goodram
industrial



EUROPEAN MEMORY SOLUTIONS FOR INDUSTRIAL APPLICATIONS

EUROPEAN MEMORY SOLUTIONS

EUROPEAN MEMORY MANUFACTURER

Goodram is a Polish brand of memory and data storage products owned by Wilk Elektronik S.A. As the only manufacturer of DRAM modules and SSDs in the European Union, we combine access to global semiconductor technologies with our own engineering and manufacturing facilities in Poland.

Full control over the production process, rigorous validation and multi-stage quality testing translate into the reliability of solutions used in servers, data centers, industrial systems and modern IT infrastructure.

A presence in more than 40 markets and local manufacturing expertise strengthen supply chain security and support the development of European technological sovereignty.

GOODRAM IN NUMBERS

35 YRS
of experience in the semiconductor market

No.1
in Poland in the DRAM memory and SSD category according to Futuresource

6M
memory modules per year – our production capacity

100%
of production tested by the quality and R&D teams

40+
markets worldwide

EU
the only manufacturer of DRAM and SSD products in the European Union

Our brands

One Goodram brand. Five specialized product lines.

goodram
Memory and data storage for personal computers, laptops and the public sector.

goodram RIVAL
High-performance memory and storage for gamers, technology enthusiasts and users of gaming PCs and consoles.

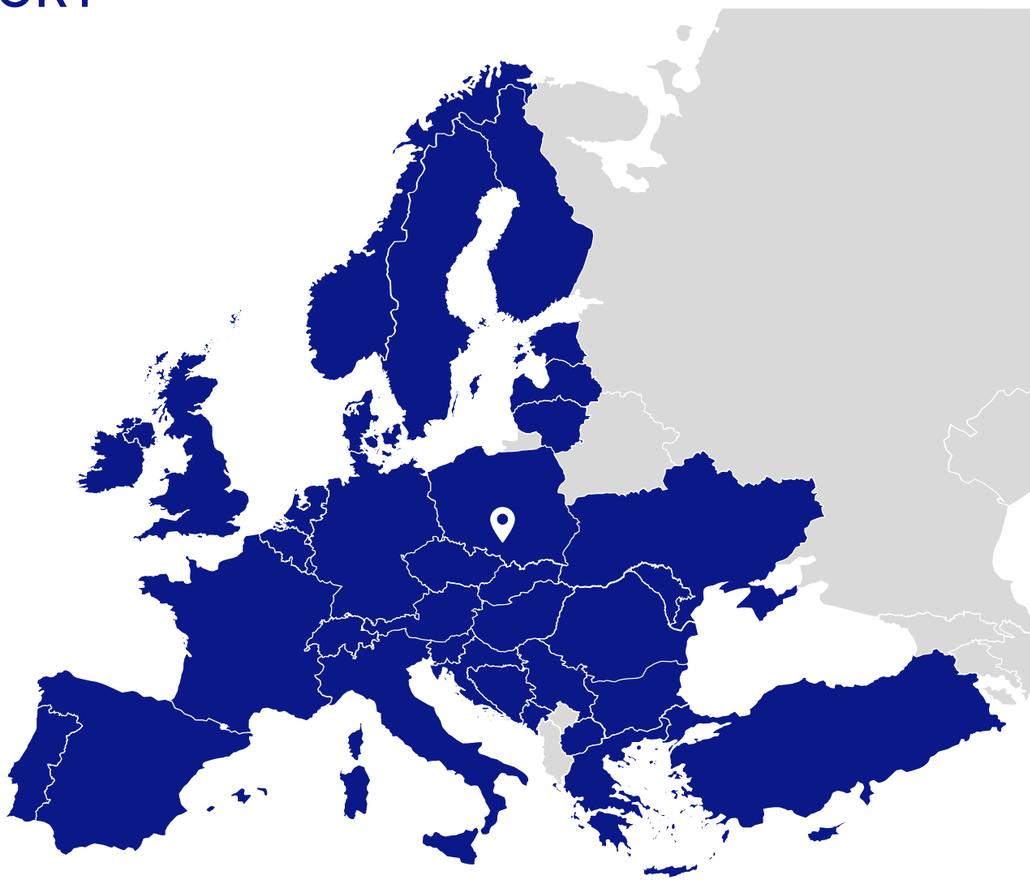
goodram PRO
Solutions for professionals, workstations, and manufacturers of computers and specialized systems.

goodram industrial
Memory and storage for automation, robotics, surveillance systems, embedded devices and IoT, as well as industrial and military applications.

goodram enterprise
Solutions for rack server manufacturers, data centers, AI infrastructure and specialized workstations.

MARKET POSITION AND COMPANY HISTORY

Three decades of manufacturing experience, full control over the production process and distribution throughout Europe are foundations trusted by our partners in the industrial, defence and embedded systems



Company milestones

1991
Wilk Elektronik S.A. is established.

1995
The company becomes the RAM market leader in Poland.

2003
Launch of in-house memory production under the Goodram brand.

2008
SSDs are added to the product portfolio.

2013
Launch of the industrial product line.

2016
Launch of the gaming product line.

2021
Major expansion of production capacity.

2024
Launch of AI and server product lines.

2026
New Goodram brand architecture – one strong umbrella brand and the new RIVAL and PRO lines.

WHAT SETS GOODRAM INDUSTRIAL APART?

Implementing Goodram Industrial memory is more than a component choice. It is a commitment to a supplier that actively supports your engineers through rigorous testing, integration, and extended product lifecycle management.

Goodram combines European manufacturing with engineering expertise and a transparent supply model, helping customers reduce operational risk at every stage of the project.

European manufacturing

Manufacturing in Poland enables closer cooperation with European customers, shorter communication paths and better alignment with regional business and regulatory requirements.

Long-term availability

Lifecycle planning supports server platforms that need to remain stable for many years of operation.

Flexible MOQ

Minimum order quantities support evaluation, pilot projects and phased infrastructure deployments.

Direct engineering support

Customers work directly with technical specialists when selecting products, assessing compatibility and performing qualification.

Fixed BOM

The ability to maintain a fixed component configuration allows customers to qualify a product once and deploy it repeatedly without unexpected hardware changes.

RIGOROUS TESTING AND VALIDATION

Industrial qualification is aimed at eliminating operational risks before field deployment.

Goodram's validation process confirms compatibility, long-term stability, and exact repeatability of parameters across a wide range of industrial platforms and harsh environment use cases.



Production of DRAM memory modules at our factory in Łaziska Górne, Poland.

Multi-stage validation process

1. Incoming components are inspected and verified before the production process begins to ensure consistent product quality from the very start.
2. Every manufactured DRAM module and SSD undergoes automated functional and performance testing at all stages of production, confirming correct operation and repeatability.
3. Products are validated on more than 600 platforms to confirm compatibility with a wide range of enterprise-grade hardware configurations.
4. Final quality validation. Before shipment, every product undergoes a final validation process confirming compliance with Goodram quality requirements for enterprise applications.

