



# ATP Industrial Grade Flash Products & DRAM Modules

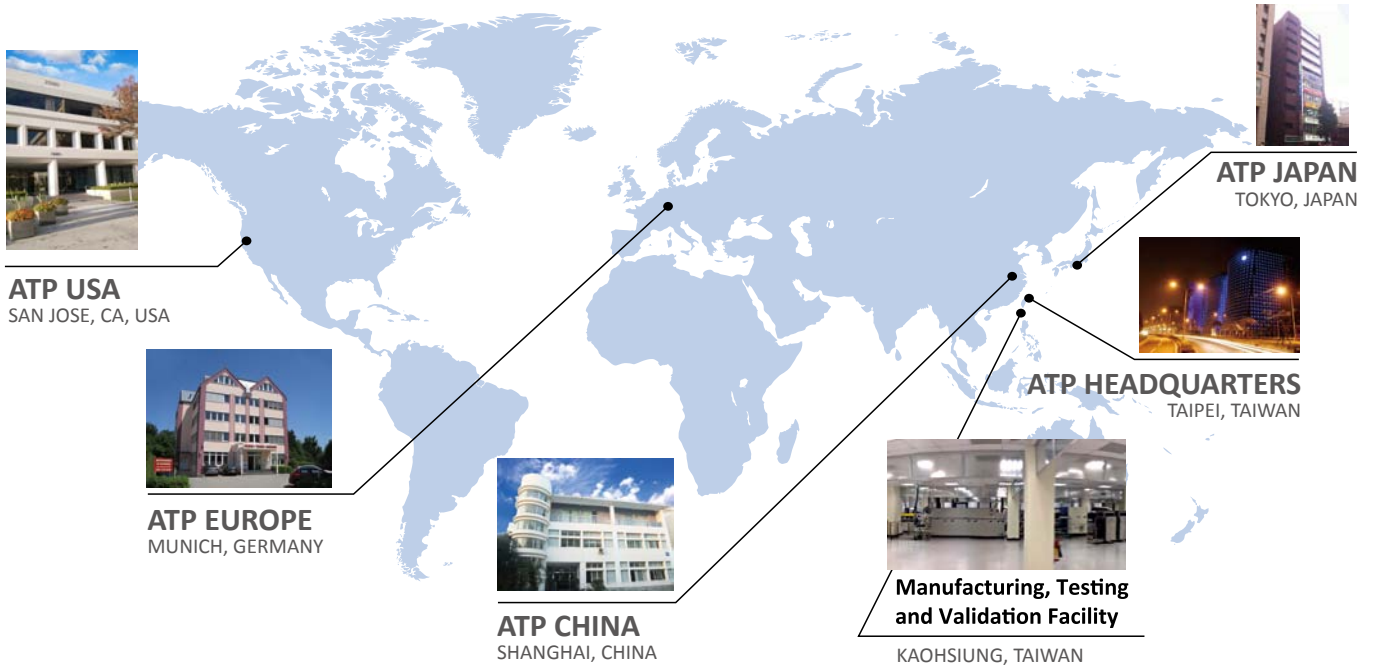
Targeted Product Portfolio, Engineered Specifically for Your Mission Critical Applications



ATP Electronics, Inc.



## ATP GLOBAL SUPPORT OFFICES



**ATP TAIWAN**  
Headquarters  
TEL: +886-2-2659-6368  
FAX: +886-2-2659-4982  
sales-apac@atpinc.com  
10F, No. 185, Tiding Blvd. Sec. 2,  
Neihu, Taipei,  
Taiwan 11493

**ATP USA**  
TEL: +1-408-732-5000  
FAX: +1-408-732-5055  
sales@atpinc.com  
2590 North First Street, Suite #150,  
San Jose, CA 95131,  
USA

**ATP EUROPE**  
TEL: +49-89-374-9999-0  
FAX: +49-89-374-9999-29  
sales-europe@atpinc.com  
Max-Planck-Str. 3,  
D-85716 Unterschleißheim,  
Germany

**ATP JAPAN**  
TEL: +81-3-6206-8097  
FAX: +81-3-6206-8098  
sales-japan@atpinc.com  
#1007, 10F 1-8-4 Kandasakuma-cho,  
Chiyoda-ku, Tokyo,  
Japan

**ATP CHINA**  
TEL: +86-21-5080-2220  
FAX: +86-21-5080-2219  
sales@cn.atpinc.com  
2F, Building 15, No. 115, Lane 572, Bibo  
Road, Zhangjiang High-Tech Park Pudong,  
Shanghai,  
China 201203

## Table of Contents

<b>ATP GLOBAL SUPPORT OFFICES.....</b>	<b>1</b>
<b>ABOUT ATP.....</b>	<b>3</b>
<b>WHY ATP.....</b>	<b>4</b>
<b>ATP MARKET FOCUS &amp; APPLICATIONS</b>	<b>5</b>
<b>DRAM SOLUTIONS.....</b>	<b>7</b>
<b>FLASH SOLUTIONS.....</b>	<b>11</b>
<b>Memory Cards</b>	
SD/microSD.....	17
CF/CFast.....	19
<b>SSDs</b>	
SII Pro.....	20
SI Lite.....	21
XE.....	22
M V.....	23
<b>Embedded Modules</b>	
eUSB SSD.....	24
M.2.....	25
mSATA/mSATA mini.....	26
SlimSATA.....	27
SATA DOM.....	28
<b>USB Drives.....</b>	<b>29</b>



# ABOUT ATP

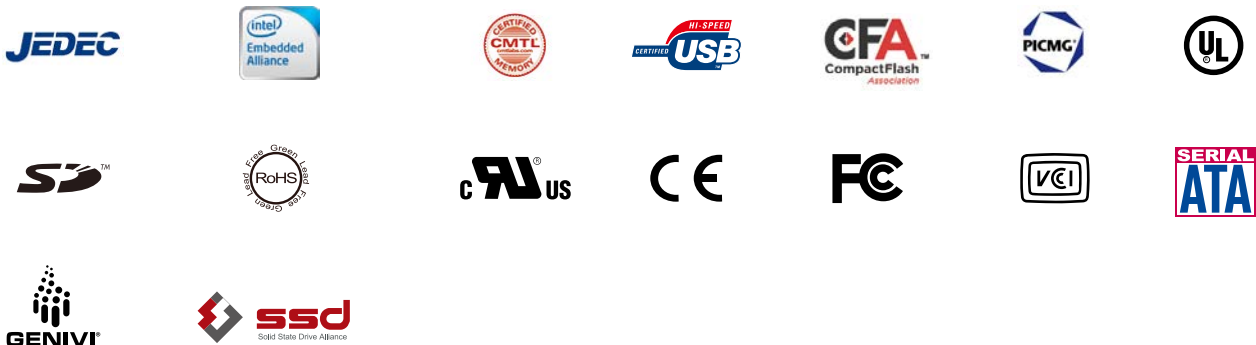
ATP Electronics is a leading solutions provider of high performance, high quality and durable NAND flash and DRAM memory modules. With over twenty years of experience in service based memory products, ATP continues to focus on mission critical applications such as industrial/automation, telecom, medical, automotive, and enterprise computing where high levels of technical expertise, product validations and manufacturing quality are required. A certified Eco/Green partner of tier one OEMs, all ATP products are fully RoHS and China RoHS compliant. A true manufacturer, ATP offers in-house design, testing, and product tuning at both system and component levels. In addition, ATP supply chain support includes controlled/fixed BOMs and long-term product life cycles management.

The ATP **System-In-Package (SIP)** flash product manufacturing process is the backbone of superior build quality and durability. The industry leading SIP process involves advanced wire bonding, stacking, and encapsulation stages, which make ATP products durable and reliable under harsh environments such as moisture, extreme temperature, and electrostatic discharge.

A technology driven company, ATP continues to focus on a targeted product portfolio and offers unique technologies such as PowerProtector, Secure Erase, and the Elevated Temperature Burn In Testing system which screens for SMT related assembly and IC infant mortality issues. PowerProtector ensures consistent flash operations during a power failure and exceeds the performance offered by other existing solutions such as SuperCap designs. ATP Secure Erase eliminates any traces of the original data and offers a diverse variety of military and industrial protocols, including NAVSO P-5239-26, IREC (IRIG) 106, USA-AF AFSSI 5020 and, USA-Army 380-19.

The ATP brand continues to grow through industrial OEM sales channels. ATP offers worldwide sales and technical support via its offices in the USA, Europe, and Asia.

## Industry Association and Compliance



# WHY ATP



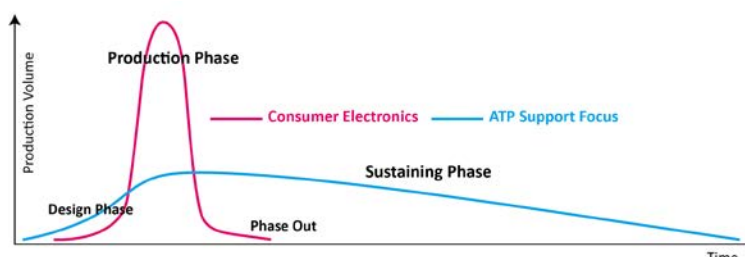
## Extended & Long Term Product Longevity

### During Design Phase, ATP provides:

- Partnership to find the right balance of technology leadership, cost effectiveness, and long term stability
- Controlled BOM with advanced notifications on die revision changes

### During Sustaining Phase, ATP provides:

- Mass production volume taking cost/availability advantage of mainstream technology standards, form factors and IC configurations



## Micron PLP Program - Long Life Cycle DRAM and Flash Product

- Based on IC components from Micron's Product Longevity Program (PLP), ATP is committed to providing guaranteed and extended product life cycles of up to 10 years.
- The longer life cycle addresses the supply chain requirements of mission-critical applications.
- Micron' PLP offers the stability necessary for ATP's module solutions to meet the challenges and help our customers reduce the frequency of painful re-design and re-qualification.



## The Management of Total Cost of Ownership (TCO)

- ATP ensures the product life cycle and quality at the beginning of project to manage the TCO.
- Endurance and retention evaluations are initiated to provide the most cost-effective option to customers.
- The TCO service facilitates project level communication which consequently minimizes the cost associated with the solution.



