Industrial and IoT Storage Solutions

Western Digital®

- Decades of innovation in the flash memory industry

- Broad portfolio of NAND flash products for industrial and IoT applications

- World-class fabs

- Vertically integrated products (including controller, firmware, assembly and testing)

- Extensive ecosystem integration and system-level expertise

- Remote monitoring capabilities

Empowering IoT and Industrial Innovation

The convergence of ubiquitous connectivity and compute capability is driving an exponential growth in connected devices and connected sensors, generating incredible volumes of data and enabling vast new types of transformative applications and business models. Adding to this complicated but exciting picture are the tremendous amounts of data rapidly flowing from artificial intelligence and machine learning. In addition to capturing this data locally as primary or backup storage, edge storage devices, such as Western Digital embedded storage, Solid State Drives (SSDs) and industrial cards, will help maximize network efficiency and enable systems to analyze the data and act on the results in real-time.

Meeting Industrial and IoT Demanding Environmental, Endurance and Reliability Requirements

Leveraging 30 years of expertise in NAND flash memory and storage systems, Western Digital Industrial-Grade products deliver edge storage solutions for industrial and IoT applications requiring durability, high reliability, and high-intensity recording across a wide range of operational requirements. Designed and tested to withstand demanding environmental conditions, such as extreme temperatures, humidity and vibration, our portfolio features advanced memory management firmware, which includes power immunity, auto/manual read refresh, error-correcting code (ECC), and wear leveling. Data (write)-intensive applications can rely on Western Digital Industrial products to capture every critical moment, log each event, and ensure quality of service to end-users. These high-endurance solutions offer extended product life cycles which can reduce total cost of ownership (TCO) by eliminating costly redesigns and minimizing unnecessary maintenance calls.

Serving Industrial and IoT Applications

Industrial PC
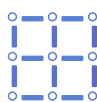
Networking

Digital Signage

Factory Automation

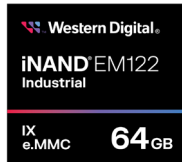**Medical and Agriculture**

SoM and SBC

Transportation

POS and Ultra-thin Devices

Advanced Features

e.MMC Embedded Flash Drives

iNAND® IX EM122 and EM132 e.MMC 5.1 storage solutions offer dependable and robust embedded storage options to system designers in the Industrial and IoT market. The EM132 is the first 256GB and 3D NAND-based e.MMC in the Industrial and IoT market.

Features and Benefits
- e.MMC 5.1 interface
- 8GB to 256GB[1] in small form factor
- Wide temperature range: −25°C to 85°C (I and MC) and −40°C to 85°C (XI)
- Auto and manual refresh, enhanced health status, smart partitioning

UFS Embedded Flash Drive

iNAND IX EU312 and iNAND IX EU552 the industrial-grade UFS versions 2.1 and 3.1, based on 3D NAND technology, deliver higher capacities and better performance compared to e.MMC-based products.

Feature and Benefits
- UFS 2.1 interface for high data speeds, 64GB to 512GB in small form factor
- UFS 3.1 interface for the latest I/F speed, 128GB to 512GB in small form factor
- Wide temperature range: −25°C to 85°C (I) and −40°C to 85°C (XI)
- Fast boot, auto refresh and host manual refresh, enhanced health status
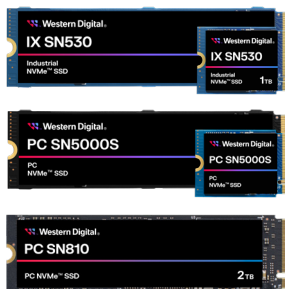
PCIe® SSD

Western Digital IX SN530, PC SN5000S, PC SN740 and PC SN810 NVMe™ SSDs are designed to capture massive amounts of sensor and imaging (video) data from POS, delivery robots, factory automation, industrial PCs and laptops and gaming devices—some generating terabytes of data per day.

Features and Benefits
- PCIe Gen3x4 NVMe 1.4 PCIe Gen4x4 NVMe 1.4 (PC SN810 & PC SN5000S)
- M.2 2280 and M.2. 2230 form factors
- TLC and SLC configurations for higher endurance of up to 24 PBW (IX SN530)
- High capacities up to 2TB
- Wide temperature range: −40°C to 85°C (IX SN530) 0°C to 85°C (PC SN740) 0°C to 80°C (PC SN810 & PC SN5000S)

[1] One megabyte is equal to one million 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.

Advanced Features

SATA SSD

Western Digital PC SA510 delivers high performance and reliability with low power consumption based on 112 Layer TLC (triple level cell) 3D-NAND flash technology. In capacities of up to 1TB[1], the PC SA510 achieves this while expending less power. The PC SA510 is available in 2.5"/7mm cased or M.2 2280 form factors providing required space savings and design flexibility.

