SANDISK™

(→) SANDISK® IX SN530 NVMe™
Industrial-Grade SSD

Empowering a new generation of data-rich industrial and autonomous driving designs

SANDISK® IX SN530 NVMe™ industrial-grade SSD offers a high-performance, wide–temperature range storage solution designed for the demanding requirements of industrial and autonomous driving applications. With flexibility through high-capacity TLC and high-endurance SLC options, the IX SN530 SSD offers two M.2 form factors and up to 2TB[2] of storage space.

Product Highlights

- High performance at industrial-grade temperatures -40˚C to +85˚C[9]
- Up to 2TB[2] in M.2 2280 and up to 1TB[2] in M.2 2230
- Available in TLC and SLC configurations

Applications

- Industrial PCs
- Factory automation
- Robotics
- Fanless designs
- Digital signage
- Data logging and boot device for autonomous driving systems

Features

Built for Extreme Conditions

The IX SN530 SSD supports a wide range of environmental conditions, including operating temperatures and shock and vibration, which allows it to be used in systems placed in various physical locations in a vehicle or other equipment, enabling placement flexibility for system designers.

Robust and Reliable Design

A fully vertically integrated solid state drive, the IX SN530 SSD is built with SANDISK's 96-layer 3D NAND technology, in-house controller and firmware development, internal validation and qualification, and extensive testing; making it ideal for handling a wide variety of industrial and automotive use cases. In addition, Sandisk supports five-year longevity with controlled bill-of-material and provides product change notifications, for customers' peace of mind.

Further, by offering SLC configurations, the IX SN530 SSD supports write-intensive applications, such as data recorder and data set management, saving the need to use multiple high-capacity TLC devices by delivering up to 9 times the TLC endurance and up to 5 times the TLC sustained write performance.

Gearing Up with NVMe SSDs

The IX SN530 SSD is available in two M.2 form factors—a compact M.2 2230 and M.2 2280—addressing a variety of system designs and mechanical constraints. This compact solution helps to reduce maintenance costs and enhance serviceability, making the transition to industrial-grade PCIe® NVMe™ SSDs easier.

Product Information

Capacity[2]	85GB	170GB	340GB	256GB	512GB	1TB	2TB
Interface[1]	PCIe® Gen3 x4 NVMe v1.4						
Form factors	M.2 2280-S3-M / M.2 2230-S3-M						M.2 2280-S3-M
3D NAND flash	SLC 96-layer			TLC 96-layer			

Performance

	85GB	170GB	340GB	256GB	512GB	1TB	2TB
Sequential Read up to (MB/s)[3]	2,400	2,400	2,400	2,400	2,400	2,400	2,500
Burst Sequential Write up to (MB/s)[4]	900	1,750	1,950	900	1,750	1,950	1,800
Sustained Sequential Write up to (MB/s)[3]	900	1,750	1,950	140	280	540	525
Random Read up to (IOPS)[3]	160K	310K	410K	160K	310K	410K	360K
Random Write up to (IOPS)[3]	180K	330K	350K	85K	150K	350K	315K

Power (projected)

	85GB	170GB	340GB	256GB	512GB	1TB	2TB
Average Power (W)[5]	3.3	3.3	3.5	3.5	3.5	3.5	3.9
Peak Power (W)[6]	5.5	5.5	5.5	5.5	5.5	5.5	5.5

Reliability

	85GB	170GB	340GB	256GB	512GB	1TB	2TB
Endurance (TBW)[7]	6,000	12,000	24,000	650	1,300	2,600	5,200
Mean Time To Failure (MTTF)[8] (Hours)	3,000,000						
Unrecoverable Bit Error Rate (UBER)	1 error per 10^{16} bits read						
Data Retention (EOL)	1 year at +55°C						

Environmental

Operating Temperature[9]	-40°C to +85°C
Non-Operating Temperature	-40°C to +95°C
Operating Vibration	20GRMS, 7 to 2,000Hz, 30min/axis on 3 axes
Shock	1,500G, 0.5ms Half Sine pulse duration
Altitude	-1500ft (-457m) to 40,000ft (12,192m)
Certifications	FCC, CE, UL,BSMI, KCC, RCM, Morocco, VCCI and CAN ICES-3(B)/NMB-3(B)

Advanced Features

Functional
- DRAM-less architecture with Host Memory Buffer (HMB) support.
- nCache® 3.0 SLC tiered caching technology.