## Customization

- Customized module and flash designs
- Electronic design and manufacturing services (EDMS)
- Patented security features
- Conformal coating
- JEDEC compliant, customization/SPD tuning available



## Sales & Engineering Support

- Efficient, competent and professional sales staff to serve your needs
- Application specific design and customization to meet your specific requirements
- Fast turn-around samples and production orders
- Global manufacturing facilities, technical support, and logistics support including experience with contract manufacturer coordination



## Controlled Bill of Materials (BOM)

- Quality and engineering documentation provided
- Long product life cycle with buffer inventory support and advance PCN/EOL



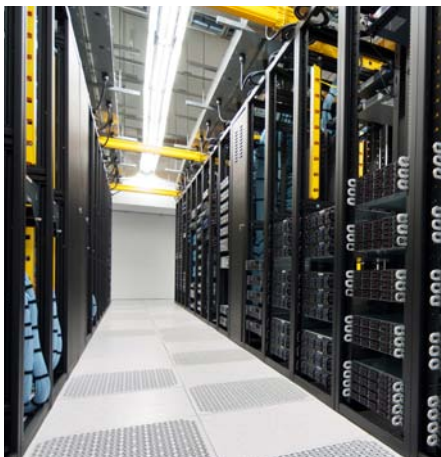
## 100% Tested for Reliability and Consistency

- NAND Flash Level Test & Storage Device Level Test
- Usage model Test by Applications / Industry standards
- Joint validation
- Mass Production Level Test

(For more details, please check page 11)

# ATP MARKET FOCUS &

Established in 1991, ATP has accumulated many years of experience in the design, manufacturing, and support of high performance, highest quality DRAM modules and NAND flash storage products. ATP focuses in mission critical applications such as industrial, networking/telecom, medical, and automotive, where high levels of technical support/expertise, consistency of performance, and manufacturing quality are required at both the system and component levels.



## Networking/Telecom

Networking/telecommunication applications typically have the greatest demands in terms of performance, reliability, and capacity. ATP provides industry leading production level TDBI (Test During Burn In) capability and utilizes specific in-house testing solution to ensure long-term reliability and quality of ATP industrial grade DRAM products which can operate under extreme temperature conditions.

Furthermore, networking/telecommunication environments usually have high traffic with multiple concurrent transactions. ATP industrial Grade SSDs and embedded modules offer a wide range of capacities and increase the performance in IOPS with full power failure protection technologies.

ATP appeases customers not only with its technological advancements, but also its broad processor/chipset compatibility (for DRAM products), supply chain longevity, logistic flexibility, strong engineering supports.

### Applications

- WAN Optimization Appliances
- VPN/ Firewall Appliances/Next-Gen Firewalls
- Advanced TCA System
- Small Cell
- Routers/Gateways/Servers



## Enterprise Mobility

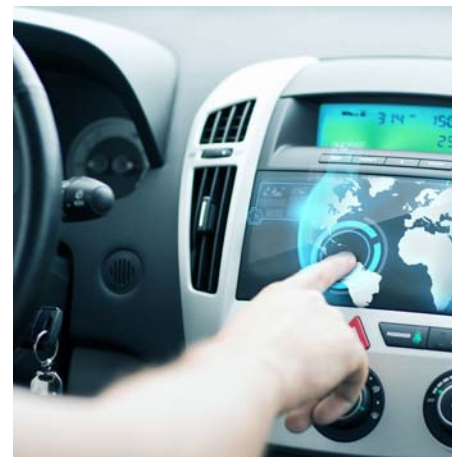
ATP is a leader in enterprise mobility, providing storage and memory products that are robust enough for harsh conditions and extreme environments. ATP Industrial Grade memory cards built with SIP (System-in-Package technology) offer considerable protection from harsh environmental conditions and provide water, dust, and ESD proof durability.

Enterprise mobility devices require more than just brute physical durability but also demand reliable memory storage for unreliable power sources and frequent rewriting. ATP has developed a total solution of the "Data Integrity" technologies to secure dependable data storage in an enterprise mobility environment.

ATP Industrial Grade memory cards have been previously tested and qualified by major enterprise mobility companies such as Intermec, Motorola, and Honeywell.

### Applications

- Mobility ERP
- Barcode Scanning and Data Collection
- Mobile Payment
- Rugged and Field Handheld-Computing
- Mobile Healthcare



## Automotive

ATP is recognized by worldwide major tier 1 auto infotainment suppliers and tier 2 telematics system developers/service providers due to its product quality and strong capabilities which include engineering, manufacturing, and supply chain management.

In order to provide robust and reliable assurance, ATP flash products are developed based on the strict validation processes such as ATP NAND Flash IC Level test, usage model test/specific industrial stander test (AEC-Q100, MIL-STD, JEDEC...etc) and power cycling test in product development phase. In mass production, ATP conducts 100 % production level burn-in test to sort out manufacturing/component defects before shipping to customers.

Moreover, ATP SIP (System-In-Package) technology allows the great reliability as well as extreme tolerance to shock/vibration, temperature, dust and humidity in harsh conditions. Its products with above mentioned technological advancements fully appease automotive applications' rigorous quality standards.

### Applications

- Automotive IVI Systems
- Navigations
- In Vehicle Infotainment/Rear Seat Entertainment System
- Fleet Surveillance
- In Vehicle Computer
- Fleet Management
- Automotive Telematics
- Surveillance Systems
- Drive Recorders

# APPLICATIONS



**Industrial PC/Embedded**

In high-performance Industrial PC and embedded applications, demand for faster data transfer rates and higher bandwidth are increasing. At the same time, constraints on space, endurance, reliability and power are rising. Industrial/Embedded computing storage and memory implementations require a level of technical support and product tunability that only a true designer/manufacturer can offer.

ATP products provide the optimal solution for industrial control systems, which must withstand constant vibration, high humidity, and wide temperature ranges.

ATP designs, builds, and supports all of its own DRAM and flash products. With full control of the BOM, testing, and QA procedures, ATP can customize, build, and tune a storage/memory solution for the most demanding or unique embedded application.

**Applications**

- Industrial Control System
- Industrial PC/Embedded System
- Industrial Automation
- Robotics
- Factory Machinery
- Data Logging
- HMI



**Healthcare**

ATP understands that “Data Integrity, Reliability, and Performance” are essential requirements for critical operations in the healthcare industry.

The flexible form factors and densities products of ATP DRAM and NAND Flash memory have been utilized in hospital, clinical and diagnostic applications, such as booting up, image capturing and data logging.

Customer satisfaction is no doubt guaranteed with the high quality and performance, long product life as well as low TCO (Total Cost of Ownership) of ATP PowerProtector (ATP patented technology), System-In-Package technology, customized DRAM module testing service, strong Quality Assurance (QA), and BOM supporting capabilities.

**Applications**

- Life support/Data Logging
- Bedside Infotainment Terminal
- Point-of-Care Mobile Device
- Patient Monitoring Device
- ECG /EEG/EMG\* Monitor
- Sonogram/Ultra Sound
- Endoscopy System
- Diagnostic Imaging System

\*ECG- Electrocardiogram  
 EEG - Electroencephalography  
 EMG- Electromyography



**Gaming**

ATP DRAM and Flash storage solutions have been used in gaming machines and other peripherals for boot up and extended storage with flexible form factors, such as 2.5”SSDs, Compact Flash cards, CFast, SATA DOMs and SD cards... etc. ATP NAND Flash products with its hardware/firmware based PowerProtector technology ensure data integrity won’t be compromised during a power failure and with AES 128/256 encryption for anti-hacking and anti-tampering.

ATP has also offered customized testing services, like Test During Burn In (TDBI) and the Automatic Test Equipment (ATE), in order to ensure long-term quality and reliability of ATP industrial grade DRAM modules.

**Applications**

- Lottery Ticket Machines
- Slot Machines
- Gaming Servers

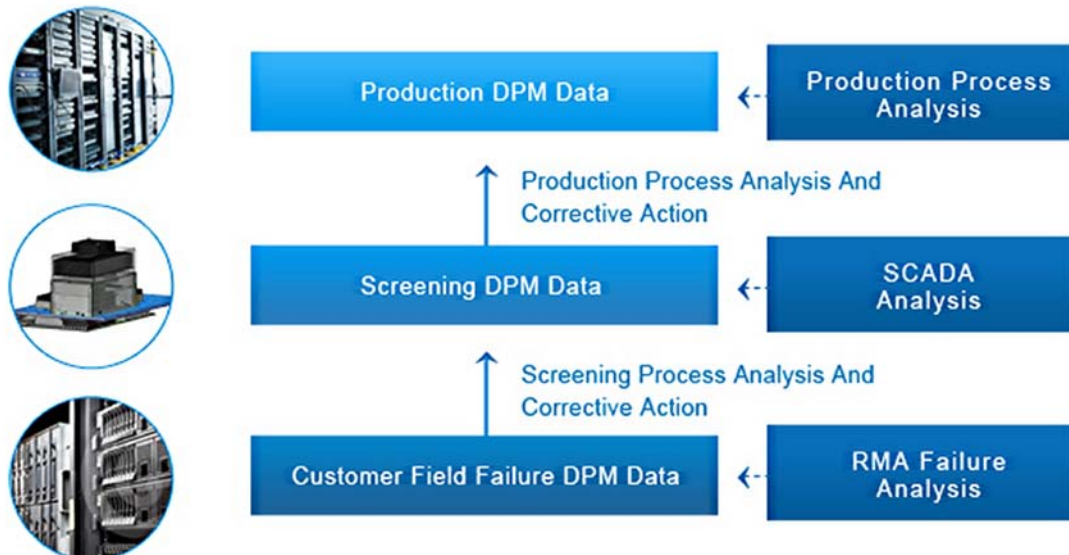
# DRAM SOLUTIONS

ATP DRAM Modules for Networking & Embedded Applications.  
 Tested by Next Generation TDBI and ATE with Increased Flexibility, Efficiency and Scalability.