Feature and Benefits:
- Capacities up to 1TB[1] for a multitude of design options
- Leading-edge SATA performance up to 560MB/s[2] sequential read
- Sequential Read / Write up to 560 / 520 MB/s
- Random Read / Write up to 91k / 84 k IOPS

[2] 1 MB/s = 1 million bytes per second. Based on internal testing; performance may vary depending upon host device, usage conditions, drive capacity, and other factors. IOPS = input/output operations per second. Performance measured using CrystalDiskMark (1000MB LBA range) on SATA 6Gb/s host.

SD Cards

Industrial SD Card IX LD332 and LD342 are ideal for Industrial and IoT applications that require a removable storage media like drones, drive recorder, digital signage, aviation, and body and dash cams.

Features and Benefits
- 8GB to 512GB
- High endurance (3K P/E Cycle)
- Wide temperature range: −25°C to 85°C (I) and −40°C to 85°C (XI)
- BOM control
- Extended longevity

microSD™ Cards

Industrial microSD Card IX QD332, QD334 and QD342 offer industrial-grade extended temperature flexibility to support customers that not only want a removable solution but also a small form factor with extreme endurance. SLC, MLC, and TLC solutions are available.

Features and Benefits
- 8GB to 256GB
- Wide temperature range:
  −25°C to 85°C (I) and −40°C to 85°C (XI)
- Extreme endurance (Up to 30K P/E cycle)
- Longevity
- BOM control
- Auto/manual refresh, health status, host lock

Industrial Embedded Flash Drives

	iNAND IX EM132	iNAND IX EM122	iNAND IX EU552	iNAND IX EU312	iNAND MC EM141
Interface	e.MMC 5.1	e.MMC 5.1	UFS 3.1	UFS 2.1	e.MMC 5.1
Capacity[1]	16GB to 256GB	8GB to 64GB	64GB to 512GB	16GB to 256GB	32 GB to 256 GB
Operating Temperature	−25°C to 85°C (I) −40°C to 85°C (XI) 32GB to 256GB	−25°C to 85°C (I) −40°C to 85°C (XI)	−25°C to 85°C (I) −40°C to 85°C (XI)	−25°C to 85°C (I) −40°C to 85°C (XI)	−25 °C to 85 °C
NAND Flash Technology	3D TLC	2D MLC	3D TLC	3D TLC	3D-TLC
Ordering Information	SDINBDA6-XXXG-I1/XI1	SDINBDG4-XXXG-I2/XI2	SDINFDQ6-XXXG-I1/XI1	SDINDDH6-XXXG-I/XI	SDINBDV4-XXXG

Industrial SD Cards

	Industrial IX LD342	Industrial IX LD332
Interface	SD 6.0 UHS-I 104	SD 5.1 UHS-I 104
Capacity[1]	16GB to 512GB	8GB to 64GB
Operating Temperature	−25°C to 85°C	−25°C to 85°C (I) −40°C to 85°C (XI)
NAND Flash Technology	3D TLC	2D MLC
Speed Class	C10, U1, U3, V10, V30	C10
Performance R/W[2]	Up to 100/50 MB/s	Up to 80/50 MB/s
Ordering Information	SDSDAF4-XXXG-I	SDSDAF3-XXXG-I/XI

Industrial microSD Cards

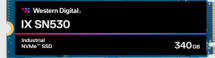|	Industrial IX QD342	Industrial IX QD332	Industrial IX QD334
Interface	SD 6.0 UHS-I 104	SD 5.1 UHS-I 104	SD 5.1 UHS-I 104
Capacity[1]	16GB to 256GB	8GB to 128GB	8GB to 64GB
Operating Temperature	−25°C to 85°C	−25°C to 85°C (I) −40°C to 85°C (XI)	−40°C to 85°C (XI)
NAND Flash Technology	3D TLC	2D MLC	2D SLC
Speed Class	C10, U1, U3, V10, V30	C10, U1	C10, U3
Performance R/W[2]	Up to 100/50 MB/s	Up to 80/50 MB/s	Up to 90/50 MB/s
Ordering Information	SDSDQAF4-XXXG-I	SDSDQAF3-XXXG-I/XI	SDSDQED-XXXG-XI

SATA Drives for Industrial and IoT Applications

	PC SA510
Interface	SATA 6Gb/s
Form Factor	2.5"/7mm cased, M.2 2280
Capacity[1]	250GB to 1TB
Operating Temperature	0°C to 70°C
NAND Flash Technology	3D TLC
Performance R/W[2]	560/520 MB/s
Endurance[3]	Up to 400 TBW
2.5"/7 mm non-SED	2.5"/7mm: SDBSBXD-####
2.5"/7 mm SED	2.5"/7mm: SDBSBXD-####
M.2 2280 non-SED	M.2 2280: SDBSNXD-####
M.2 2280 SED	M.2 2280: SDBSNXD-####

Solid State Drives (PCIe/NVMe)

