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

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

Embedded Flash Drive

Supporting 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 NVMe™ 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 sustained write 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 quality standards, certified for ASPICE CL3, is ISO26262 ASIL-B ready, and goes through rigorous testing to help ensure the reliability and quality essential for automotive applications. This device is outfitted in a BGA 16mm x 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.

	TLC			SLC[4]		
	256GB[1]	**512GB[1]**	**1024GB[1]**	**85GB[1]**	**170GB[1]**	**340GB[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, Automotive-trim					
DRAM	DRAMless Host Memory Buffer supported					
Endurance (TBW)[7]	700	1,400	2,800	7,500	15,000	30,000
Temperatures[3]	-40°C to +105°C, AEC-Q100 Grade-2, A2T per JESD402					
Performance[2]						
Burst Sequential Read [MB/s]	2,500	3,700	3,700	2,500	3,700	3,700
Burst Sequential Write [MB/s]	1,100	2,200	3,000	1,100	2,200	3,000
Sustained Sequential Read [MB/s]	1,900	3,000	3,500	2,500	3,700	3,700
Sustained Sequential Write [MB/s]	200	400	800	1,100	2,200	3,000
Random Read [IOPs]	190K	350K	550K	190K	350K	550K
Random Write [IOPs]	230K	270K	320K	250K	450K	500K
Electricity						
Power Supply	PWR_1: 3.3V/2.5V PWR_2: 1.2V PWR_3: 0.8V					
Power[5]	3.8W (PS0), 24mW (PS4/D3Hot)					
Features						
Virtualization	SR-IOV with 8 x Virtual Functions Virtualization Management					
Namespaces	32 Namespaces Each can be configured as TLC or SLC up to the available LBA range Capabilities. Namespace features include: Namespace Format, Namespace Reservations, and control access					
Security	TCG Opal 2.02 encryption, Secure boot, Secure FFU and locking external connections					
Quality and Reliability						
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 recovery 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 +105°C					
Automotive Standards						
Safety	ISO-26262 ASIL-B ready, comply with Safety Manual and FMEDA report					
Automotive Compliant	A-SPICE capability level-3 and IATF16949 certification. AEC-Q100 quality standards compliance, APQP and PPAP, ZVEI PCN and 8D report for FA and CAPA					

Order Information[6]

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 byte. 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. Precondition: 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. If configured as 100% SLC.
5. The average power with PWR_1 input is 2.5V and the measured at +105°C Tc.
6. The P/N is for tray packaging. For Tape & Reel packaging, use the P/N with a "T" suffix.
7. Projected maximum TBW. Based on a sequential 128KB transfer size workload (without idles). 100% of usable capacity. Assumed WAF=1.

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