



# 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.

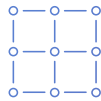
## Meeting Industrial and IoT Demanding Environmental, Endurance and Reliability Requirements

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 in small form factor
- Wide temperature range: -25°C to 85°C (I) and -40°C to 85°C(XI)
- Auto and manual refresh, enhanced health status, smart partitioning



### UFS Embedded Flash Drive

iNAND IX EM312 the industrial-grade UFS version 2.1 based on 3D NAND technology, delivers higher capacities and up to 2.5 times the performance of e.MMC-based products.

#### Features and Benefits

- UFS 2.1 interface for high data speeds
- 16GB to 256GB in small form factor
- Wide temperature range: -25°C to 85°C (I) and -40°C to 85°C(XI)
- Fast boot, auto refresh, manual refresh, enhanced health status



### PCIe SSD

Western Digital IX SN530, PC SN530, CL SN720, CL SN520, and PC SN730 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
- M.2 2280, M.2 2242 and M.2. 2230 form factors
- High capacities up to 2TB
- TLC and SLC configurations for higher endurance of up to 24 PBW (IX SN530)
- Temperature range:
  - 40°C–85°C (IX SN530)
  - 0°C–85°C (CL series)
  - 0°C–70°C (PC SN730 & PC SN530)

Note: 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 SA530 and SanDisk X600 SATA SSDs deliver leading-edge performance, high capacity, and enhanced endurance. In capacities of up to 1TB, the PC SA530 3D NAND SATA SSD is optimized for the demanding power management requirements of ultra-thin and small form factor products.

#### Features and Benefits

- X600 – 128GB
- PC SA530 – 256GB to 1TB
- 2.5" and M.2 2280 form factors
- Sequential R/W up to 560/530 MB/s
- Random R/W up to 95K/84K IOPS

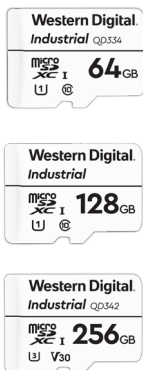


### SD Cards

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 – 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 EU312
Interface	e.MMC 5.1	e.MMC 5.1	UFS 2.1
Capacity <sup>1</sup>	16GB-256GB	8GB-64GB	16GB-256GB
Operating Temperature	-25°C - 85°C (I) -40°C-85°C (XI) 32GB - 256GB	-25°C - 85°C (I) -40°C - 85°C (XI)	-25°C - 85°C (I) -40°C - 85°C (XI)
NAND Flash Technology	3D TLC	2D MLC	3D TLC
Ordering Information	SDINBDA6-XXXG-I/XI1	SDINBDG4-XXXG-I2/XI2	SDINDDH6-XXXG-I/XI



Industrial SD Cards

		
	Industrial IX LD342	Industrial IX LD332
Interface	SD 6.0 UHS-I 104	SD 5.1 UHS-I 104
Capacity <sup>1</sup>	16GB to 512GB	8GB to 64GB
Operating Temperature	-25°C - 85°C	-25°C - 85°C (I) -40°C - 85°C (XI)
NAND Flash Technology	3D TLC	2D MLC
Speed Class	C10, U1, U3, V10, V30	C10
Performance R/W <sup>2</sup>	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 <sup>1</sup>	16GB to 256GB	8GB to 128GB	8GB to 64GB
Operating Temperature	-25°C - 85°C	-25°C - 85°C (I) -40°C - 85°C (XI)	-40°C - 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 <sup>2</sup>	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

		
	Commercial X600	Commercial PC SA530
Interface	SATA III (Rev 3.2)	SATA III (Rev 3.2)
Form Factor	2.5"/7 mm and M.2 2280	2.5"/7 mm and M.2 2280
Capacity <sup>1</sup>	128GB	256GB to 1TB
Operating Temperature	0°C - 85°C	0°C - 70°C
NAND Flash Technology	3D TLC	3D TLC
Performance R/W <sup>2</sup>	Up to 560/530 MB/s	Up to 560/530 MB/s
Endurance <sup>3</sup>	Up to 500 TBW	Up to 400 TBW
2.5"/7 mm non-SED	SD9SB8W-128G	SDASB8Y-XXXG/1T00 (1TB)
2.5"/7 mm SED	SD9TB8W-128G	SDATB8Y-XXXG/1T00 (1TB)
M.2 2280 non-SED	SD9SN8W-128G	SDASN8Y-XXXG/1T00(1TB)
M.2 2280 SED	SD9TN8W-128G	SDATN8Y-XXXG/1T00(1TB)

Solid State Drives (PCIe/NVMe)

