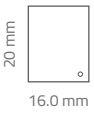
CFast Card

1 Under highest Sequential write value. May vary by density, configuration and applications.
2 The 7,680 GB capacity is rated for commercial temperature operation only (0°C to 70°C)
3 Product specifications may be subject to change.
4 Measured with Random Write. May vary by density, configuration and applications

Form Factor	Interface	Product Line	Capacity	NAND	Sequential Performance MB/s (up to)		Reliability TBW (max) [1]	Operating Temperature (°C)
					Read	Write		
Automotive Grade 2 e.MMC	v5.1, HS400	E700Paa[3]	20 GB to 80 GB	3D TLC (pSLC mode)	310	240	2,000	-40 to 105
		E600Saa[3]	64 GB to 256 GB	3D TLC	310	240	280	-40 to 105
Automotive Grade 3 e.MMC		E700Pia[3]	20 GB to 80 GB	3D TLC (pSLC mode)	310	240	2,000	-40 to 85
		E600Sia[3]	64 GB to 256 GB	3D TLC	310	240	280	-40 to 85
Smaller Footprint e.MMC		E700Pc (6.7 x 7.2 x 0.65 mm)	20 GB	3D TLC (pSLC mode)	240	210	680	-25 to 85
		E600Vc (6.7 x 7.2 x 0.65 mm)	64 GB	3D TLC	240	210	12	-25 to 85
		E700Pc (7.2 x 7.2 x 0.8 mm)	20 GB to 40 GB	3D TLC (pSLC mode)	240	210	1,360	-25 to 85
		E600Vc (7.2 x 7.2 x 0.8 mm)	64 GB to 128 GB	3D TLC	240	220	24	-25 to 85
		E600Vi (9.0 x 10.0 x 0.8 mm)	32 GB to 64 GB	3D TLC	290	225	55	-40 to 85
		E600Vc (9.0 x 10.0 x 0.8 mm)	32 GB to 64 GB	3D TLC	290	225	55	-25 to 85
Standard e.MMC	v5.1, HS400	E700Pi[3]	20 GB to 80 GB	3D TLC (pSLC mode)	310	240	2,000	-40 to 85
		E700Pi	10 GB to 40 GB	3D TLC (pSLC mode)	290	225	1,360	-40 to 85
		E600Si[3]	64 GB to 256 GB	3D TLC	310	240	280	-40 to 85
		E600Si	32 GB to 128 GB	3D TLC	290	225	110	-40 to 85
		E700Pc	20 GB to 80 GB	3D TLC (pSLC mode)	310	240	2,000	-25 to 85
		E700Pc	10 GB to 40 GB	3D TLC (pSLC mode)	290	225	1,360	-25 to 85
		E650Sc[3]	64 GB to 256 GB	3D TLC	310	240	280	-25 to 85
		E600Sc	32 GB to 128 GB	3D TLC	290	225	110	-25 to 85
PCIe® NVMe M.2 Type 1620 HSBGA SSD	PCIe G4 x2	N701Pi / N701Pc	80 GB to 320 GB	3D TLC (pSLC mode)	3,565	3,280	29,235	-40 to 85 / 0 to 70
		N601Si / N601Sc	240 GB to 960 GB	3D TLC	3,560	3,280	2,810	-40 to 85 / 0 to 70
	PCIe G3 x4	N700Pi / N700Pc	40 GB to 160 GB	3D TLC (pSLC mode)	2,000	1,600	4,280	-40 to 85 / 0 to 70
		N600Vi / N600Vc	120 GB to 480 GB	3D TLC	2,050	1,550	765	-40 to 85 / 0 to 70



e.MMC



M.2 Type 1620 HSBGA SSD

1 Under highest Sequential write value. May vary by density, configuration and applications.
2 The 7,680 GB capacity is rated for commercial temperature operation only (0°C to 70°C)
3 Product specifications may be subject to change.
4 Measured with Random Write. May vary by density, configuration and applications

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Chinese Taipei

Completed the RBA Validated Audit Process, achieving SILVER Status without any priority findings, earning a score of 186.9

Validated Audit Report: VAR-20230410-TW-02A01-2
Audit date: April 10, 2023
Certificate Issue date: April 29, 2023
Expiration date: April 11, 2025

Robert F. Leduner
CEO, RBA

Certifications

According to leading industry standards


CERTIFICATE dqs

ISO 9001:2015


Certificate

ISO 28000:2017


Certificate

ISO 14001:2015


Certificate

ISO 45001:2018

ISO14064-1:2018

ISO/IEC 17025:2017

VDA 6.3


CERTIFICATE dqs

IATF16949:2016


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- SNIA
- JESD219
- IEC 60529
- IP6X
- ATIS
- JESD22-A110
- MIL-STD-883
- IEC 61000-4-2:2008
- JESD78B
- UL94-v0

Industry Associations and Compliances

JEDEC SD CFA CompactFlash Association SERIAL ATA PCI SIG

FC CE UK CA VCI RoHS Compliant

From our humble beginnings with only two desks in a business suite in Silicon Valley, we have established ourselves as global leaders in storage and memory. Today, ATP is a strategic supplier for more than 60% of companies named as Leaders in Gartner's 2025 Magic Quadrant reports. These reports cover Primary Storage Platforms, Data Center Switching, Secure Access Service Edge (SASE), and Enterprise Wired and Wireless LAN Infrastructure.

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