QUALITY, COMPLIANCE AND SUPPLY CHAIN SECURITY

Memory qualification in projects is a key element of risk management. Companies today require a transparent supply chain and compliance with legal regulations.

Goodram meets these criteria through manufacturing and operations located in Europe, which ensure full quality control and a transparent product lifecycle.

Supply chain transparency

Our comprehensive database enables identification of each batch and its origin at every stage of production.

Traceability

Documented manufacturing and quality processes support audits, lifecycle planning and infrastructure maintenance.

Regulatory readiness

Goodram monitors European regulatory initiatives, including CRA, NIS2 and CSF, and adapts its processes accordingly.

Controlled manufacturing and validation

Manufacturing, testing and quality assurance are carried out at the Goodram factory in Poland.

European technical support

Direct access to technical specialists improves communication during qualification, deployment and after-sales support.



Memory testing area under sustained load.

HOW WE SUPPORT YOUR PROJECT

Successful deployments require technical validation, stable product configurations and cooperation with a memory supplier throughout the entire project lifecycle. Goodram supports customers from initial assessment through qualification and deployment, helping reduce risk.

Project requirements

Understanding the target platform, workload profile, technical requirements and long-term infrastructure goals.

Technical consultation

Recommendation of SSD and memory configurations based on performance, compatibility and project-specific needs.

Evaluation samples

Possibility to obtain sample units for testing in a specific project.

Compatibility and validation

Verification against target server platforms and infrastructure environments.

Product qualification

Support with qualification procedures and technical documentation.

Deployment and deliveries

Project execution supported by transparent communication, flexible quantities and planned deliveries.

Lifecycle management

Long-term availability and lifecycle planning to maintain infrastructure continuity.

After-sales support

Diagnostics, technical assistance and direct communication with dedicated specialists.

goodram industrial

A EUROPEAN FOUNDATION FOR SECURE INFRASTRUCTURE

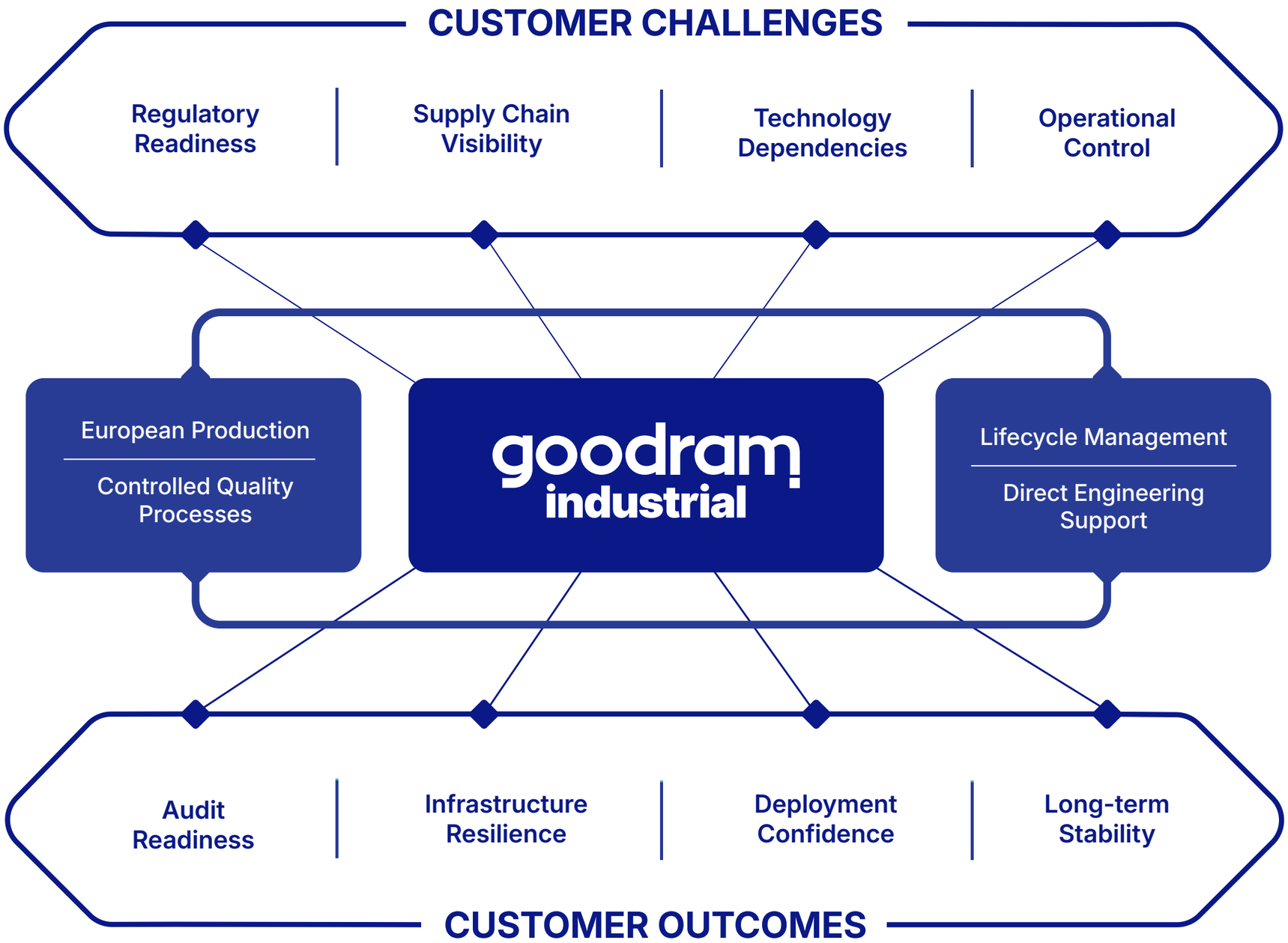
For cloud providers, OEMs and integrators, selecting DRAM and SSDs is a matter of hardware stability and security. Goodram – as the only manufacturer of DRAM and SSD products in the EU – eliminates geopolitical risk by ensuring full control over the hardware.

We control 100% of the production process: from R&D and rigorous testing to packaging. For business customers, we offer Fixed BOM configurations and Firmware Lock, eliminating unauthorized modifications and ensuring full hardware consistency.

Compliance ready

Hard production data and full traceability of manufactured memory products provide cloud providers with input data for assessing digital sovereignty under SOV-5 (European Sovereign Cloud Framework).

Our procedures help meet NIS2 security audit requirements, while under the Cyber Resilience Act (CRA) we provide support with vulnerability reporting. Customers receive direct access to R&D engineers and the assurance of a long product lifecycle.



CFast

CFast cards comply with the PCMCIA I or II standards with a SATA interface. The card controller, functionally compatible with typical SATA SSD controllers, provides low power consumption and data transfer speeds of up to 550 MB/s. Other features include S.M.A.R.T., advanced power management methods and DRAM cache memory. CFast is available with 3D TLC, 3D pSLC, MLC, pSLC and SLC NAND memory, and capacity may depend on the technology used. Its small size and a housing suitable for repeated use make CFast a good solution for many mobile applications.