## ATP Unique Features and Testing Systems

ATP has successfully integrated the DRAM ATE and TDBI tests and the SCADA system into one mass-production-scale burn-in system. ATP focuses on maximizing the ATE testing coverage and accelerating the TDBI testing cycle. A traceable quality record from IC level testing (from DRAM module level ATE production data to field product usage) has been built, massively collected, and analyzed via the SCADA system. The entire system is designed to (1) build a system for quality data acquisition, and (2) implement a system for process improvement, based on the quality and reliability driven industrial and server environments. The new system provides a wide testing temperature ranging from -40° to 85°C, which few other TDBI systems can provide. The combined tests have proven to effectively lower the field return rates from major ATP OEM customers. The system has demonstrated ATP's add on value and its commitments to industrial grade quality and reliability.

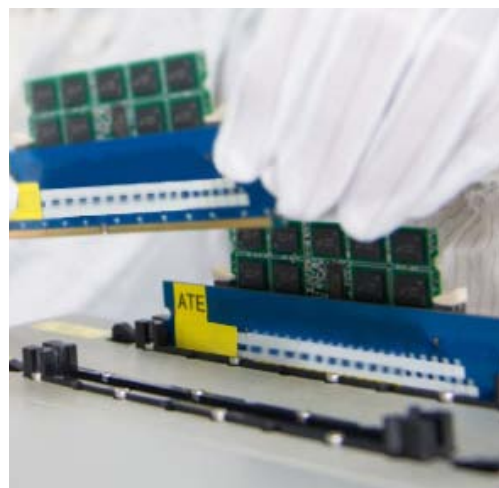




### The Next Generation Test During Burn In – ATP TDBI System

The ATP TDBI system features a unique chamber design allowing for flexibility in customer specific temperature profiles and also features a flexible monitoring/control system.

The elevated temperature burn in process reduces field failures due to fringe manufacturing defects and IC infant mortality. The design of the thermal chamber allows for a higher level of production level efficiency, scalability, and flexibility.



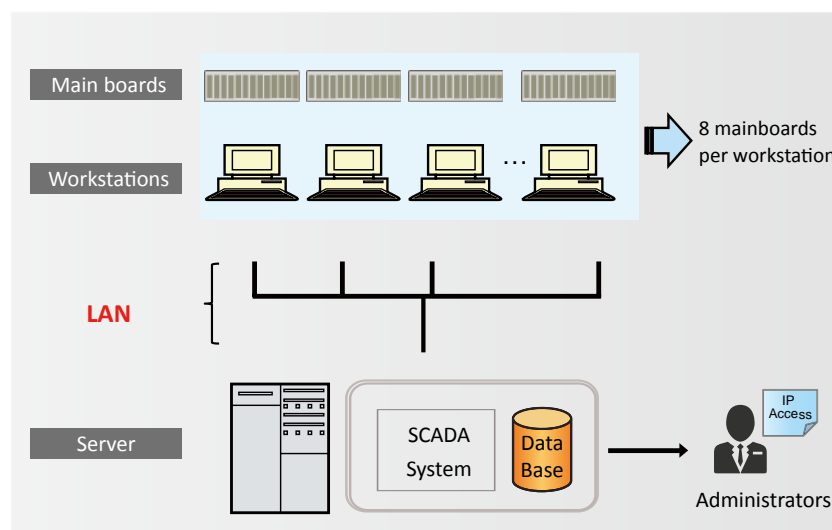
### The ATP New Automatic Test Equipment Test-ATE Test

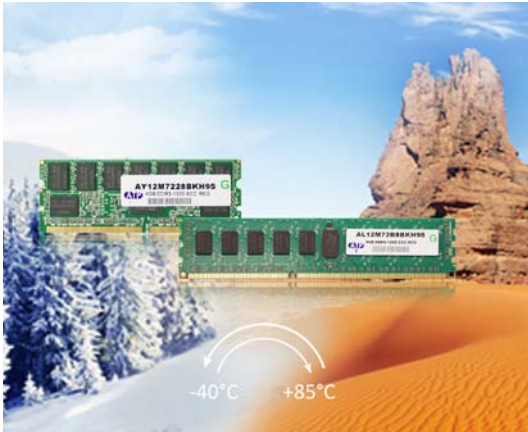
ATE provides electrical testing patterns with various parameter settings, such as marginal voltage, signal frequency, clock, command timing and data timing under continuous thermal cycles. For specific weaknesses of some ICs, ATE can provide specific testing patterns to stress the screening of the potential defects during the testing. Also, based on customers' requests, tailor-made electrical testing patterns can be programmed and implemented into the ATE testing process. The ATE testing system is also able to pin point individual defective ICs and defective DRAM PCB boards, providing a much more efficient failure analysis method for both new product development and mass production stages.

### The SCADA (Supervisory Control and Data Acquisition)

The SCADA (Supervisory Control and Data Acquisition) feature of the TDBI system allows for true flexibility in application/customer specific temperature profiles and data patterns (customer specific software/ scripts). SCADA also offers real time monitoring and production lot logging for QA traceability.

- Remote monitoring and control over thermal burn-in testing array
- Real time monitoring of testing cycle status on all systems
- Database containing all profiles, test cycles, and production logs for QA traceability

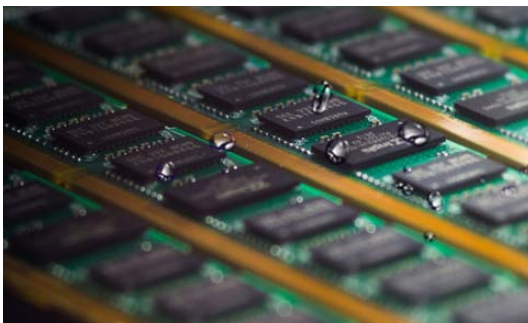




### Wide Temperature (WT)

A cost effective solution, with a wide temperature range from -40°C to 85°C, ideally suited for telecom, industrial and military/ aerospace applications.

ATP offers two testing Technologies for the Wide Temperature DRAM Solution: 1. Advanced IC Level Testing and 2. The Enhanced Module Level TDBI and ATE Testing. Compared to other competitors' WT DRAM solutions, the ATP-exclusive IC level and system level testing on quality major DRAM ICs has given ATP WT DRAM modules more reliability in the long run, based on user data in the field. ATP WT DRAM solution has also provided a superior overall system-wide stability over typical commercial temperature DRAM modules.

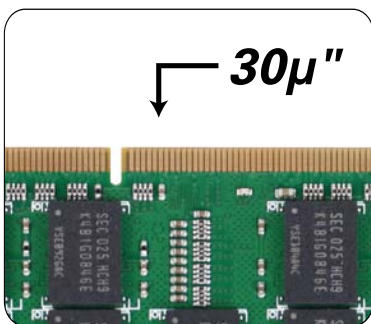


### Conformal Coating

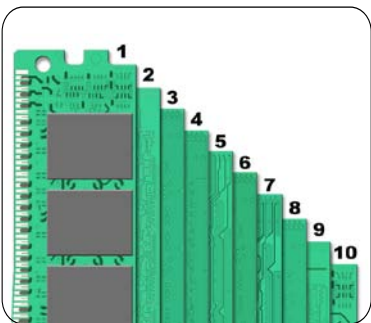
Conformal Coating is a process in which a protective layer of Parylene is applied to electronic circuits and modules to protect against dust, chemicals, extreme temperatures, moisture, and corrosion. Uncoated surfaces are prone to damage and malfunction, hence the added protection becomes necessary for harsh environments.

In contrast to dipping and spraying techniques, the chemical vapor deposition (CVD) provides a vacuum like environment in which the Parylene particles coat all components and points of failure.

### Increased Thickness, Increased Strength









- In order to ensure the quality of the signal transmission between the connector and ATP DRAM module, ATP utilizes golden finger plating with 30µ" thickness, comparing to competitors' DRAM modules thickness typically at less than 10 µ".



- 6 ~ 10 Layer PCB Provides Improved High-Speed Signal Quality.
- Superior Quality Checks on Impedance control and strictly conform to IPC and JEDEC standards.

## Complete DRAM Product Line

Product	Category	Speed (MT/s)	Form Factor	Features
<b>DDR4</b> 	RDIMM RDIMM VLP UDIMM/UDIMM ECC SO-DIMM ECC	2133	<ul style="list-style-type: none"> <li>Low profile</li> <li>Very Low Profile (VLP) options (VLP: 0.74" height)</li> </ul>	<ul style="list-style-type: none"> <li>Density: 4GB to 16GB</li> <li>Increase performance and bandwidth which is up to 3200 MT/s</li> <li>Decrease voltage for better power consumption</li> <li>Provide better reliability, availability and serviceability (RAS) and improve data integrity as well.</li> </ul>
<b>DDR3</b> 	LRDIMM RDIMM UDIMM/UDIMM ECC SO-RDIMM SO-DIMM/SO-DIMM ECC mini-RDIMM mini-UDIMM ECC	1866 1600 1333 1066	<ul style="list-style-type: none"> <li>Low profile</li> <li>Very Low Profile (VLP) options (VLP: 0.74" height)</li> <li>Ultra Low Profile (ULP) options (ULP: 0.7"~0.72" height)</li> </ul>	<ul style="list-style-type: none"> <li>Density: 1GB to 32GB 32GB to 64GB(LRDIMM)</li> <li>Chipkill support</li> <li>Fly-by command/address/control bus with on-DIMM termination.</li> <li>Higher bandwidth performance, effectively up to 1866 MT/s</li> <li>Better performance at low power; 1.5V (Normal) and 1.35V(Low Voltage)</li> </ul>
<b>DDR2</b> 	RDIMM UDIMM/UDIMM ECC SO-RDIMM SO-CDIMM SO-DIMM mini-RDIMM FB-UDIMM*	800 667 533 400	<ul style="list-style-type: none"> <li>Low Profile</li> <li>Very Low Profile (VLP) options (VLP:0.72"~0.74" height)</li> </ul>	<ul style="list-style-type: none"> <li>Density: 1GB to 8GB</li> <li>Chipkill support</li> </ul> <b>FB-DIMM</b> <ul style="list-style-type: none"> <li>Low power and low voltage options</li> <li>Apple FB-DIMM</li> </ul>
<b>DDR*</b> 	UDIMM/UDIMM ECC SO-CDIMM SO-DIMM	400 333 266	<ul style="list-style-type: none"> <li>Low Profile</li> <li>Very Low Profile (VLP) options (VLP:0.72"~0.74" height)</li> </ul>	<ul style="list-style-type: none"> <li>Density: 512MB to 1GB</li> <li>Chipkill support</li> </ul>
<b>SDRAM*</b> 	RDIMM UDIMM/UDIMM ECC SO-UDIMM	PC 133 PC 100	<ul style="list-style-type: none"> <li>Low Profile</li> <li>Very Low Profile (VLP) options (VLP:0.72"~0.74" height)</li> </ul>	<ul style="list-style-type: none"> <li>Density: 256MB to 1GB</li> <li>Chipkill support</li> <li>Legacy system support</li> </ul>

Product Portfolio	Category	Product	Features
<b>Industrial Grade Family</b> 	SO-DIMM UDIMM RDIMM	DDR3 DDR2 DDR* SDRAM*	<ul style="list-style-type: none"> <li>Extended temperature: -40°C ~ +85°C</li> <li>Controlled BOM and SPD</li> <li>For mission critical industrial applications</li> <li>conformal coating</li> </ul>

\* Available on a project basis.

