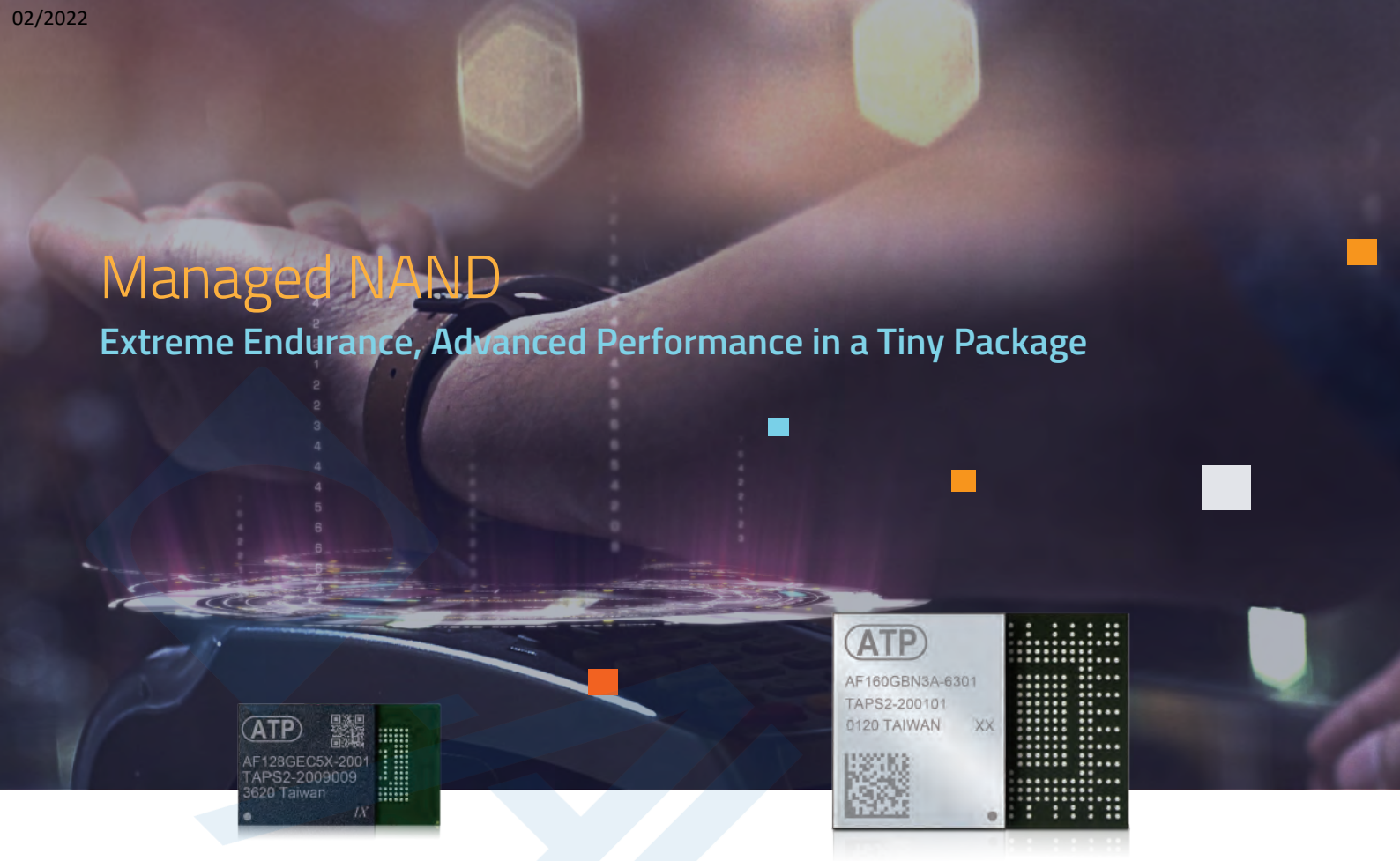

Managed NAND

Extreme Endurance, Advanced Performance in a Tiny Package

ATP's managed NAND solutions integrate raw NAND flash memory and hardware controller. As soldered-down solutions, they are secure against constant vibrations, making them ideal for embedded and automotive applications requiring rugged endurance and durability.

e.MMC offerings use a 153-ball fine pitch ball grid array (FBGA package). Smaller than a typical postage stamp, its tiny footprint makes the e.MMC perfectly suitable for embedded systems with space constraints but require rugged endurance, reliability and durability in harsh environments.