	CFast				
Flash type	3D TLC	3D pSLC	MLC	pSLC	SLC
P/E cycles	3 000	50 000	3 000	20 000	60 000
Capacity	128 GB - 512 GB	32 GB – 256 GB	32 GB – 256 GB	16 GB – 64 GB	8 GB – 32 GB
Interface	SATA III				
Key features	Wear Levelling Bad Block Management TRIM S.M.A.R.T. NCQ, Over-provisioning Low power consumption Thermal sensor TCG Opal Fixed bill of materials (optional) PCN and EOL notifications				
Operating temp. (°C)	0 – 70 -40 – 85	0 – 70 -40 – 85	0 – 70 -25 – 85 -40 – 85		-25 – 85 -40 – 85
Storage temp. (°C)	-40 – 85				
Max. speed (MB/s)	Read: up to 550 Write: up to 490	Read: up to 550 Write: up to 500	Read: up to 555 Write: up to 465	Read: up to 545 Write: up to 465	Read: up to 540 Write: up to 305
Max. power cons. (mW)	< 1 550	< 1 300	< 1 550	< 1 475	< 1 700
MTBF (hours)	> 2 000 000	> 3 000 000	> 2 000 000		
Environmental resistance	High/low temperature High humidity (55, 95% RH) Temperature cycle (30 min, 20 cycles) Shock (1500 G) Vibration (20 G) Free fall (0.8 m) Torque (1.3 N/m) Bend (>50 N) ESD (±4 kV)				
Dimensions (mm)	42.8 × 36.4 × 3.3				

CFexpress

CFexpress cards are the latest solution supported by the Compact Flash Association (CFA), capable of meeting the toughest requirements of industrial customers. Offering excellent performance and broad compatibility, Goodram's CFexpress™ Type B card also gives users a wide choice of capacities. In addition, industrial-grade CFexpress™ cards are available for any application in harsh environmental conditions, including extreme temperatures, shock and vibration.



	CFexpress
Flash type	3D TLC
P/E cycles	3 000
Capacity	15 GB - 1024 GB
Interface	PCIe NVMe 3.0 x2
Key features	PCIe NVMe gen3 ×2 Type B slot Wear Levelling LDPC ECC Subpage Mode Data Care Management Extended service life Power-loss data protection TRIM, ASPM, firmware update S.M.A.R.T TCG Opal (optional) End-to-End Data Protection AES256 (optional) Fixed bill of materials (optional) PCN and EOL notifications
Operating temp. (°C)	-40 – 85
Storage temp. (°C)	-40 – 85
Max. speed (MB/s)	Read: up to 1610 Write: up to 820
Max. power cons. (mW)	< 760
MTBF (hours)	> 2 000 000
Environmental resistance	High/low temperature High humidity (55, 95% RH) Temperature cycle (30 min, 20 cycles) Shock (1500 G) Vibration (20 G) Free fall (0.8 m) Torque (1.3 N/m) Bend (>50 N), ESD (±4 kV)
Dimensions (mm)	38.5 × 29.6 × 3.8

eMMC

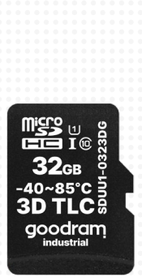
eMMC (Embedded MultiMediaCard) is a type of compact memory device used mainly in portable devices. Unlike removable microSD/SD cards or SSD drives, the eMMC standard refers to a non-volatile memory chip embedded in the device's motherboard. eMMC is a compact storage device that is physically integrated into the application. Thanks to its small size, it can be successfully used in devices where SSD drives cannot be installed due to limited space. This applies not only to mobile phones and tablets, but also to modern automotive systems and Internet of Things (IoT) applications.



	eMMC			
Form factor	153 Ball FBGA			
Flash type	3D TLC	3D pSLC	MLC	2D pSLC
P/E cycles	3 000	30 000	3 000	20 000
Capacity	16 GB – 128 GB	8 GB – 32 GB	8 GB – 16 GB	4 GB – 8 GB
Interface	eMMC 5.1			
Key features	Power-off notification HS400 Extended service life Command Queuing Enhanced strobe Cache flush report BKOPS management Cache barrier RPMB Secure write protection Secure Erase Trim Fixed bill of materials (optional) PCN and EOL notifications Custom engraving (optional)			
Operating temp. (°C)	-25 – 85			
Storage temp. (°C)	-40 – 85			
Max. speed (MB/s)	Read: up to 320 Write: up to 260	Read: up to 320 Write: up to 260	Read: up to 225 Write: up to 140	Read: up to 225 Write: up to 140
Max. power cons. (mW)	< 175			< 170
Dimensions (mm)	11.5 × 13 × 1			

microSD/SD

microSD and SD memory cards are available in three capacity standards: SDSC (Standard Capacity), SDHC (High Capacity) and SDXC (eXtended Capacity) with bus support up to UHS-I. Selected models have an additional SPI interface. Small dimensions, low power consumption, a wide range of available capacities (from 128 MB to 256 GB) and a wide choice of NAND types (SLC, pSLC, MLC, 3D TLC and 3D pSLC) make microSD and SD cards a popular data storage solution among many industrial developers.





	microSD					SD				
Flash type	3D TLC	3D pSLC	MLC	pSLC	SLC	3D TLC	3D pSLC	MLC	pSLC	SLC
P/E cycles	3 000	30 000	3 000	20 000	60 000	3 000	30 000	3 000	20 000	60 000
Capacity	16 – 256 GB	16 – 128 GB	4 – 64 GB	2 GB – 32 GB	128 MB – 4 GB	32 – 256 GB	16 – 128 GB	4 – 128 GB	2 – 64 GB	128 MB – 32 GB
Interface	UHS-I			High Speed for 2 GB, the rest UHS-	128 MB-2 GB High Speed, 4 GB UHS-I	UHS-I				1128 MB-2 GB High Speed, 4 GB-32 GB UHS-I
Key features	Static and dynamic wear leveling Bad block management S.M.A.R.T. Auto read refresh Data cloning system Feature Details (MLC only) Fixed bill of materials (optional) PCN and EOL notifications									
Operating temp. (°C)	-25 – 85 -40 – 85									
Storage temp. (°C)	-40 – 85									
Max. speed (MB/s)	Read: up to 95 Write: up to 80	Read: up to 95 Write: up to 90		Read: up to 20 Write: up to 20		Read: up to 95 Write: up to 80		Read: up to 95 Write: up to 90		Read: up to 65 Write: up to 55
Max. power cons. (mA)	< 400									
MTBF (hours)	> 3 000 000									
Environmental resistance	High/low temperature High humidity (55, 95% RH) Temperature cycle (30 min, 20 cycles) Shock (1500 G), Vibration (20 G) Free fall (1.5 m) Torque (0.1 N/m) Bend (>10 N) Salt spray (3% NaCl) Waterproof (IPX7) X-ray ESD (±4 kV contact, ±8 kV air)									
Dimensions (mm)	15 × 11 × 1					32 × 24 × 2.1				

USB Flash Drive

USB flash drives are available in many housing variants and with a wide choice of NAND memory types (SLC, pSLC, MLC, 3D TLC). Because the USB 3.2 gen. 1 interface is supported by almost all personal computers and embedded systems, these devices are used as storage media for operating systems, data and application keys. Backward compatibility with USB 2.0 and USB 1.1 provides flexibility for developers and administrators.