# FLASH SOLUTIONS



## ATP Testing Capabilities

Product Development	<p><b>NAND Flash Level Test &amp; Storage Device Level Test</b> - Ensuring the reliability and function of new process NAND Flash</p> <ul style="list-style-type: none"> <li>Enhanced IC level validation and IC level reliability report/notes</li> <li>Die/Wafer level expertise</li> <li>Data reliability and raw bit error rate impact under various data pattern</li> </ul>	<p>Program Disturb vs. ECC levels ECC 1 &lt; ECC 2 &lt; ECC 3 &lt; ECC 4</p>
	<p><b>Application and Industry Standard Specific Validation Testing</b></p> <ul style="list-style-type: none"> <li>The nature of Embedded/Industrial segments is a high variance of application/use case</li> <li>Industry standards: IPC/JEDEC, AEC-Q100, MIL-STD...etc</li> <li>Additional tests: Power cycling test, Product life time simulation...etc</li> </ul>	<p><b>Power Cycling Test</b></p>
	<p><b>Joint/Supplemental Validation</b> - Compatibility/ function tests along with customers' host devices</p> <ul style="list-style-type: none"> <li>Verify actual NAND usage and controller efficiency under specific usage model</li> <li>Collaborative testing with host devices to simulate real application with same operating systems, platforms and access points</li> <li>Customized test criteria with specific software / test script provided by customers</li> <li>Improve ATP knowledge regarding specific usage models and behaviors</li> </ul>	
Mass Production	<p><b>Mass Production Level Test</b> - Offering rigorous testing scripts and scalable equipment to fulfill customers' testing requirements.</p> <ul style="list-style-type: none"> <li>Sorting out manufacturing/components defects for quality / reliability assurance</li> <li>Efficient &amp; scalable testing equipment</li> <li>ATP developed testing equipment and testing script with lot tracking /recording</li> </ul>	

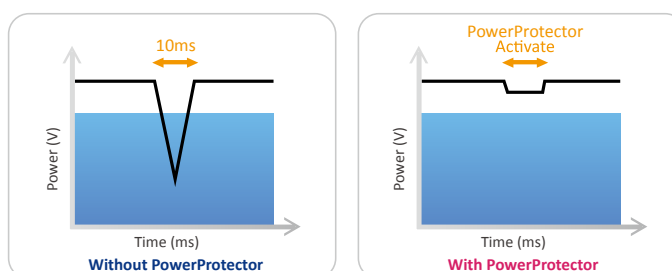
Note\*: ATP testing support may vary on different products. Any inquiry or support needed, please contact ATP.

## ATP Prominent Technologies



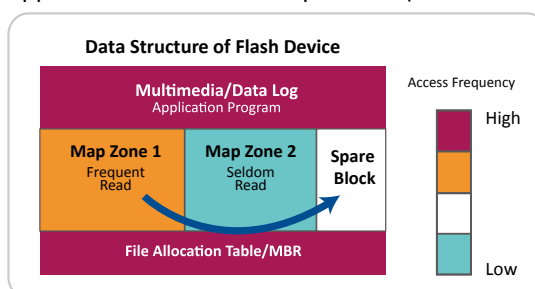
### PowerProtector

- ATP Patented technology – PowerProtector, upgrades existing power protection mechanisms (both hardware and firmware), and offers an advanced level of protection ensuring that NAND Flash data integrity is not compromised during a power failure scenario and also preserves data in mission critical applications.
- ATP PowerProtector contains stand-alone design and solid state capacitors features that have been proven to exceed the performance and reliability offered by other existing data back-up solutions.



### AutoRefresh

- AutoRefresh in read operations can drastically reduce the risk of data loss in the read-only area, as the feature automatically checks the ECC in every read operation before uncorrectable failure occurs. It can also move data to good blocks, before any failure occurs.
- Best suited for read intensive applications such as boot-up and IVI (In-vehicle infotainment)



### Life Monitor

- Offers flash health status feedback to the host.
- Prevents data failure by proactively detecting the percentage of remaining life in the storage device and allowing users time for safe storage retirement and replacement.



Note : The compatibility and support of Life Monitor may vary on different platform/operation system. Any inquiry about Life Monitor, please contact ATP sales.



### System-In-Package (SIP)

- All ATP Industrial Grade Memory Cards are manufactured with ATP’s SIP process, which fully encapsulates all exposed components and points of failure to protect against water/humidity, dust, electrostatic discharge, shock/vibration, and extreme temperatures.



### Secure Erase

- Initiates a block-by-block, data pattern write operation to systematically eliminate any trace of the original data.
- The ATP software application ensures that the declassification becomes quicker, easier and more effective for SSD’s and flash based storage devices.

## aMLC (*advanced*MLC)

ATP aMLC is an advanced firmware technology that manipulates MLC flash 2 bits each cell into 1 bit and makes aMLC act/perform approaching SLC flash. It is developed as a cost effective solution compared to SLC NAND flash for industrial customers who require higher reliability, endurance and performance but need to meet budget requirement for their critical mission applications.

### Differentiations allow ATP aMLC to outperform similar solutions significantly in the market!

#### ATP Unique NAND Flash Level & Storage Device Level Testing

ATP is to provide customer aMLC solutions approaching SLC-like spec/performance based on ATP thorough product evaluation/testing in NAND flash IC level & storage device level. For instance, ATP verifies the reliability/function of any new process NAND, selects highest grade NAND Flash IC/wafer, operates read disturb test, data retention test and power cycling test to ensure ATP aMLC to meet customers' requirements based on actual testing results.

#### Reliability, Density, P/E cycles, Performance (RDPP)

- » **Reliability** For NAND components, ATP selects the highest grade NAND ICs with highest P/E cycle (3K as of MLC recent 2Xnm generations) then with its advanced testings, screens out infant mortality weak ICs / weak NAND block to ensure superior quality. Moreover, aMLC undergoes thorough 100% production level burn-in test to enhance it's commitment to reliability.
- » **Density** Main stream densities are available to fulfill customers' aMLC target applications.
- » **P/E cycle** ATP aMLC reach more than 40K P/E cycles at 85°C comparing with other in-market solutions' 20K~30K P/E cycles.
- » **Performance** Upgraded specification as compare to traditional MLC NAND
  - more than 13x higher endurance
  - 3x greater write performance
  - over 5x data retention improvement (based on same P/E cycles)

### NAND Flash Comparison Table

Product	SLC	ATP aMLC	MLC	TLC
NAND P/E Cycle Rating	≥60 K (2xnm)	≥40 K*1 (2xnm)	3 K (2xnm)	0.5 K~3 K (2xnm)
ECC Requirement	8 bits/540 B	>20 bits/1 KB *	40 bits/1 KB	~70 bits/1 KB
Data Retention	5~10 years 2.7 K P/E cycles @ 55°C	5~10 years* 2.7 K P/E cycles @ 55°C	1 year 2.7 K P/E cycles @ 55°C	6 months 1 K P/E cycles @ 25°C
Performance Seq./Ran. Write * 2	x2.3 / x1.5	x2 / x1.3	x1 / x1	x0.3/ x0.3

Note \*: Based on ATP NAND Flash IC Test Reliability Note

Note 1: Endurance is highly dependent on the system implementation of firmware algorithm

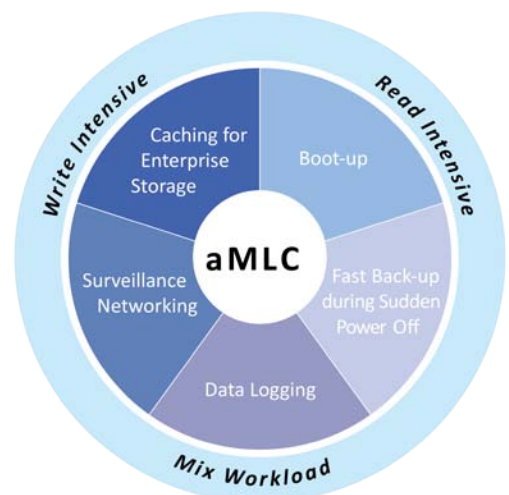
Note 2: The test result may vary depending on density, configuration and test environment.

### aMLC Target Applications

ATP aMLC is best suited for the following most up-to-date industrial application demands:

**Write Intensive** - Data logging for surveillance, medical imaging, transportation ticketing system, and drive recorder which demand high P/E cycled for frequent data writing. Caching for hybrid enterprise storage that aMLC products serve as a cache for enterpriser HDD RAID to store the hot data or as temporary buffer to enhance overall system performance.

**Read Intensive** - Boot-up for OS/application drive in the system of POS, ATM, Kiosk, and automation applications. Emergency file back up for enterprise server/data center during system panic or sudden power-off situations.