Reliability
- End-to-end data path protection.
- 3-gear LDPC engine with advanced DSP capabilities in hardware.
- NAND XOR protection for multi-page recovery.
- Automatic Data Refresh.
- NVMe™ S.M.A.R.T.

Flash management
- Dynamic and static wear-leveling, bad block management and background garbage collection.

Security
- TCG Pyrite security support for password protection (ATA-like).
- Secure Boot including RSA authentication and secure field firmware upgrade.

Physical Dimensions

Weight typical (gr)	2230: 3.2 ± 0.5 / 2280: 7.5 ± 1.0	2280: 7.5 ± 1.0
Width (mm)[10]	2230: 22 ± 0.15 / 2280: 22 ± 0.15	2280: 22 ± 0.15
Length (mm)[10]	2230: 30 ± 0.15 / 2280: 80 ± 0.15	2280: 80 ± 0.15
Thickness maximum (mm)[10]	2.38	

Ordering Information

	85GB	170GB	340GB	256GB	512GB	1TB	2TB
M.2 2230-S3-M	SDBPTPZ-085G-XI	SDBPTPZ-170G-XI	SDBPTPZ-340G-XI	SDBPTPZ-256G-XI	SDBPTPZ-512G-XI	SDBPTPZ-1T00-XI	N/A
M.2 2280-S3-M	SDBPNPZ-085G-XI	SDBPNPZ-170G-XI	SDBPNPZ-340G-XI	SDBPNPZ-256G-XI	SDBPNPZ-512G-XI	SDBPNPZ-1T00-XI	SDBPNPZ-2T00-XI

1. PCI Express 3.0 up to four lanes, and a bit rate of 2.5Gbps or 5Gbps or 8Gbps. Configurable lane width: x1, x2 and x4. NVM Express version 1.4
2. The capacities are based on IDEMA Standard LBA 1–03. One megabyte is equal to one billion bytes, 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 environment. 2TB is supported by M.2 2280 form factor only.
3. Test Conditions: burst performance is measured by CrystalDiskMark 6.0.0, using 1000MB LBA range as a secondary drive in desktop with Intel® Core™ i7 7700 CPU, 8GB RAM. OS: Windows 10 Pro 64-bit 20H1 19041.208 with Microsoft StorNVMe driver. Sequential read performance refers for both burst and sustained specifications.
4. Test Conditions: sustained sequential performance is measured by FIO 1.97, using 100% LBA range as a secondary drive in Dell Precision 7820, with Intel® Xeon® Silver 4208 CPU, 16GB RAM. OS: Cent OS 8, Kernel 4.18.0–193.6.3.el8_2.x86_64.
5. Average maximum power is measured while the SSD is continuously processing sequential read and write commands for at least 10 seconds, with a transfer size of 128KB per command, QD= 32 and 1 thread. Sampling interval is 1 second. Measured at 25°C and can vary due to input voltage and ambient temperature variation.
6. Peak power is the maximum instantaneous power consumption measured while the SSD is continuously processing commands for at least 10 seconds, with a transfer size of 128KB per command, QD=32 and 1 thread. The sampling interval is 10µs. Measured at 25°C and can vary due to input voltage and ambient temperature variation.
7. TBW = Terabytes Written. Projected endurance is calculated based on sustained sequential write operation without frequent idle.
8. Based on Sandisk internal calculation, using a prediction methodology in accordance with the Telcordia Special Report SR-332. The prediction is based on a Parts Stress Analysis, performed at a temperature of 40°C in a GB (ground, benign) environment with duty cycle of 12 hours per day.
9. Operational temperature is defined such as -40°C refers to ambient temperature. +85°C refers to NAND BGA case temperature. When SMART composite temperature reported by the drive exceeds 85°C, thermal throttling will be initiated.
10. The form factor complies with PCI Express M.2 Specification, rev. 4.0. Components Z height above PCB <=1.5mm (S3).