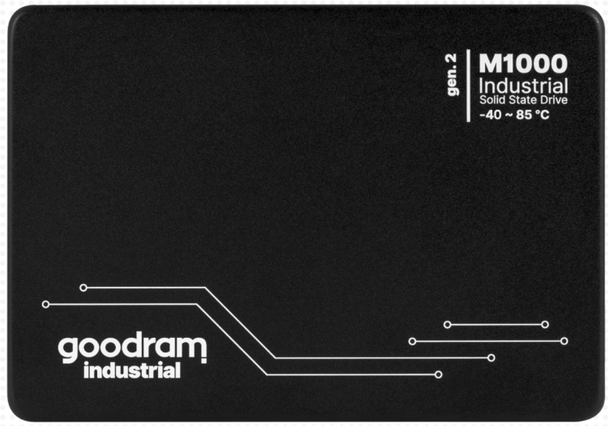


	Industrial USB Flash Drive			
Flash type	3D TLC	MLC	pSLC	SLC
P/E cycles	3 000	3 000	20 000	60 000
Capacity	16 GB - 256 GB	4 GB - 256 GB	2 GB - 128 GB	128 MB - 32 GB
Interface	USB 2.0 / USB 3.2 gen. 1 (compatible with USB 1.1 / USB 2.0)			
Key features	Wear leveling Bad block management ECC Fixed bill of materials (optional) PCN and EOL notifications			
Operating temp. (°C)	0 – 70 -25 – 85 -40 – 85			
Storage temp.(°C)	-40 – 85			
Max. PCBA speed (MB/s)	Read: up to 265 Write: up to 175	Read: up to 190 Write: up to 130	Read: up to 150 Write: up to 125	Read: up to 170 Write: up to 120
Max. PCBA power cons. (mA)	< 220	< 210		< 120
Max. uCOB speed (MB/s)	Read: up to 220 Write: up to 100	Read: up to 190 Write: up to 85	Read: up to 140 Write: up to 100	Read: up to 65 Write: up to 50
Max. uCOB power cons. (mA)	< 187	< 130		< 90
MTBF (hours)	> 2 000 000			
Environmental resistance	High/low temperature High humidity (55, 95% RH) Temperature cycle (30 min, 20 cycles) Shock (1500 G) Vibration (20 G) Free fall (1.1 m) Torque (0.5 N/m) Bend (>50 N) ESD (±4 kV)			
Dimensions (mm)	55.8 × 18.6 × 9.6*			

*Dimensions for the standard housing. A wide choice of housings is available.

2.5″ SATA Solid State Drive

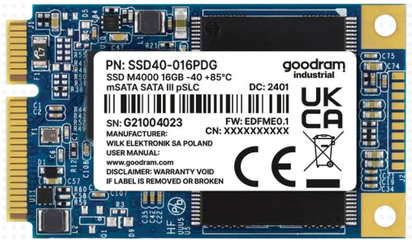
2.5″ SATA is the most common solid state drive form factor. All SSDs can be configured with 3D TLC, 3D pSLC, MLC, pSLC and SLC NAND flash memory. They provide data transfer speeds of up to 550 MB/s, low power consumption and advanced power management modes. Thanks to reliability resulting from the absence of moving parts and low power consumption, solid state drives are ideal for both desktop and mobile applications.



	2.5″ SATA Solid State Drive				
Flash type	3D TLC	3D pSLC	MLC	pSLC	SLC
P/E cycles	3 000	50 000	3 000	20 000	60 000
Capacity	64 GB - 2 TB	32 GB - 512 GB	4 GB - 512 GB	8 GB - 256 GB	8 GB - 128 GB
Interface	SATA III				
Key features	Wear Levelling Bad Block Management TRIM S.M.A.R.T. NCQ Over-provisioning Low power consumption Thermal Throttling DEVSLP (optional) PLP (optional) Fixed bill of materials (optional) PCN and EOL notifications				
Operating temp. (°C)	0 – 70 -40 – 85	0 – 70 -40 – 85	0 – 70 -25 – 85 -40 – 85		-25 – 85 -40 – 85
Storage temp. (°C)	-40 – 85				
Max. speed (MB/s)	Read: up to 550 Write: up to 500	Read: up to 550 Write: up to 510	Read: up to 550 Write: up to 490	Read: up to 545 Write: up to 465	Read: up to 540 Write: up to 425
Max. power cons. (mW)	< 1 750	< 1 450	< 2 650	< 2 630	< 2 300
MTBF (hours)	> 2 000 000	> 3 000 000	> 2 000 000		
Environmental resistance	High/low temperature High humidity (55, 95% RH) Temperature cycle (30 min, 20 cycles) Shock (1500 G) Vibration (20 G) Free fall (0.8 m) Torque (0.1 N/m) Bend (>20 N) ESD (±4 kV)				
Dimensions (mm)	100 × 69.85 × 7				

mSATA Solid State Drive

mSATA SSD is a solid state drive form factor that can be mounted directly on the motherboard. It is 80% smaller than 2.5”, so it takes up minimal space. Compatibility with the SATA I, II and III standards means that these devices can be installed in any device with an mSATA port. Like the entire SSD range, the absence of moving parts and low power consumption make it an ideal choice as a storage medium in mobile systems.



	mSATA Solid State Drive				
Flash type	3D TLC	3D pSLC	MLC	pSLC	SLC
P/E cycles	3 000	50 000	3 000	20 000	60 000
Capacity	64 GB – 2TB	32 GB – 512 GB	4 GB – 512 GB	2 GB – 512 GB	8 GB – 128 GB
Interface	SATA III				
Key features	Static and dynamic wear leveling Bad block management TRIM S.M.A.R.T. NCQ Over-provisioning Low power management Thermal throttling DEVSLP mode (optional) Built with chips from leading manufacturers Fixed bill of materials (optional) PCN and EOL notifications				
Operating temp. (°C)	0 – 70 -40 – 85			0 – 70 -25 – 85 -40 – 85	0 – 70 -40 – 85
Storage temp.(°C)	-40 – 85				
Max. speed (MB/s)	Read: up to 550 Write: up to 510		Read: up to 550 Write: up to 490		Read: up to 540 Write: up to 425
Max. power cons. (mW)	< 1 750	< 1 350	< 2 690		< 2 250
MTBF (hours)	> 2 000 000	> 2 500 000	> 2 000 000		
Environmental resistance	High/low temperature High humidity (55, 95% RH) Temperature cycle (30 min, 20 cycles) Shock (1,500 G, Half Sin Pulse) Vibration (80 – 2,000 Hz/20 G in 3 Axis) Free fall (0.8 m) Torque (0.1 N/m, 30 sec/5 times) Bend (>20 N for 1 min/5 times) Contact ESD (±4 kV contact 25 times)				
Dimensions (mm)	50.8 × 29.85 × 4				