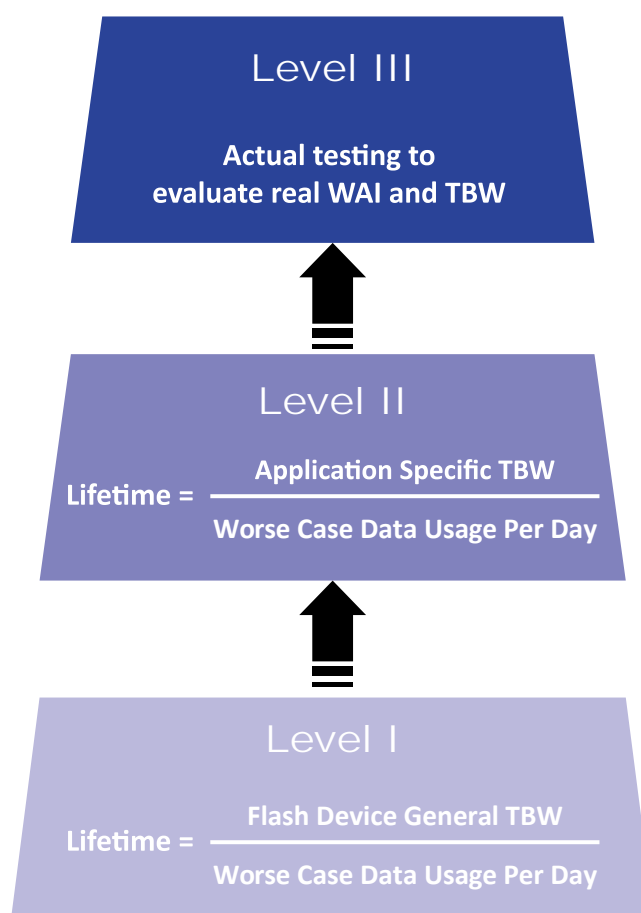


## Three Levels of Endurance Calculations

With years of experiences co-working with the various industrial sectors, ATP is able to provide a complimentary consulting service. Based on the three levels of endurance calculations, ATP can analyze the actual application data and provide the best solution for an optimized total cost of ownership.

Compared to the current mean time between failure (MTBF) , “Lifetime Calculation”, based on Total Bytes Written (TBW) and Write Amplification Index (WAI) information, provides a more meaningful measure of a flash product ’s endurance. ATP has developed a sophisticated set of methods:

Level 1 is utilized for preliminary evaluation and Level 2 is given for flash device solution selection. Once the solution is selected, a Level 3 evaluation can be performed to confirm actual usage/project WAI. Candidate flash devices selected from the Level 2 prediction are run in the final host device to determine the most suitable solutions in the Level 3 evaluation.



## Complete Flash Product Line

Product		Dimensions (L x W x H mm)	Flash Type	Densities	Operating Temp.	Data Transfer Rate (MB/s)(max.)	TBW** (max.)	Power Protector (H/W)	Secure Erase (S/W)***	Life Monitor (S/W)***	
<b>SATA</b>											
2.5" SSD	Velocity SII Pro		100.0 x 69.9 x 9.2	SLC	32GB~256GB	-40°C~+85°C	Read: 520 MB/s Write: 420 MB/s	5,120 TB	✓	✓	✓
	Velocity SI Lite		100.0 x 69.9 x 9.2	SLC	4GB~64GB	-40°C~+85°C	Read: 182 MB/s Write: 133 MB/s	768 TB	✓	✓	✓
	Velocity XE		100.0 x 69.9 x 9.2	aMLC	8GB~64GB	0°C~+70°C	Read: 250 MB/s Write: 180 MB/s	512 TB	-	✓	✓
	Velocity M V		100.0 x 69.9 x 9.2	MLC	64GB~512GB	0°C~+70°C	Read: 520 MB/s Write: 440 MB/s	307.2 TB	✓	✓	✓
M.2	2260 D2-B-M		60.0 x 22.0 x 3.5	SLC	32GB~128GB	-40°C~+85°C	Read: 530 MB/s Write: 390 MB/s	2,560 TB	✓	✓	✓
				MLC	64GB~256GB	0°C~+70°C	Read: 530 MB/s Write: 300 MB/s	153.6 TB	✓	✓	✓
	2242 D2-B-M		42.0 x 22.0 x 3.5	SLC	8GB~64GB	-40°C~+85°C	Read: 530 MB/s Write: 400 MB/s	1,280 TB	✓	✓	✓
				MLC	8GB~128GB	0°C~+70°C	Read: 530 MB/s Write: 155 MB/s	76.8 TB	✓	✓	✓
mSATA MO-300A		50.8 x 29.8 x 3.7	SLC	4GB~128GB	-40°C~+85°C	Read: 530 MB/s Write: 430 MB/s	2,560 TB	✓	✓	✓	
			aMLC	8GB~64GB	0°C~+70°C	Read: 250 MB/s Write: 190 MB/s	512 TB				
			MLC*	8GB~256GB	0°C~+70°C	Read: 520 MB/s Write: 300 MB/s	153.6 TB				
mSATA mini MO-300B		26.8 x 29.8 x 3.7	SLC	4GB~32GB	-40°C~+85°C	Read: 80 MB/s Write: 65 MB/s	640 TB	✓	✓	✓	
SlimSATA MO-297A		54.0 x 39.0 x 4.0	SLC	2GB~128GB	-40°C~+85°C	Read: 530MB/s Write: 430 MB/s	2,560TB	✓	✓	✓	
			aMLC	8GB~64GB	0°C~+70°C	Read: 250 MB/s Write: 190 MB/s	512 TB				
			MLC*	8GB~256GB	0°C~+70°C	Read: 520 MB/s Write: 300 MB/s	153.6 TB				
CFast		42.8 x 36.4 x 3.6	SLC	2GB~32GB	-40°C~+85°C	Read: 500 MB/s Write: 300 MB/s	640T B	✓	✓	✓	
			MLC*	8GB~64GB	0°C~+70°C	Read: 420 MB/s Write: 80 MB/s	38.4 TB				
SATA DOM	Vertical		35.5 x 33.1 x 7.6	SLC	2GB~16GB	-40°C~+85°C	Read: 80 MB/s Write: 65 MB/s	320 TB	✓	✓	✓
				MLC*	8GB~32GB	0°C~+70°C	Read: 170 MB/s Write: 50 MB/s	19.2 TB			
	Horizontal		35.1 x 30.0 x 14.0	SLC	2GB~16GB	-40°C~+85°C	Read: 80 MB/s Write: 65 MB/s	320 TB	✓	✓	✓
				MLC*	8GB~32GB	0°C~+70°C	Read: 170 MB/s Write: 50 MB/s	19.2 TB			

Product		Dimensions (L x W x H mm)	Flash Type	Densities	Operating Temp.	Data Transfer Rate (MB/s)(max.)	TBW** (max.)	Power Protector (H/W)	Secure Erase (S/W)***	Life Monitor (S/W)***	
PATA/IDE											
Compact Flash		42.8 x 36.4 x 3.3	SLC	512MB~32GB	-40°C~+85°C	Read: 61 MB/s Write: 55 MB/s	640 TB	✓	✓	✓	
			MLC*	8GB~32GB	0°C~+70°C	Read: 110 MB/s Write: 46 MB/s	38.4 TB	-	✓	✓	
SD											
SD/SDHC/SDXC	SD/SDHC		32.0 x 24.0 x 2.1	SLC	512MB~32GB	-40°C~+85°C	Read: 20 MB/s Write: 18 MB/s	384 TB	-	✓	✓
	UHS-I SDHC			MLC	8GB~128GB	-25°C~+85°C	Read: 87.2 MB/s Write: 58.9 MB/s	19.2 TB			
microSD/microSDHC	microSD/microSDHC		15.0 x 11.0 x 1.0	SLC	512MB~8GB	-40°C~+85°C	Read: 20 MB/s Write: 18 MB/s	96 TB	-	✓	✓
	UHS-I microSDHC			MLC	8GB~32GB	-25°C~+85°C	Read: 68.3 MB/s Write: 24.4 MB/s	19.2 TB			
USB Drive											
eUSB		2.54mm 36.9 x 26.6 x 11.5 2.00mm 36.9 x 26.6 x 8.4	SLC	512MB~16GB	-40°C~+85°C	Read: 30 MB/s Write: 27 MB/s	320 TB	✓	✓	✓	
			MLC*	8GB~16GB	0°C~+70°C	Read: 30 MB/s Write: 22 MB/s	9.6 TB	Optional	✓	✓	
NANODURA		34 x 12.2 x 4.5	SLC	512MB~8GB	-40°C~+85°C	Read: 21 MB/s Write: 16 MB/s	96 TB	-	✓	-	
USB Module		26.6 x 12.0 x 4.5									

\* Available on a project basis.

\*\* All TBW data listed are under random write value in each product line. The TBW data are subject to change by density, configuration and customers' applications.

\*\*\* ATP software support for demo use only.

# Memory Cards



## SD/SDHC/SDXC

ATP Industrial Grade SD/SDHC cards are designed for application in demanding industries, such as automotive, healthcare, and aviation, where critical data requires the highest level of reliability, durability, and data integrity. They are also suitable for removable application and small footprint mechanism devices.

ATP SD cards with read disturb protector-AutoRefresh technology and Autoscan features are best suited for read intensive applications. For instance in the automotive industry, ATP SD cards have been recognized by worldwide major tier 1 Auto Infotainment Suppliers and tier 2 telematics electronic vehicle system developers/service providers for their map system, IVI (in-vehicle-infotainment), and OS boot-up. On the other hand, ATP SD cards with SLC mode and Power cycling solution are ideal for write intensive applications. Such applications include data logging and storage of hospital medical devices and surveillance systems.

Moreover, with ATP's SIP (System-In-Packaging) manufacturing process, the operating/storage temperature of ATP Industrial Grade SD cards is -40 to 85 degrees Celsius. All ATP Industrial Grade products go through multi data pattern burn testing. This is to screen for early fallout occasionally seen in any semiconductor technology.

