(→) SANDISK® iNAND® AT EN610 NVMe™ SSD

Embedded Flash Drive

Supporting the distributed and shared architectures

SANDISK® iNAND® AT EN610 NVMe SSD offers an automotive-grade, high-performance, wide–temperature range storage solution designed for the demanding requirements of next-generation automotive architectures. With flexibility through high-capacity TLC and high-endurance SLC options, the iNAND® AT EN610 SSD offers an M.2 Type 1620 BGA form factor and up to 1TB[1] of storage space.

Flexibility for distinct needs

Up to four PCIe® Gen4 lanes deliver exceptional speed and offer a versatile storage solution, with up to 1TB[1] of TLC storage. This can be fully or partially configured to SLC storage for applications requiring lower latencies, higher endurance, and higher write sustained performance.

Virtualization enablement

SR-IOV technology enables multiple Virtual Functions (VFs) within a single SSD, resulting in each application having its own virtual SSD.

Automotive-grade design

iNAND AT EN610 NVMe SSD complies with AEC-Q100, ISO 26262, and ASPICE, and goes through rigorous testing to ensure the reliability and quality essential for automotive applications. This device is outfitted in a BGA 16mm × 20mm package with a pin-out adhering to PCI-SIG standard specifications, providing a standardized, durable, and solid solution.

Enhanced device security

The device incorporates the TCG Opal 2.02 protocol and utilizes the AES-256-XTS encryption algorithm to help ensure that data stored on the drive is encrypted and protected. To further enhance data security, the secure boot and firmware upgrade processes are designed so only authorized firmware is executed on the device.

Product Highlights

- High performance at Automotive - temperatures -40˚C to +105˚C[3]
- SR-IOV with 8 × Virtual Functions
- PCIe Gen4×4
- M.2 Type 1620 BGA
- 256GB, 512GB, 1TB[1]
- 32 namespaces TLC and SLC configurable

Applications

- High Performance Central Compute
- In-Vehicle Infotainment (IVI)
- Advanced Driver Assist Systems (ADAS)
- Autonomous Driving System (ADS)
- Multi-host needing shared storage

	256GB[1]	512GB[1]	1024GB[1]
Product Information			
Form-factor	M.2 Type 1620-S5 BGA per PCI-SIG 16mm × 20mm × 1.8mm (W×H×L)		
Interface	PCIe Gen4×4 (Backward compatible) NVMe 1.4c 1 × Physical Function		
NAND	BiCS5 112L, 512Gb, TLC, auto-trim		
DRAM	DRAMless Host Memory Buffer supported		
Endurance (TBW)	700	1,400	2,800
Performance[2]			
Burst Sequential Read [MB/s]	2,500	3,700	3,700
Burst Sequential Write [MB/s]	1,100	2,200	3,000
Sustained Sequential Read [MB/s]	1,900	3,000	3,500
Sustained Sequential Write [MB/s]	200	400	800
Random Read [IOPs]	120K	200K	270K
Random Write [IOPs]	55K	110K	210K
Temperatures[3]	-40°C to +105°C, AEC-Q100 Grade-2		
Power[4]	6.8W (peak), 5.0W (avg @ 2.5V PS0), 5mW (lowest power state PS0/D3)		
Power Supply	PWR_1: 3.3V/2.5V PWR_2: 1.2V PWR_3: 0.8V		
Virtualization	SR-IOV with 8 × Virtual Functions Virtualization Management		
Namespaces	32 Namespaces Each can be configured as TLC or SLC up to the available LBA range Capabilities: Namespace Format, Namespace Reservations, and control access		
Health Reporting	Enhanced Automotive Self-Monitoring Advanced Reporting Technology (S.M.A.R.T.), in addition to NVMe standard-defined SMART attributes		
Data Integrity	Low-density parity-check code (LDPC) Page-level protection with XOR mechanism End-to-End Data-Path Protection (E2E DPP) SRAM Error-Code Correction		
Reliability	Automatic Data Self-refresh and Host Manual Refresh Comprehensive thermal management with full performance up to above +105°C		
Security	TCG Opal 2.02 support, Secure boot, Secure FFU and locking external connections		
Safety	ISO-26262 ASIL-B ready, Safety Manual and FMEDA report availability		
Automotive Compliant	A-SPICE level-2 and IATF16949 Certification AEC-Q100, APQP and PPAP and ZVEI PCN		

Order Information

256GB[1]	512GB[1]	1024GB[1]
SDDQUGD-256G-ZA	SDDQUGD-512G-ZA	SDDQUGD-1T00-ZA

1. Per IDEMA specifications. One gigabyte (GB) is equal to one billion bytes and one terabyte (TB) is equal to one trillion bytes. Actual user capacity may be less due to operating enviroment.
2. HMB enabled. All numbers are measured under nominal voltage and room temperature. One megabyte (MB) is equal to one million bytes. Procondition: filling the drive twice sequential data. Sequential test settings: QD=8 | Threads=1 | Range size=1GB | Block size=128KB; Sequential sustained test settings: QD=8 | Threads=1 | Range size=100% | Block size=128KB. Random test setting: QD=32 | Threads=16 | Range size=1GB | Block size=4KB.
3. Operational temperature is defined as -40°C refers to ambient temperature. +105°C refers to the SMART composite temperature reported by the drive. (when thermal throttling is triggered).
4. Typical Power Number under nominal conditions and subject to change.
5. If configured as 100% SLC.

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