M.2 SATA Solid State Drive

M.2 is another type of SSD with a SATA or NVMe interface. An M.2 SATA solid state drive can be mounted directly on the motherboard. It can be configured with 3D TLC, 3D pSLC, MLC, pSLC and SLC NAND memory, and the printed circuit board assembly (PCBA) can be supplied in two sizes: 42 × 22 mm and 80 × 22 mm. A small footprint, the absence of moving parts and low power consumption make the M.2 SATA SSD an excellent solution for mobile applications. Other form factors (2260, 22110) are available on request.



	M.2 SATA Solid State Drive									
	M.2 2242					M.2 2280				
Flash type	3D TLC	3D pSLC	MLC	pSLC	SLC	3D TLC	3D pSLC	MLC	pSLC	SLC
P/E cycles	3 000	50 000	3 000	20 000	60 000	3 000	50 000	3 000	20 000	60 000
Capacity	64 GB - 1 TB	32 GB - 256 GB	4 GB - 512 GB	16 GB - 256 GB	8 GB - 64 GB	64 GB - 2 TB	32 GB - 512 GB	4 GB - 512 GB	2 GB - 256 GB	8 GB - 128 GB
Interface	SATA III									
Key features	Static and dynamic wear leveling - Bad block management - TRIM - S.M.A.R.T. - NCQ Over-provisioning - Low power management - Thermal throttling - DEVSLP mode (optional) - PLP (optional) Built with chips from leading manufacturers - Fixed bill of materials (optional) - PCN and EOL notifications									
Operating temp. (°C)	0 – 70 -40 – 85				-25 – 85 -40 – 85	0 – 70 -40 – 85		0 – 70 -25 – 85 -40 - 85	0 – 70 -40 – 85	-25 – 85 -40 – 85
Storage temp. (°C)	-40 – 85									
Max. speed (MB/s)	Read: up to 550 Write: up to 510		Read: up to 555 Write: up to 490	Read: up to 545 Write: up to 460	Read: up to 540 Write: up to 320	Read: up to 550 Write: up to 510		Read: up to 550 Write: up to 490		Read: up to 540 Write: up to 425
Max. power cons. (mW)	< 1 750	< 1 350	< 2 100	< 2 630	< 1 950	< 1 800	< 1 300	< 2 650		< 2 280
MTBF (hours)	> 2 000 000	> 3 000 000	> 2 000 000			> 3 000 000		> 2 000 000		
Environmental resistance	High/low temperature, High humidity (55, 95% RH), Temperature cycle (30 min, 20 cycles), Shock (1,500 G, Half Sin Pulse), Vibration (80 – 2,000 Hz/20 G in 3 Axis), Free fall (0.8 m), Torque (0.1 N/m, 30 sec/5 times), Bend (>20 N for 1 min/5 times), Contact ESD (±4 kV contact 25 times)									
Dimensions (mm)	42 × 22 × 3.8					80 × 22 × 3.8				

M.2 NVMe Solid State Drive



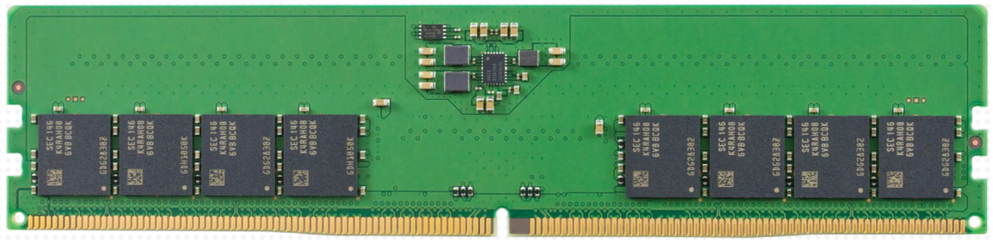
	M.2 NVMe Solid State Drive							
Interface	NVMe PCIe 4×4				NVMe PCIe 3×4			
Form factor	M.2 2230	M.2 2242	M.2 2280		M.2 2242		M.2 2280	
Flash type	3D TLC		3D TLC	3D pSLC	3D TLC	3D pSLC	3D TLC	3D pSLC
P/E cycles	3 000	3 000	50 000	20 000	3 000	50 000	3 000	50 000
Capacity	256 GB – 512 GB	128 GB – 2 TB	128 GB – 2 TB	120 GB – 960 GB	128 GB – 2 TB	32 GB – 512 GB	128 GB – 2 TB	32 GB – 512 GB
Advanced features	Dynamic SLC cache TCG Opal/Pyrite (optional) ETEDPP (end-to-end data path protection) Read-only mode Built with chips from leading manufacturers Fixed bill of materials (optional) PCN and EOL notifications			TCG Opal/Pyrite (optional), NVMe Format, Physical presence (SID) (optional), Manufacturer's Secure ID (MSID), Read-only mode Built with chips from leading manufacturers, Fixed bill of materials (optional), PCN and EOL notifications	Dynamic SLC cache - TCG Opal/Pyrite (optional) Secure and cryptographic data erase - Media wear indicator Read-only mode - Physical presence (SID) (optional) - PLP (optional) Built with chips from leading manufacturers Fixed bill of materials (optional) - PCN and EOL notifications			
Operating temp. (°C)	0 – 70 -40 – 85				0 – 70	0 – 70 -40 – 85	0 – 70	0 – 70 -40 – 85
Storage temp.(°C)	-40 – 85							
Max. data transfer speed (MB/s)	Read: up to 4,900 Write: up to 3,200	Read: up to 4,900 Write: up to 3,700		Read: up to 7,200 Write: up to 6,500	Read: up to 2,450 Write: up to 1,900			
Max. power consumption (mA)	< 5 200	< 5 300		< 2 630	< 3 900		< 4 000	
MTBF (hours)	> 2 000 000							
Dimensions (mm)	30 × 22 × 2.15	42 × 22 × 3.8	80 × 22 × 3.8	80 × 22 × 1.35	42 × 22 × 3.8		80 × 22 × 3.8	

DDR5 SDRAM

Goodram Industrial offers a wide range of industrial memory modules — from early-generation DDR1 to the latest DDR5 technology. Within the industrial series, the brand offers various form factors, including DIMM and SODIMM, as well as additional options such as ECC support, extended temperature range and fixed bill of materials. Goodram Industrial pays particular attention to compliance with the Product Change Notification (PCN) procedure, ensuring customers are informed of any changes to the bill of materials, especially in the case of long-term orders. Our solutions are designed for a wide range of industrial applications, including industrial computer systems, automation, automotive systems, home automation, POS systems, the Internet of Things (IoT) and medical applications.