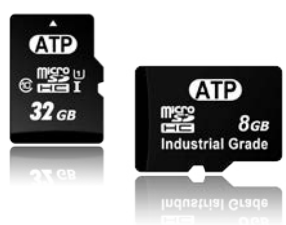
## microSD/microSDHC

ATP Industrial microSD/microSDHC cards are designed for demanding applications, such as navigation system, digital camera, driving recorder, handheld devices, multi-media player and systems and own every features/advantages that ATP SD cards have.

Furthermore, The ATP microSD cards have been tested and qualified by major handheld companies such as Motorola and Honeywell. These products are also ideal for automotive IVI, point of sales, enterprise mobility, and embedded/industrial applications.

## Applications

- Industrial PC
- Medical devices
- Automation
- Automotive IVI systems
- Test and Measurement
- Surveillance systems
- Drive recorders
- Navigations
- Network cameras
- Mobile/Handheld computers



### Key Features

- SLC (Single-Level-Cell) NAND flash and MLC (Multi-Level Cell / 2-bit per Cell) NAND Flash
- Advanced Wear Leveling algorithm
- Bad Block Management
- Read Disturb Protector - AutoRefresh to ensure data integrity during read operation
- IP57/IP67 waterproof/Dustproof test (IEC 60529)
- Highly reliable and pass environmental test (Bend/Torque/Salt Spray/Solar radiation)
- ESD resistance
- Life Monitor (Note : The compatibility and support of Life Monitor may vary on different platform/operation system)

### Specifications

Product Name	SD/SDHC/SDXC	
Flash Type	SLC	MLC
Density	512MB to 32GB	8GB to 128GB
Performance	Sequential Read up to 20 MB/s	Sequential Read up to 87.2 MB/s
	Sequential Write up to 18 MB/s	Sequential Write up to 58.9 MB/s
Interface	SD 2.0	SD 3.0 UHS Mode
Operating Temperature	-40°C to +85°C	-25°C to 85°C
Reliability	Advanced Static/Dynamic Wear-Leveling	
	TBW** (max.) : 384 TB	TBW** (max.) : 34.8 TB
	MTBF @25°C: >5,000,000 hours	MTBF @25°C: >2,000,000 hour
	Number of Insertions: 10,000 minimum	
Dimensions: LxWxH (mm)	32.0 x 24.0 x 2.1	

Product Name	microSD/microSDHC	
Flash Type	SLC	MLC
Density	512MB to 8GB	8GB to 32GB
Performance	Sequential Read up to 20 MB/s	Sequential Read up to 68.3 MB/s
	Sequential Write up to 18 MB/s	Sequential Write up to 24.4 MB/s
Interface	SD 2.0	SD 3.0 UHS Mode
Operating Temperature	-40°C to +85°C	-25°C to 85°C
Reliability	Advanced Static/Dynamic Wear-Leveling	
	TBW** (max.) : 96 TB	TBW** (max.) : 19.2 TB
	MTBF @25°C: >5,000,000 hours	MTBF @25°C: >2,000,000 hour
	Number of Insertions: 10,000 minimum	
Dimensions: LxWxH (mm)	15.0 x 11.0 x 1.0	

\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.

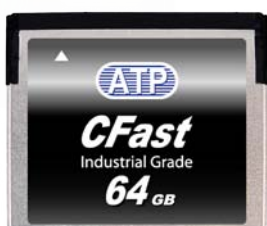


## Memory Cards



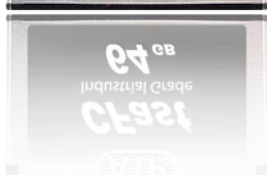
### CompactFlash Card - Industrial Grade

the ATP Industrial Grade CompactFlash Card has enhanced endurance levels for extended product life cycle by utilizing selected SLC NAND flash and Advanced Wear Leveling technology. Moreover, the implemented AutoRefresh technology monitors the error bit levels during each read operation to better ensure data integrity.



### CFast Card - Industrial Grade

With the more advanced SATA interface, the ATP Industrial Grade CFast is the ideal replacement for CompactFlash. The CFast is fully compliant with CFA's CFast specification version 2.0 with a SATA 6 Gb/s interface. The ATP CFast with PowerProtector guarantees reliable controller and lasting NAND flash operations with a backup power circuit during a power failure. By utilizing SLC NAND flash memory and Advanced Wear Leveling technology, the ATP Industrial Grade CFast has higher program/write endurance and a longer product life span.



#### Key Features

- SLC (Single-Level-Cell) NAND Flash with a longer lifespan
- Enhanced endurance with Advanced Wear Leveling algorithm
- Bad Block Management
- Read Disturb Protector - AutoRefresh to ensure data integrity during read operation
- Built-in hardware-based data protection technology during power failure – PowerProtector
- Supports S.M.A.R.T. ATA feature set



#### Specifications

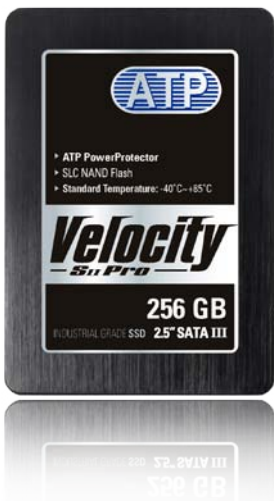
Product Name	CompactFlash Card		CFast Card	
Flash Type	SLC	MLC*	SLC	MLC*
Density	512MB to 32GB	8GB to 32GB	2GB to 32GB	8GB~64GB
Performance	Sequential Read up to 61 MB/s	Sequential Read up to 110 MB/s	Sequential Read up to 500 MB/s	Sequential Read up to 420 MB/s
	Sequential Write up to 55 MB/s	Sequential Write up to 46 MB/s	Sequential write up to 300 MB/s	Sequential write up to 80 MB/s
Interface	UDMA 0~7		SATA III 6 Gb/s	
Operation Temperature	-40°C to 85°C	0°C to 70°C	-40°C to +85°C	0°C to 70°C
Reliability	Advanced Wear Leveling & Bad Block Management			
	TBW** (max.) : 640 TB	TBW** (max.) : 38.4 TB	TBW** (max.) : 640 TB	TBW** (max.) : 38.4 TB
	MTBF @25°C: >5,000,000 hours			
	Number of Insertions: 10,000 minimum			
Dimensions: LxWxH (mm)	36.4 x 42.8 x 3.3		36.4 x 42.8 x 3.6	

\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.

## 2.5" SATA SSDs



### Velocity SII Pro

The ATP Velocity SII Pro 2.5" SSD with SATA III interface is a best-in-class wide-temp industrial grade SLC SSD solution with enterprise-class features. SII Pro SSD offers outstanding performance and proven reliability, ideal for extreme performance, high data security (AES 128/256 encryption), and consistent data integrity requirement (ATP PowerProtector technology), suited for POS, industrial computers, data center and industrial applications exposed to mission critical, high shock and vibration environments.

#### Key Features

- Ideal for heavy program/erase applications
- High Performance with SATAIII interface
- Enhanced endurance with Advanced Wear Leveling algorithm
- Built-in hardware-based data protection technology during power failure – PowerProtector
- NSA Compliant SecureErase
- Supports S.M.A.R.T. ATA feature set
- AES 128/256 bit encryption
- MIL-STD-810G compliant

#### Specifications

Product Name	Velocity SII Pro SSD 2.5" SATA-III
Flash Type	SLC
Density	32GB to 256GB
Performance	Sequential Read up to 520 MB/s
	Sequential Write up to 420 MB/s
	Random Read IOPS up to 9,000
Interface	SATA III 6 Gb/s
Operating Temperature	-40°C to +85°C
Reliability	Advanced Wear Leveling
	TBW** (max.) : 5,120 TB
	MTBF @ 25°C : >2,000,000 hours
Dimensions: LxWxH (mm)	100.0 x 69.9 x 9.2

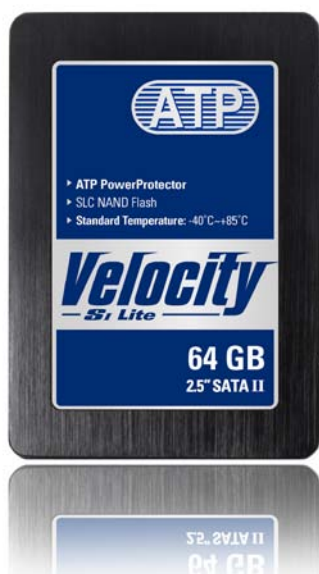


\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.

## 2.5" SATA SSDs



### Velocity SI Lite

The ATP Velocity SI Lite SSD with SATA II interface is specifically designed and engineered for mission critical industrial applications, where high endurance and reliability are required. Utilizing SLC (Single Level Cell) NAND flash components, the ATP Velocity SI Lite SSD offers sequential read speed of up to 182 MB/s and sequential write of up to 133 MB/s. The Velocity SI Lite SSD is a cost-effective alternative for enterprise and industrial applications with high reliability, durability, performance and data integrity requirements.

#### Key Features

- 2.5" SATA II form factor
- Enhanced endurance with Advanced Wear Leveling algorithm
- Built-in hardware-based data protection technology during power failure - PowerProtector
- NSA Compliant SecureErase
- Supports S.M.A.R.T. ATA feature set
- AES 128/256 bit encryption

#### Specifications

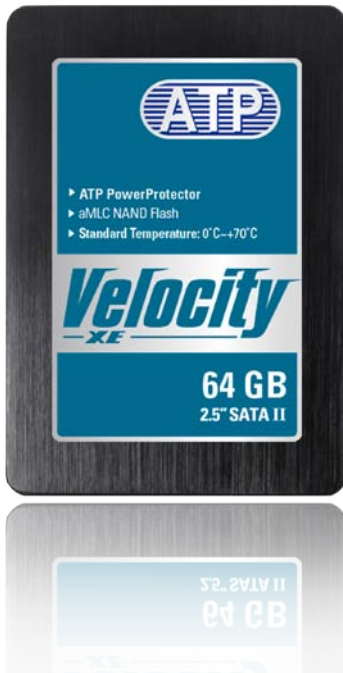
Product Name	Velocity SI Lite 2.5" SSD SATA-II
Flash Type	SLC
Density	4GB to 64GB
Performance	Sequential Read up to 182 MB/s
	Sequential Write up to 133 MB/s
	Random Read IOPS up to 2,700
Interface	SATA II 3 Gb/s
Operating Temperature	-40°C to +85°C
Reliability	Advanced Wear Leveling
	TBW** (max.) : 768 TB
	MTBF @ 25°C : >2,000,000 hours
Dimensions: LxWxH (mm)	100.0 x 69.9 x 9.2



\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.