	 Commercial CL SN720	 Commercial CL SN520	 Commercial CL SN520	 Commercial PC SN730
Interface	PCIe Gen3x4 NVMe 1.3	PCIe Gen3x2 NVMe 1.3	PCIe Gen3x2 NVMe 1.3	PCIe Gen3x4 NVMe 1.3
Form Factor	M.2 2280	M.2 2242	M.2 2280	M.2 2280
Capacity <sup>1</sup>	256GB to 2TB	128GB to 512TB	128GB to 512TB	256GB to 1TB
Operating Temperature	0°C – 85°C	0°C – 85°C	0°C – 85°C	0°C – 70°C
NAND Flash Technology	3D TLC	3D TLC	3D TLC	3D TLC
Performance R/W <sup>2</sup>	Up to 3,470/3,000 MB/s	Up to 1,700/1,450 MB/s	Up to 1,700/1,450 MB/s	Up to 3,400/3,100 MB/s
Endurance <sup>3</sup>	Up to 1600 TBW	Up to 400 TBW	Up to 400 TBW	Up to 400 TBW
Ordering Information				
128GB		SDAPMUW-128G-1022	SDAPNUW-128G-1022	
256GB	SDAQNTW-256G-1022	SDAPMUW-256G-1022	SDAPNUW-256G-1022	SDBPNTY-256G (Non-SED) SDBQNTY-256G (SED)
512GB	SDAQNTW-512G-1022	SDAPMUW-512G-1022	SDAPNUW-512G-1022	SDBPNTY-512G (Non-SED) SDBQNTY-512G (SED)
1TB	SDAQNTW-1T00-1022			SDBPNTY-1T00 (Non-SED) SDBQNTY-1T00 (SED)
2TB	SDAQNTX-2T00-1022			

Solid State Drives (PCIe/NVMe)

	 Industrial-grade IX SN530	 Industrial-grade IX SN530	 Industrial-grade IX SN530	 Industrial-grade IX SN530	 Commercial-grade PC SN530
Interface	PCIe Gen3x4 NVMe 1.4	PCIe Gen3x4 NVMe 1.4	PCIe Gen3x4 NVMe 1.4	PCIe Gen3x4 NVMe 1.4	PCIe Gen3x4, NVMe v1.4
Form Factor	M.2 2280-S3-M	M.2 2280-S3-M	M.2 2230-S3-M	M.2 2230-S3-M	M.2 2230-S3-M, M.2242-S3-M, M.2280-S3-M
Capacity <sup>1</sup>	256GB to 2TB	85GB to 340GB	256GB to 1TB	85GB to 340GB	256GB to 1TB
Operating Temperature	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	0°C to 70°C
NAND Flash Technology	3D TLC	3D SLC	3D TLC	3D SLC	3D TLC
Performance R/W <sup>2</sup>	Up to 2,500/1,800 MB/s	Up to 2,400/1,950 MB/s	Up to 2,400/1,950 MB/s	Up to 2,400/1,950 MB/s	Up to 2400/1950 MB/s
Performance sustain W <sup>2</sup>	Up to 540	Up to 1,950 MB/s	Up to 540 MB/s	Up to 1,950 MB/s	-
Endurance <sup>3</sup>	Up to 5,200 TBW	Up to 24 PBW	Up to 2,600 TBW	Up to 24 PBW	Up to 400 TBW
Ordering Information					
256GB / 85GB	SDBPNPZ-256G-XI	SDBPNPZ-085G-XI	SDBPTPZ-256G-XI	SDBPTPZ-085G-XI	SDBPTPZ-256G (M.2 2230) SDBPMPZ-256G (M.2 2242) SDBPNPZ-256G (M.2 2280)
512GB / 170GB	SDBPNPZ-512G-XI	SDBPNPZ-170G-XI	SDBPTPZ-512G-XI	SDBPTPZ-170G-XI	SDBPTPZ-512G (M.2 2230) SDBPMPZ-512G (M.2 2242) SDBPNPZ-512G (M.2 2280)
1TB / 340GB	SDBPNPZ-1T00-XI	SDBPNPZ-340G-XI	SDBPTPZ-1T00-XI	SDBPTPZ-340G-XI	SDBPTPZ-1T00 (M.2 2230) SDBPMPZ-1T00 (M.2 2242) SDBPNPZ-1T00 (M.2 2280)
2TB	SDBPNPZ-2T00-XI	—	—	—	—

<sup>1</sup> 1 gigabyte (GB) = 1 billion bytes. Actual user capacity less.

<sup>2</sup> Based on internal testing; performance may be lower depending on host device, usage and other factors. 1MB=1,000,000 bytes.

<sup>3</sup> TBW (terabytes written) values calculated using JEDEC client workload (JESD219) and vary by product capacity.

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