DDR5 is the latest generation of the DDR family, delivering a maximum data transfer rate of up to 6,400 MT/s. Thanks to the voltage reduction to 1.1 V, overall power consumption is reduced by up to 15%. Integrating the power management IC (PMIC) directly into the module and using built-in error correction code (On-Die ECC, ODECC) improve reliability and efficiency.
In addition, DDR5 uses two 36-bit channels (72 bits for ECC modules), increasing bandwidth and improving the speed and efficiency of memory access in industrial environments.

DDR5 DIMM



DDR5 SODIMM



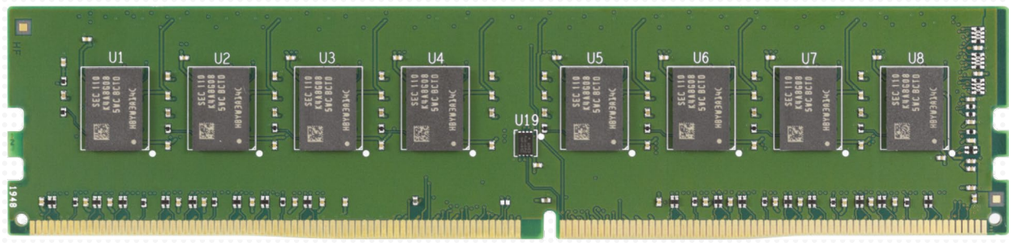
	DDR5 Memory Modules			
Module type	UDIMM	UDIMM ECC	SODIMM	SODIMM ECC
Capacity	8 GB – 32 GB	16 GB – 32 GB	8 GB – 32 GB	16 GB – 32 GB
Data rate	4 800 MT/s 5 200 MT/s 5 600 MT/s 6 400 MT/s	4 800 MT/s 5 200 MT/s 5 600 MT/s 6 400 MT/s	4 800 MT/s 5 200 MT/s 5 600 MT/s 6 400 MT/s	4 800 MT/s 5 200 MT/s 5 600 MT/s 6 400 MT/s
Pin count	288-pin	288-pin	262-pin	262-pin
Bus width	64 Bits	72 Bits	64 Bits	72 Bits
Voltage	1.1 V		1.1 V	
PCB height	31.25 mm		30 mm	
Operating temperature (°C)	0 – 85		0 – 85	
Extended temperature range (°C)	-40 – 85		-40 – 85	
On-Die ECC	Yes	Yes	Yes	Yes
Power management IC	Yes	Yes	Yes	Yes
Fixed bill of materials	*	*	*	*
EOL and PCN notifications	Yes	Yes	Yes	Yes
Conformal coating	*	*	*	*

* optional

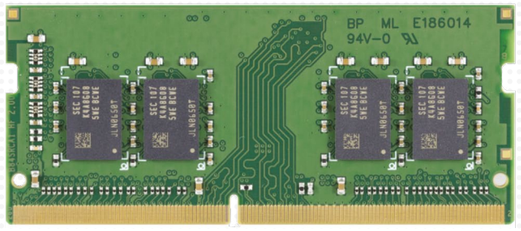
DDR4 SDRAM

DDR4, currently one of the most widespread memory types, introduced new solutions such as the POD12 interface and CRC for the data bus, delivering transfer speeds of over 3,200 MT/s. With bandwidth of up to 25,600 MB/s, DDR4 has become the optimal choice for high-performance industrial systems where speed and reliability are key.

DDR4 DIMM



DDR4 SODIMM



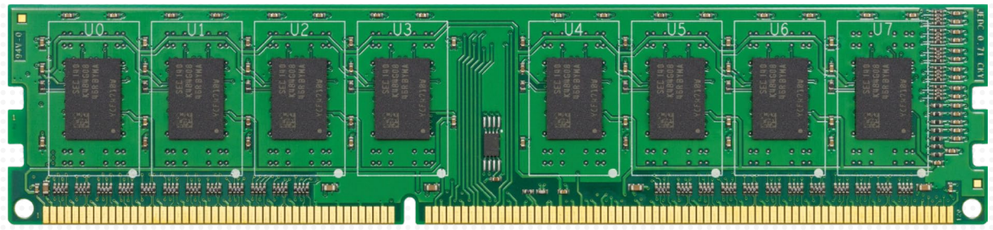
	DDR4 Memory Modules			
Module type	UDIMM	UDIMM ECC	SODIMM	SODIMM ECC
Capacity	4 GB – 32 GB	4 GB – 32 GB	4 GB – 32 GB	4 GB – 32 GB
Data rate	2 133 MT/s 2 400 MT/s 2 666 MT/s 2 933 MT/s 3 200 MT/s	2 133 MT/s 2 400 MT/s 2 666 MT/s 2 933 MT/s 3 200 MT/s	2 133 MT/s 2 400 MT/s 2 666 MT/s 2 933 MT/s 3 200 MT/s	2 133 MT/s 2 400 MT/s 2 666 MT/s 2 933 MT/s 3 200 MT/s
Pin count	288-pin	288-pin	260-pin	260-pin
Bus width	64 Bits	72 Bits	64 Bits	72 Bits
Voltage	1.2 V		1.2 V	
PCB height	31.25 mm		30 mm	
PCB height VLP	19 mm		19 mm	
Operating temp. (°C)	0 – 85		0 – 85	
Extended temperature range (°C)	-40 – 85		-40 – 85	
Fixed bill of materials	*	*	*	*
EOL and PCN notifications	Yes	Yes	Yes	Yes
Conformal coating	*	*	*	*

* optional

DDR3 SDRAM

DDR3 was a significant step forward, delivering lower power consumption and higher capacity for a wide range of industrial applications. Thanks to data transfer speeds of up to 1,866 MT/s provided by the “fly-by” bus architecture, DDR3 optimized performance to the requirements of industrial systems.