NVMe Heat Sink Ball Grid Array (HSBGA) SSDs are ATP's tiniest NVMe flash storage solutions. They use high-speed PCIe 3.0 interface x4 lanes and NVMe protocol to deliver up to 32 Gb/s bandwidth at 8 Gb/s per lane.

Key Differentiators*

- **Extreme Endurance:**** 2-3X Higher than standard e.MMC for higher terabytes written (TBW), healthy memory storage, and long product service life.
- **SRAM Soft Error Detection and Recovery.***** Maximizes data integrity by providing timely error detection, logging, and configurable action to address the error.
- **Product Traceability.** Laser imprints important information on the ATP e.MMC to identify each piece for accurate tracking and efficient inventory management.

* May vary by product and project support.
** Under best write amplification index (WAI) with highest sequential write value. May vary by density, test configuration, workload and applications.
*** Configuration is predetermined by the customer with ATP and cannot be changed on the field.

Key Differentiators*

- **pSLC Mode.** Storing only one bit per cell increases endurance and reliability, offering 2X-3X better sustainable performance.
- **Optimized Power Consumption.** Consuming low power at only 5 mW duringPower State 4 (Sleep Mode) to deliver huge power savings.
- **DRAM-Less Configuration.** Host Memory Buffer (HMB) support improves performance by obtaining DRAM resources as cache, thus overcoming the limited memory capacity within the storage and optimizing I/O performance.
- **Better Thermal Dissipation.** The heat sink effectively transfers heat to cool the device and keep the performance at optimal levels.
- **Optional Security Features:** HW Write Protect, HW Quick Erase, HW Secure Erase (Data Sanitization, AFSSI-5020), AES-256 Encryption, TCG Opal 2.0

e.MMC

Key Features

- AEC-Q100 Grade 2 (-40°C~105°C) Compliant
- AEC-Q100 Grade 3 (-40°C~85°C) Compliant
- 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*
- Designed with 3D NAND

* Low-density parity-check error correcting code. By product support.

e.MMC								
	Extended Industrial Grade		Automotive Grade 2		Automotive Grade 3		Industrial Grade	
Product Line	Premium	Superior	Premium	Superior	Premium	Superior	Premium	
	E700Pa	E600Sa	E700Paa	E600Saa	E700Pia	E600Sia	E750Pi	E700Pi
Flash Type	3D Pseudo SLC	3D MLC	3D Pseudo SLC	3D MLC	3D Pseudo SLC	3D MLC	3D Pseudo SLC	
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 105°C		-40°C to 85°C		-40°C to 85°C	
Capacity*	8 GB to 64 GB	16 GB to 128 GB	8 GB to 64 GB	16 GB to 128 GB	8 GB to 64 GB	16 GB to 128 GB	10 GB to 21 GB	8 GB to 64 GB
Performance								
Sequential Read/Write up to (MB/s)**	300 / 240	300 / 170	300 / 240	300 / 170	300 / 240	300 / 170	295/ 215	300 / 240
Bus Speed Modes	x1 / x4 / x8							
ICC (Typical RMS in Read/Write) mA	135 / 155	135 / 180	135 / 155	135 / 180	135 / 155	135 / 180	95.5 / 92	135 / 155
ICCQ (Typical RMS in Read/Write) mA	110 / 95	110 / 100	110 / 95	110 / 100	110 / 95	110 / 100	104 / 87.5	110 / 95
Endurance and Reliability								
Endurance TBW² (Max.)	1,213 TB	309 TB	1,213 TB	309 TB	1,320 TB	824 TB	1,034 TB	1,320 TB
Reliability MTBF @ 25°C	>2,000,000 hours							
Others								
Dimensions: L x W x H (mm)	11.5 x 13.0 x 1.3							
Certifications	AEC-Q100, RoHS, REACH						RoHS, REACH	
Warranty	One Year							