## Velocity XE

The ATP Velocity XE SATA SSD provides outstanding performance and proven reliability for product operation, which is perfect for networking and thin clients, also suit for enterprise storage systems with outstanding sequential read and writes performance to relieve performance bottlenecks associated with traditional rotating media HDD storage.

### Key Features

- Designed for enterprise applications requiring high endurance on aMLC (Advanced Multi-Level Cell) technology
- Enhanced endurance by Advanced Wear Leveling algorithm
- Support Static Data Refresh technology
- NSA Compliant SecureErase
- Supports S.M.A.R.T. ATA feature set
- AES 128/256 bit encryption

### Specifications

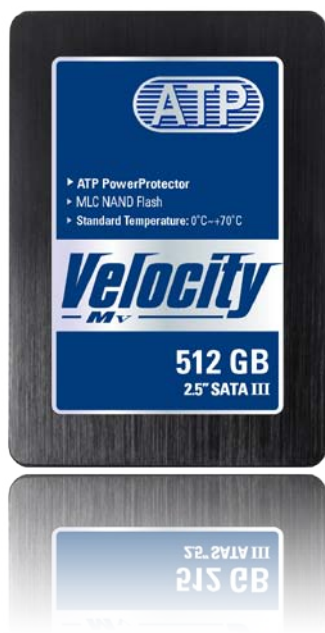
Product Name	Velocity XE 2.5" SSD SATA-II
Flash Type	aMLC
Density	8GB to 64GB
Performance	Sequential Read up to 250 MB/s
	Sequential Write up to 180 MB/s
	Random Read IOPS up to 4,000
Interface	SATA II 3 Gb/s
Operating Temperature	0°C to +70°C
Reliability	Advanced Wear Leveling
	TBW** (max.) : 512 TB
	MTBF @ 25°C : >2,000,000 hours
Dimensions: LxWxH (mm)	100.0 x 69.9 x 9.2

\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.

## 2.5" SATA SSDs



### Velocity M V

Utilizing MLC (Multi Level Cell) NAND flash components, the ATP Velocity M V Enterprise Grade SSD is a best-in-class MLC SSD solution with enterprise-class features for cost-sensitive client environment. M V SSD offers outstanding performance and proven reliability, ideal for extreme performance, high data security (AES 128/256 encryption), and consistent data integrity requirement, suited for POS, industrial computers, data center and industrial applications exposed to high shock and vibration environments.

#### Key Features

- Designed for enterprise applications requiring high endurance on MLC technology
- High performance with SATA III Interface
- Enhanced endurance with Advanced Wear Leveling algorithm
- Built-in hardware-based data protection technology during power failure – PowerProtector
- NSA Compliant SecureErase
- Supports S.M.A.R.T. ATA feature set
- AES 128/256 bit encryption
- MIL-STD-810G compliant

#### Specifications

Product Name	Velocity M V 2.5" SSD SATA-III
Flash Type	MLC
Density	64GB to 512GB
Performance	Sequential Read up to 520 MB/s
	Sequential Write up to 440 MB/s
	Random Read IOPS up to 7,000
Interface	SATA III 6 Gb/s
Operating Temperature	0°C to 70°C
Reliability	Advanced Wear Leveling
	TBW** (max.) : 307.2 TB
	MTBF @ 25°C : >2,000,000 hours
Dimensions: LxWxH (mm)	100.0 x 69.9 x 9.2



\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.



# Embedded Modules



## eUSB SSD

### Pin-Pin Replacement for Intel® Z-U130 Value SSD

The ATP eUSB SSD is specifically designed to support applications such as networking, embedded, and medical applications that previously used Intel's Z-U130 Value SSD. In addition, utilizing PowerProtector technology ensures reliable controller and lasting NAND flash operation with a backup power circuit during a sudden power failure.

#### Key Features

- Product flexibility as a boot drive
- Enhanced endurance with Advanced Wear Leveling algorithm
- Built-in hardware-based data protection technology during power failure - PowerProtector
- Supports S.M.A.R.T. ATA feature set
- RoHS compliant and CE/FCC certification

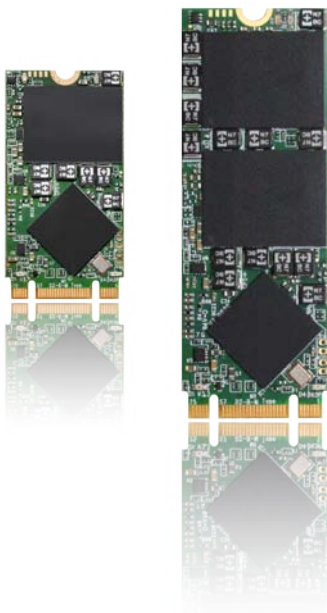
#### Specifications

Product Name	eUSB SSD	
Flash Type	SLC	MLC*
Density	512MB to 16GB	8GB to 16GB
Performance	Sequential Read up to 30 MB/s	Sequential Read up to 30 MB/s
	Sequential Write up to 27 MB/s	Sequential Write up to 22 MB/s
Connector Pin	9 Pins Internal USB (USB 2.0 & 1.1 compliant)	
Operating Temperature	-40°C to +85°C	0°C to 70°C
Reliability	Advanced Wear Leveling	
	TBW** (max.) : 320 TB	TBW** (max.) : 9.6 TB
	MTBF @ 25°C : >5,000,000 hours	
Profile	Standard Profile	Low Profile
Dimensions : LxWxH (mm)	36.9 x 26.6 x 11.5	36.9 x 26.6 x 8.4
Connector Pin Pitch	2.54 mm	2.00 mm



\*Available on a project basis.  
 \*\*All TBW data listed are under highest random write value in each product line.  
 The TBW data are subject to change by density, configuration and customers' applications.

## Embedded Modules



### M.2

The ATP M.2 2242/2260 Embedded SSD is the Next Generation Form Factor (NGFF) storage solution. It provides outstanding performance and proven reliability for product operation, which is perfect for networking and thin clients, also suit for enterprise storage systems with high data security (AES 128 encryption), and consistent data integrity requirement such as POS, industrial computers, data center applications.

#### Key Features

- Enhanced endurance with Advanced Wear Leveling algorithm
- Built-in hardware-based data protection technology during power failure - PowerProtector
- Supports S.M.A.R.T. ATA feature set
- RoHS compliant and CE/FCC certification

#### Specifications

Product Name	M.2			
	2260 D2-B-M		2242 D2-B-M	
Flash Type	SLC	MLC	SLC	MLC
Density	32GB to 128GB	64GB to 256GB	8GB to 64GB	8GB to 128GB
Performance	Sequential Read up to 530 MB/s	Sequential Read up to 530 MB/s	Sequential Read up to 530 MB/s	Sequential Read up to 530 MB/s
	Sequential Write up to 390 MB/s	Sequential Write up to 300 MB/s	Sequential Write up to 400 MB/s	Sequential Write up to 155 MB/s
	Random Read IOPS up to 9,000	Random Read IOPS up to 7,000	Random Read IOPS up to 9,000	Random Read IOPS up to 7,000
Interface	SATA III 6 Gb/s			
Operating Temperature	-40°C to +85°C	0°C to 70°C	-40°C to +85°C	0°C to 70°C
Reliability	Advanced Wear Leveling , AutoRefresh			
	TBW** (max.) : 2,560 TB	TBW** (max.) : 153.6 TB	TBW** (max.) : 1,280 TB	TBW** (max.) : 76.8 TB
	MTBF @ 25°C: >2,000,000 hours			
Dimensions: LxWxH (mm)	60.0 X 22.0 X 3.5		42.0 X 22.0 X 3.5	

\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.





## mSATA & mSATA mini

The mSATA & mSATA mini Industrial Grade Embedded Module is designed for small form factor embedded and networking applications with space constraints and high performance requirements. To provide further data integrity, the ATP PowerProtector technology allows the ATP mSATA & mSATA mini to intelligently manage the read and write process under a sudden power failure. Thus surpassing the technical and space limitations offered by existing power failure protection solutions. PowerProtector's leaner requirements for board footprint allows for support in smaller form factors such as mSATA & mSATA mini.

### Key Features

- Adheres to the JEDEC mechanical specification MO-300A/B
- Built-in hardware-based data protection technology during power failure - PowerProtector
- Ultra high performance solution for small form factor embedded and industrial applications
- Supports S.M.A.R.T. ATA feature set
- RoHS compliant and CE/FCC certification

### Specifications

Product Name	mSATA			mSATA mini
Flash Type	SLC	aMLC	MLC*	SLC
Density	4GB to 128GB	4GB to 64GB	8GB to 256GB	4GB to 32GB
Performance	Sequential Read up to 530 MB/s	Sequential Read up to 250 MB/s	Sequential Read up to 520 MB/s	Sequential Read up to 80 MB/s
	Sequential Write up to 430 MB/s	Sequential Write up to 190 MB/s	Sequential Write up to 300 MB/s	Sequential Write up to 65 MB/s
	Random Read IOPS up to 9,200	Random Read IOPS up to 3,800	Random Read IOPS up to 7,200	Random Read IOPS up to 3,600
Interface	SATA III 6 Gb/s	SATA II 3 Gb/s	SATA III 6 Gb/s	SATA II 3 Gb/s
Operation Temp.	-45°C to +85°C	0°C to +70°C		-45°C to +85°C
Reliability	Advanced Wear Leveling , AutoRefresh, PowerProtector			
	TBW* (max.) : 2,560 TB	TBW** (max.) : 512 TB	TBW* (max.) : 153.6 TB	TBW** (max.) : 640 TB
	MTBF @ 25°C: >5,000,000 hours	MTBF @ 25°C: >3,000,000 hours	MTBF @ 25°C: >2,000,000 hours	MTBF @ 25°C: >5,000,000 hours
Dimensions : LxWxH (mm)	50.8 x 29.8 x 3.7			26.8 x 29.85 x 3.7

\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.