DDR3 DIMM



DDR3 SODIMM



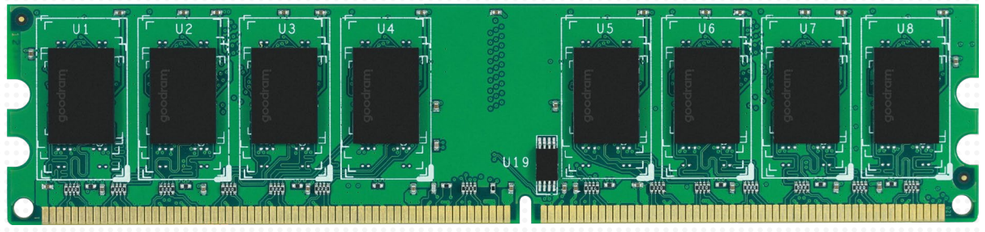
	DDR3 Memory Modules			
Module type	UDIMM	UDIMM ECC	SODIMM	SODIMM ECC
Capacity	2 GB – 8 GB	2 GB – 8 GB	2 GB – 8 GB	2 GB – 8 GB
Data rate	1 066 MT/s 1 333 MT/s 1 600 MT/s 1 866 MT/s	1 066 MT/s 1 333 MT/s 1 600 MT/s 1 866 MT/s	1 066 MT/s 1 333 MT/s 1 600 MT/s 1 866 MT/s	1 066 MT/s 1 333 MT/s 1 600 MT/s 1 866 MT/s
Pin count	240-pin	240-pin	204-pin	204-pin
Bus width	64 Bits	72 Bits	64 Bits	72 Bits
Voltage	1.35 V, 1.5 V		1.35 V, 1.5 V	
PCB height	30 mm		30 mm	
Operating temp. (°C)	0 – 85		0 – 85	
Extended temperature range (°C)	-40 – 85		-40 – 85	
Fixed bill of materials	*	*	*	*
EOL and PCN notifications	Yes	Yes	Yes	Yes
Conformal coating	*	*	*	*

* optional

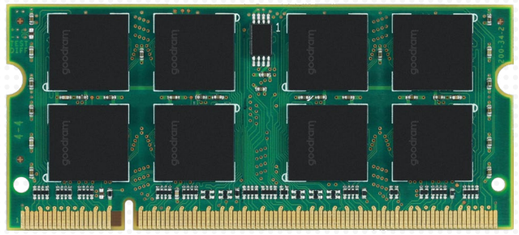
DDR2 SDRAM

The second generation of DDR delivered improved energy efficiency through operation at a reduced supply voltage. At a data transfer rate of 800 MT/s, DDR2 provides bandwidth of up to 6,400 MB/s, increasing efficiency while maintaining compatibility.

DDR2 DIMM



DDR2 SODIMM



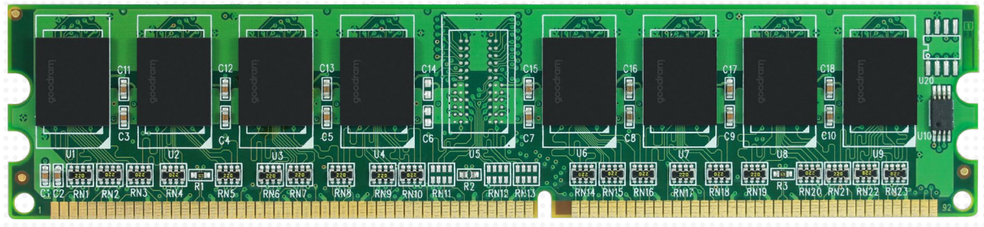
	DDR2 Memory Modules	
Module type	UDIMM	SODIMM
Capacity	512 MB – 2 GB	512 MB – 2 GB
Data rate	400 MT/s, 533 MT/s, 667 MT/s, 800 MT/s	400 MT/s, 533 MT/s, 667 MT/s, 800 MT/s
Pin count	240-pin	200-pin
Bus width	64 Bits	
Voltage	1.8 V	
PCB height	30 mm	30 mm
Operating temperature (°C)	0 – 85	
Fixed bill of materials	*	*
EOL and PCN notifications	Yes	Yes
Conformal coating	*	*

* optional

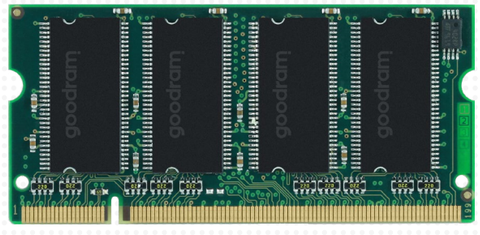
DDR1 SDRAM

The first generation of the DDR family introduced a synchronous interface active on both edges of the clock signal. With a data transfer rate of 400 MT/s and bandwidth of 3,200 MB/s over a 64-bit bus, DDR1 laid the foundation for subsequent generations of memory.

DDR1 DIMM

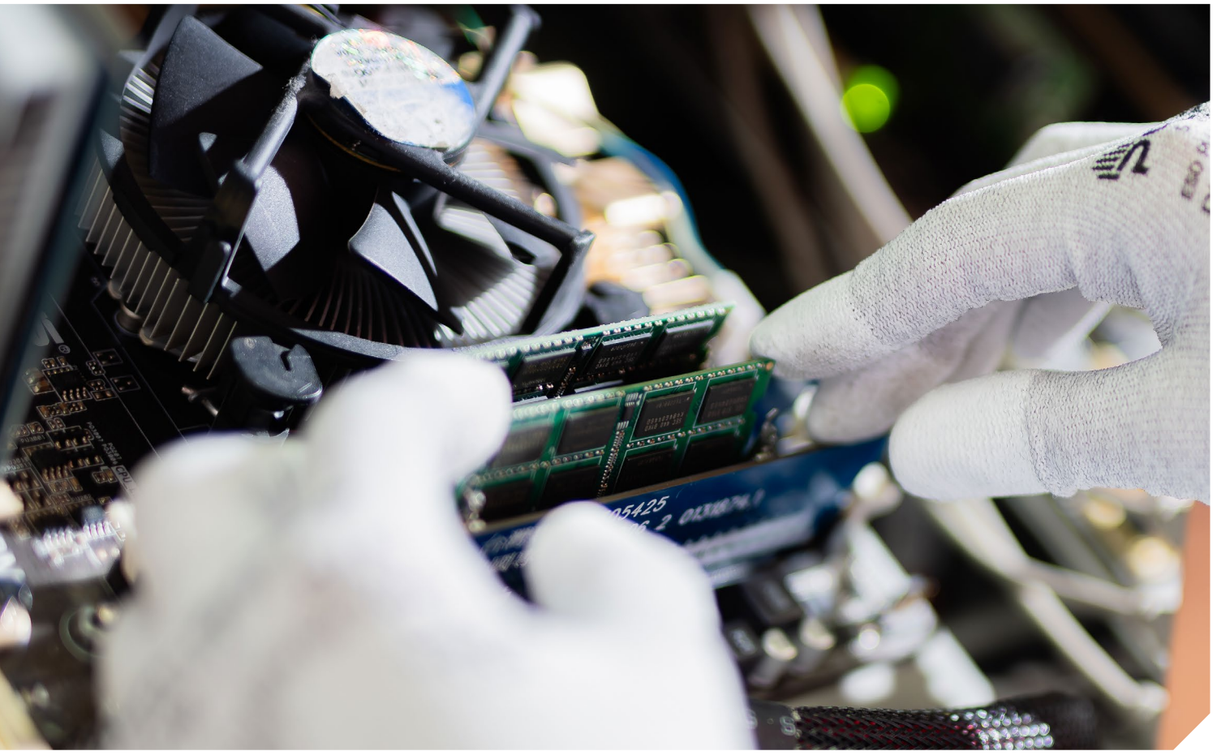


DDR1 SODIMM



	DDR1 Memory Modules	
Module type	UDIMM	SODIMM
Capacity	128 MB – 1 GB	128 MB – 1 GB
Data rate	200 MT/s, 266 MT/s, 333 MT/s, 400 MT/s	200 MT/s, 266 MT/s, 333 MT/s, 400 MT/s
Pin count	184-pin	144-pin
Bus width	64 Bits	
Voltage	2.5 V	
PCB height	29.5 mm	31.75 mm
Operating temperature (°C)	0 – 70	
Fixed bill of materials	*	*
EOL and PCN notifications	Yes	Yes
Conformal coating	*	*