e.MMC								
	Industrial Grade				Commercial Grade			
Product Line	Premium	Superior			Premium		Superior	Value
	E700Pi	E650Si	E600Si	E600Si	E750Pc	E700Pc	E650Sc	E600Vc
Flash Type	3D Pseudo SLC	3D TLC	3D MLC	3D TLC	3D Pseudo SLC		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		-40°C to 85°C		-25°C to 85°C			
Capacity*	10 GB to 21 GB	32 GB to 64 GB	16 GB to 128 GB	32 GB to 64 GB	10 GB to 21 GB		32 GB to 64 GB	
Performance								
Sequential Read/Write up to (MB/s)**	290 / 220	290 / 205	300 / 170	290 / 220	295 / 215	290 / 220	290 / 205	290 / 220
Bus Speed Modes	x1 / x4 / x8							
ICC (Typical RMS in Read/Write) mA	80 / 99	69.5 / 68.5	135 / 180	100 / 73	95.5 / 92	80 / 99	69.5 / 68.5	100 / 73
ICCQ (Typical RMS in Read/Write) mA	109 / 94	88 / 85.5	110 / 100	108 / 90	104 / 87.5	109 / 94	88 / 85.5	108 / 90
Endurance and Reliability								
Endurance TBW** (Max.)	682 TB	70 TB	824 TB	20 TB	1,034 TB	682 TB	70 TB	20 TB
Reliability MTBF @ 25°C	>2,000,000 hours							
Others								
Dimensions: L x W x H (mm)	11.5 x 13.0 x 1.0							
Certifications	RoHS, REACH							
Warranty	One Year							

Technologies & Add-On Services***													
Premium	○	○	○	○	○	○	○	○	○	○	○	○	▲
Superior	○	○	○	○	○	○	○	○	○	○	○	○	▲
Value	○	○	○	○	○	○	○	○	▲	○	○	○	▲

* Low-density parity-check error correcting code. By product support.
** All performance is collected or measured using ATP proprietary test environment, without file system overhead.
*** Please refer to pages 45-47. ▲: Customization option available on a project basis.

NVMe HSBGA

Key Features

- PCIe Gen3 x4, NVMe 1.3, M.2 Type 1620
- pSLC mode with 2X-3X of Sustainable Performance*
- High/Stable performance with Optimized Thermal Throttling Firmware/Heatsink (HSBGA)
- Optimized Power Consumption: 5 mW during Power State 4
- DRAM-less configuration supporting HMB (Host Memory Buffer)*
- Optional Security features available **

* Under highest Sequential write value. May vary by density, configuration and applications.
**Optional, by project support.

HSBGA M.2, Type 1620		
Product Line	Premium	
	N700Pi	N700Pc
Interface	PCIe G3 x4, NVMe 1.3	
Flash Type	Pseudo SLC	
Form Factor	291-Ball, HSBGA	
Operating Temperature (Tcase)[1]	-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	40 GB / 80 GB / 160 GB	
Performance		
Sequential Read (MB/s) up to	2,000	
Sequential Write (MB/s) up to	1,600	
Random Reads IOPS (4K, QD32) up to	95,000	
Random Writes IOPS (4K, QD32) up to	75,000	
Endurance and Reliability		
Endurance (TBW)[2] up to	4,280 TB	
Reliability MTBF @ 25°C	>2,000,000 hours	
Others		
Dimensions: L x W x H (mm)	16.0 x 20.0 x 1.6	
Certifications	RoHS, REACH	
Warranty	One Year	

Technologies & Add-On Services[3]										
Premium	○	○	○	○	○	○	▲	▲	○	○

1 Case Temperature, the composite temperature as indicated by SMART temperature attributes.
2 Under highest Sequential write value. May vary by density, configuration and applications.
3 Please refer to pages 45-47. ▲ Customization option available on a project basis.

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