## Embedded Modules



### SlimSATA

With its small size and ratified JEDEC standard, MO-297A, the ATP SlimSATA with PowerProtector is an ideal solution for business critical embedded and networking applications. Featuring a standard SATA interface and premium grade NAND flash components, ATP SlimSATA offers ultra-fast read performance of up to 500 MB/s and write performance of up to 400 MB/s. The ATP SlimSATA offers an alternative solution for embedded applications such as IPC, blades, AdvancedTCA, single board computers, surveillance & security and networking appliance, which has space constraints and requires high performance and reliability.

#### Key Features

- JEDEC standard: MO-297A(Slim SATA) compliant
- Enhanced endurance with Advanced Wear Leveling algorithm
- Built-in hardware-based data protection technology during power failure - PowerProtector
- Supports S.M.A.R.T. ATA feature set
- RoHS compliant and CE/FCC certification

### Specifications

Product Name	SlimSATA		
Flash Type	SLC	aMLC	MLC*
Density	2GB to 128GB	8GB to 64GB	8GB to 256GB
Performance	Sequential Read up to 530 MB/s	Sequential Read up to 250 MB/s	Sequential Read up to 520MB/s
	Sequential Write up to 430 MB/s	Sequential Write up to 190 MB/s	Sequential Write up to 300MB/s
	Random Read IOPS up to 9,200	Random Read IOPS up to 3,800	Random Read IOPS up to 7,200
Interface	SATA III 6 Gb/s	SATA II 3 Gb/s	SATA III 6 Gb/s
Operating Temperature	-40°C to +85°C	0°C to 70°C	
Reliability	Advanced Wear Leveling, AutoRefresh, PowerProtector		
	TBW** (max.) : 2,560 TB	TBW** (max.) : 512 TB	TBW** (max.) : 153.6 TB
	MTBF @ 25°C: >5,000,000 hours	MTBF @ 25°C: >3,000,000 hours	MTBF @ 25°C: >2,000,000 hours
Dimensions: LxWxH (mm)	54.0 x 39.0 x 4.0		

\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.





## SATA DOM

The ATP Horizontal/Vertical SATA DOM provides ultra-fast performance by utilizing the SATA interface with a read speed of 80 MB/s and write speed of 65 MB/s. The module utilizes industrial grade temperature SLC (Single-Level Cell) NAND flash, providing an extended operating temperature range of -40°C to +85°C. It can simply be plugged into the standard SATA 7-pin connector commonly found on newer generation motherboards, thus making it ideal for fanless computers, panel PC, industrial PC and thin client systems. The ATP Horizontal/Vertical SATA DOM has multiple connector configurations to fulfill various ME design limitations of motherboards.

### Key Features

- Compliant with Serial ATA Revision 2.6
- Compatible with SATA 1.5 Gb/s and SATA 3.0 Gb/s interface rates
- Enhanced endurance with Advanced Wear Leveling Algorithm
- Built-in hardware-based data protection technology during power failure - PowerProtector
- Supports S.M.A.R.T. ATA feature set
- RoHS compliant and CE/FCC certification

### Specifications

Product Name	Vertical SATA DOM		Horizontal SATA DOM	
Flash Type	SLC	MLC*	SLC	MLC*
Density	2GB to 16GB	8GB to 32GB	2GB to 16GB	8GB to 32GB
Performance	Sequential Read up to 80 MB/s	Sequential Read up to 170 MB/s	Sequential Read up to 80 MB/s	Sequential Read up to 170 MB/s
	Sequential Write up to 65 MB/s	Sequential Write up to 50 MB/s	Sequential Write up to 65 MB/s	Sequential Write up to 50 MB/s
	Random Read IOPS up to 3,500	Random Read IOPS up to 3,400	Random Read IOPS up to 3,500	Random Read IOPS up to 3,400
Interface	SATA II 3 Gb/s			
Operating Temperature	-40 °C to +85 °C	0°C to 70°C	-40 °C to +85 °C	0°C to 70°C
Reliability	Advanced Wear Leveling, AutoRefresh, PowerProtector			
	TBW** (max.) : 320 TB	TBW** (max.) : 19.2 TB	TBW** (max.) : 320 TB	TBW** (max.) : 19.2 TB
	MTBF @ 25°C: >2,000,000 hours			
Dimensions: LxWxH (mm)	35.5 x 33.1 x 7.6		35.1 x 30.0 x 14.0	

\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.



# USB Drives



## NANODURA / USB Module

ATP Industrial Grade USB Drives are designed for mission critical embedded applications with space constraints, high performance and high data retention requirements. The drives have the extraordinary endurance of 60,000 program/erase cycles, while most MLC-based USB drives on the market have less than 3,000 program/erase cycles. The Industrial Grade USB Drive is ideal for industrial application such as medical, IPC and automation applications.

### Key Features

- Enhanced endurance with Advanced Wear Leveling algorithm
- 10 years data retention for SLC-based ATP Industrial Grade USB Drive vs. 6 months for MLC-based USB drives
- System in Package (SIP) Technology: extreme operating temperature: -40°C to 85°C, water/moisture resistance, vibration, shock and electrostatic discharge resistant
- Supports S.M.A.R.T. ATA feature set
- NSA Compliant SecureErase

### Specifications

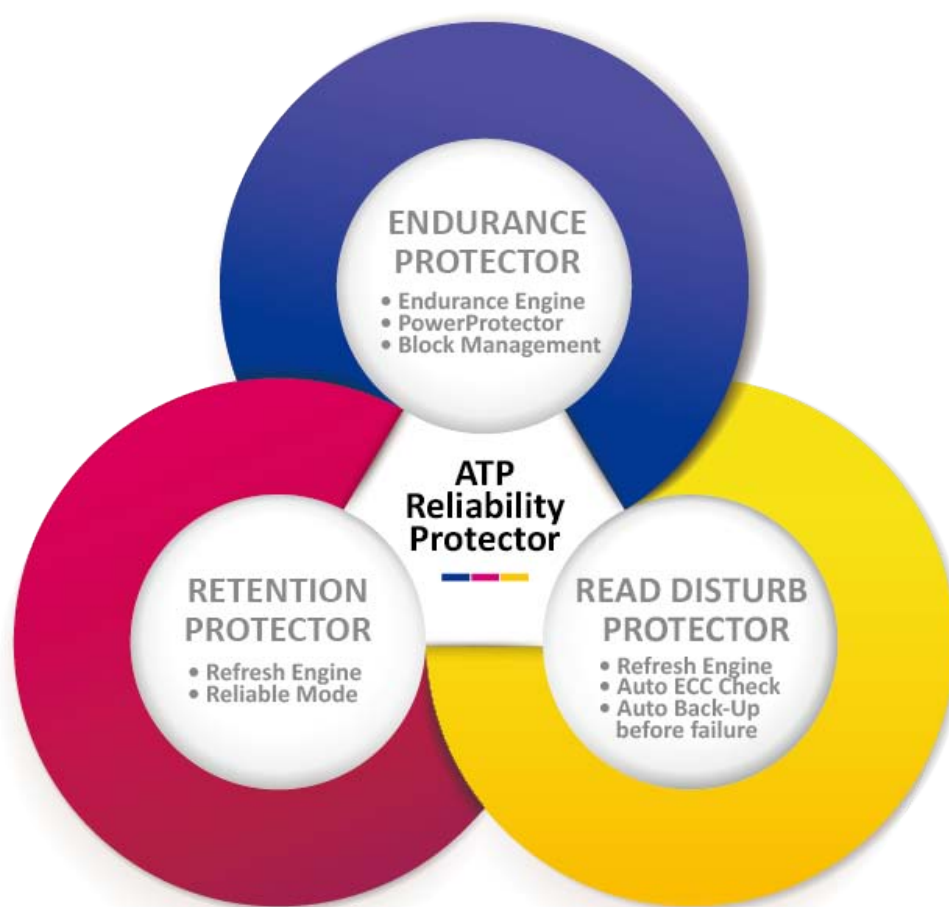
Product Name	USB Drive-NANODURA	USB Module
Flash Type	SLC	
Capacities	512MB to 8GB	
Performance	Sequential Read up to 21MB/s	
	Sequential Write up to 16MB/s	
Interface	Compatible with USB 2.0(480Mbps)	
Operating Temperature	-40°C to +85°C	
Reliability	Advanced Wear Leveling	
	TBW** (max.) : 96 TB	
	MTBF @ 25°C: >5,000,000 hours	
	Number of Insertions: 10,000 minimum	
Dimensions: LxWxH (mm)	34.0 x 12.2 x 4.5	26.6 x 12.0 x 4.5

\*Available on a project basis.

\*\*All TBW data listed are under random write value in each product line.

The TBW data are subject to change by density, configuration and customers' applications.

## ATP Reliability Protector saves your TCO



**Endurance Protector: ¼ TCO**

**Read Protector: >2M times read (ATP) VS.100K times read**

**Retention Protector: 2X more data retention**

[www.atpinc.com](http://www.atpinc.com)

**ATP TAIWAN(HQ)**

TEL: +886-2-2659-6368  
FAX: +886-2-2659-4982  
[sales-apac@atpinc.com](mailto:sales-apac@atpinc.com)

**ATP USA**

TEL: +1-408-732-5000  
FAX: +1-408-732-5055  
[sales@atpinc.com](mailto:sales@atpinc.com)

**ATP EUROPE**

TEL: +49-89-374-9999-0  
FAX: +49-89-374-9999-29  
[sales-europe@atpinc.com](mailto:sales-europe@atpinc.com)

**ATP JAPAN**

TEL: +81-3-6206-8097  
FAX: +81-3-6206-8098  
[sales-japan@atpinc.com](mailto:sales-japan@atpinc.com)

**ATP CHINA**

TEL: +86-21-5080-2220  
FAX: +86-21-5080-2219  
[sales@cn.atpinc.com](mailto:sales@cn.atpinc.com)