	Commercial PC SN810	Commercial PC SN5000S	Commercial PC SN740
Interface	PCIe Gen4x4 NVMe 1.4	PCIe Gen4x4 NVMe 2.0	PCIe Gen4x4 NVMe 1.4b
Form Factor	M.2 2280	M.2 2280 and M.2 2230	M.2 2280 and M.2 2230
Capacity[1]	256GB to 2TB	512GB to 2TB	256GB to 2TB
Operating Temperature	0°C to 85°C	0°C to 80°C	0°C to 85°C
NAND Flash Technology	3D TLC	3D QLC	3D TLC
Performance R/W[2]	Up to 6600/5000 MB/s	Up to 6000/5600 MB/s	Up to 5150/4900 MB/s
Endurance[3]	Up to 500 TBW	Up to 600 TWB	Up to 500 TBW

Ordering Information

	Commercial PC SN810	Commercial PC SN5000S	Commercial PC SN740
128GB			
256GB	SDCPNRY-256G (non-SED) SDCQNRY-256G (SED)		M.2 2230: SDDPTQD-256G (non-SED), SDDQTQD-256G (SED) M.2 2280: SDDPNQD-256G (non-SED), SDDQNQD-256G (SED)
512GB	SDCPNRY-512G (non-SED) SDCQNRY-512G (SED)	M.2 2230: SDEPTSJ-512G (non-SED); SDEQTSJ-512G (SED) M.2 2280: SDEPNSJ-512GB (non-SED); SDEQNSJ-512G (SED)	M.2 2230: SDDPTQD-512G (non-SED); SDDQTQD-512G (SED) M.2 2280: SDDPNQD-512G (non-SED), SDDQNQD-512G (SED)
1TB	SDCPNRY-1T00 (non-SED) SDCQNRY-1T00 (SED)	M.2 2230: SDEPTSJ-1T00 (non-SED); SDEQTSJ-1T00 (SED) M.2 2280: SDEPNSJ-1T00 (non-SED); SDEQNSJ-1T00 (SED)	M.2 2230: SDDPTQD-1T00 (non-SED), SDDQTQD-1T00 (SED) M.2 2280: SDDPNQD-1T00 (non-SED), SDDQNQD-1T00 (SED)
2TB	SDCPNRZ-2T00 (non-SED) SDCQNRZ-2T00 (SED)	M.2 2230: SDEPTSJ-2T00 (non-SED); SDEQTSJ-2T00 (SED) M.2 2280: SDEPNSJ-2T00 (non-SED); SDEQNSJ-2T00 (SED)	M.2 2230: SDDPTQE-2T00 (non-SED), SDDQTQE-2T00 (SED) M.2 2280: SDDPNQE-2T00 (non-SED), SDDQNQE-2T00 (SED)

Solid State Drives (PCIe/NVMe)

	Industrial-grade IX SN530	Industrial-grade IX SN530	Industrial-grade IX SN530	Industrial-grade IX SN530
Interface	PCIe Gen3x4 NVMe 1.4	PCIe Gen3x4 NVMe 1.4	PCIe Gen3x4 NVMe 1.4	PCIe Gen3x4 NVMe 1.4
Form Factor	M.2 2280-S3-M	M.2 2280-S3-M	M.2 2230-S3-M	M.2 2230-S3-M
Capacity[1]	256GB to 2TB	85GB to 340GB	256GB to 1TB	85GB to 340GB
Operating Temperature	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C
NAND Flash Technology	3D TLC	3D SLC	3D TLC	3D SLC
Performance R/W[2]	Up to 2500/1800 MB/s	Up to 2400/1950 MB/s	Up to 2400/1950 MB/s	Up to 2400/1950 MB/s
Performance sustain W[2]	Up to 540	Up to 1950 MB/s	Up to 540 MB/s	Up to 1950 MB/s
Endurance[3]	Up to 5200 TBW	Up to 24 PBW	Up to 2600 TBW	Up to 24 PBW

Ordering Information

	Industrial-grade IX SN530	Industrial-grade IX SN530	Industrial-grade IX SN530	Industrial-grade IX SN530
256GB / 85GB	SDBPNPZ-256G-XI	SDBPNPZ-085G-XI	SDBPTPZ-256G-XI	SDBPTPZ-085G-XI
512GB / 170GB	SDBPNPZ-512G-XI	SDBPNPZ-170G-XI	SDBPTPZ-512G-XI	SDBPTPZ-170G-XI
1TB / 340GB	SDBPNPZ-1T00-XI	SDBPNPZ-340G-XI	SDBPTPZ-1T00-XI	SDBPTPZ-340G-XI
2TB	SDBPNPZ-2T00-XI	—	—	—

[1] 1 gigabyte (GB) = 1 billion bytes. Actual user capacity less.
[2] Based on internal testing; performance may be lower depending on host device, usage and other factors. 1MB=1,000,000 bytes.
[3] TBW (terabytes written) and PBW (petabytes written) values calculated using JEDEC client workload (JESD219) and vary by product capacity.

Western Digital

Contact Information

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