* optional



APPLICATIONS OF GOODRAM INDUSTRIAL SOLUTIONS

- Industrial Automation
- Public Communication
- Home Automation
- Industrial Computing
- Point-Of-Sale
- Automotive Solutions
- Wireless Systems
- Video Security Systems
- Internet Of Things
- Human-Machine Interfaces

PART NUMBER DECODER

Flash memory (memory cards)

(SD, microSD, CFast, CFexpress)

SDC C1-008 M C G

Product group
- SDU: microSD
- SDC: SD
- CFA: CFAST
- CFE: CFexpress

Capacity

12M: 128 MB	002: 2 GB	032: 32 GB	512: 512 GB	030: 30 GB	480: 480 GB
25M: 256 MB	004: 4 GB	064: 64 GB	1T0: 1024 GB	060: 60 GB	960: 960 GB
51M: 512 MB	008: 8 GB	128: 128 GB	2T0: 2048 GB	120: 120 GB	1T9: 1920 GB
001: 1GB	016: 16 GB	256: 256 GB	4T0: 4096 GB	240: 240 GB	3T8: 3840 GB

Form factor + interface

00: None	V6: UHS I V60
C4: Class 4	V9: UHS I V90
C1: Class 10	X6: UHS II V60
C6: Class 6	X9: UHS II V90
U1: UHS I U1	Y6: UHS III V60
U3: UHS I U3	ST: CFAST
V1: UHS I V10	XB: CFexpress
V3: UHS I V30	Type B

Flash type
- M: MLC
- S: SLC
- P: pSLC
- T: TLC
- 3: 3D TLC
- 2: 3D pMLC
- 1: 3D pSLC

Temperature range
- C: 0°C to 70°C*
- S: 0°C to 70°C
- G: -25°C to 85°C
- D: -40°C to 85°C

Packaging
- G: BULK LOGO Goodram

USB flash drive

U0P 30-008 M C G

Product group
- U0P: PCBA
- U0C: COB
- U0M: MICRO COB

Capacity

12M: 128 MB	002: 2 GB	032: 32 GB	030: 30 GB
25M: 256 MB	004: 4 GB	064: 64 GB	060: 60 GB
51M: 512 MB	008: 8 GB	128: 128 GB	120: 120 GB
001: 1GB	016: 16 GB	256: 256 GB	240: 240 GB

Form factor + interface
- 20: USB 2.0
- 30: USB 3.0
- 31: USB 3.1
- 3A: USB 3.2 gen. 1
- 3B: USB 3.2 gen. 2

Technology
- M: MLC
- S: SLC
- P: pSLC
- T: TLC
- 3: 3D TLC
- 2: 3D pMLC
- 1: 3D pSLC

Temperature range
- C: 0°C to 70°C*
- S: 0°C to 70°C
- G: -25°C to 85°C
- D: -40°C to 85°C

Packaging
- G: Goodram BULK
- B: OEM BULK
- L: Goodram BULK
- LOGO

Carbon variant available on request

PART NUMBER DECODER

Flash memory (SSD)

(2,5″ SATA, mSATA, M.2 SATA, M.2 PCIe)

Product group
Industrial SSD

Capacity
016: 16 GB
032: 32 GB
064: 64 GB
128: 128 GB
256: 256 GB
512: 512 GB
1T0: 1024 GB
2T0: 2048 GB
4T0: 4096 GB
030: 30 GB
060: 60 GB
120: 120 GB
240: 240 GB
480: 480 GB
960: 960 GB
1T9: 1920 GB
3T8: 3840 GB

Flash type
M: MLC
S: SLC
P: pSLC
T: TLC
3: 3D TLC
2: 3D pMLC
1: 3D pSLC

Temperature range
C: 0°C to 70°C*
S: 0°C to 70°C
G: -25°C to 85°C
D: -40°C to 85°C

Packaging
G: BULK LOGO Goodram

SSD 10-256 M D G

Form factor + interface

10: 2.5″ SATA 7mm SSD*
40: mSATA
73: M.2 SATA 2230
74: M.2 SATA 2242
76: M.2 SATA 2260
78: M.2 SATA 2280
71: M.2 SATA 22110
83: M.2 PCIe NVMe gen3 ×2 2230
84: M.2 PCIe NVMe gen3 ×2 2240
86: M.2 PCIe NVMe gen3 ×2 2260
88: M.2 PCIe NVMe gen3 ×2 2280
81: M.2 PCIe NVMe gen3 ×2 22110
93: M.2 PCIe NVMe gen3 ×4 2230
94: M.2 PCIe NVMe gen3 ×4 2240
96: M.2 PCIe NVMe gen3 ×4 2260
98: M.2 PCIe NVMe gen3 ×4 2280
91: M.2 PCIe NVMe gen3 ×4 22110
A3: M.2 PCIe NVMe gen4 ×4 2230
A4: M.2 PCIe NVMe gen4 ×4 2240
A6: M.2 PCIe NVMe gen4 ×4 2260
A8: M.2 PCIe NVMe gen4 ×4 2280
A1: M.2 PCIe NVMe gen4 ×4 22110

VLP – 1.8″ available on special request

DRAM memory

(UDIMM, SODIMM)

Ranks
S: Single Rank
D: Dual Rank
Q: Quad Rank
O: Octo Rank

Organization
4: X4
8: X8
6: X16
0: not specified

Special features
C: standard voltage / standard temperature range 0°C to 85°C
I: standard voltage / extended temperature range -40°C to 85°C
L: reduced voltage / standard temperature range 0°C to 85°C
Y: reduced voltage / extended temperature range -40°C to 85°C

GR 5-S 32G 560 D 8 C

Prefix
GR: Goodram

Technology
1: DDR SDRAM
2: DDR2 SDRAM
3: DDR3 SDRAM
4: DDR4 SDRAM
5: DDR5 SDRAM

Module type
D: DIMM
E: DIMM with ECC
R: Registered
V: ECC VLP*
U: DIMM VLP*
L: LRDIMM
S: SO-DIMM
A: SO-DIMM ECC

Capacity
128: 128 GB
256: 256 GB
512: 512 GB
1G: 1 GB
2G: 2 GB
4G: 4 GB
8G: 8GB
16G: 16GB
32G: 32GB
64G: 64GB

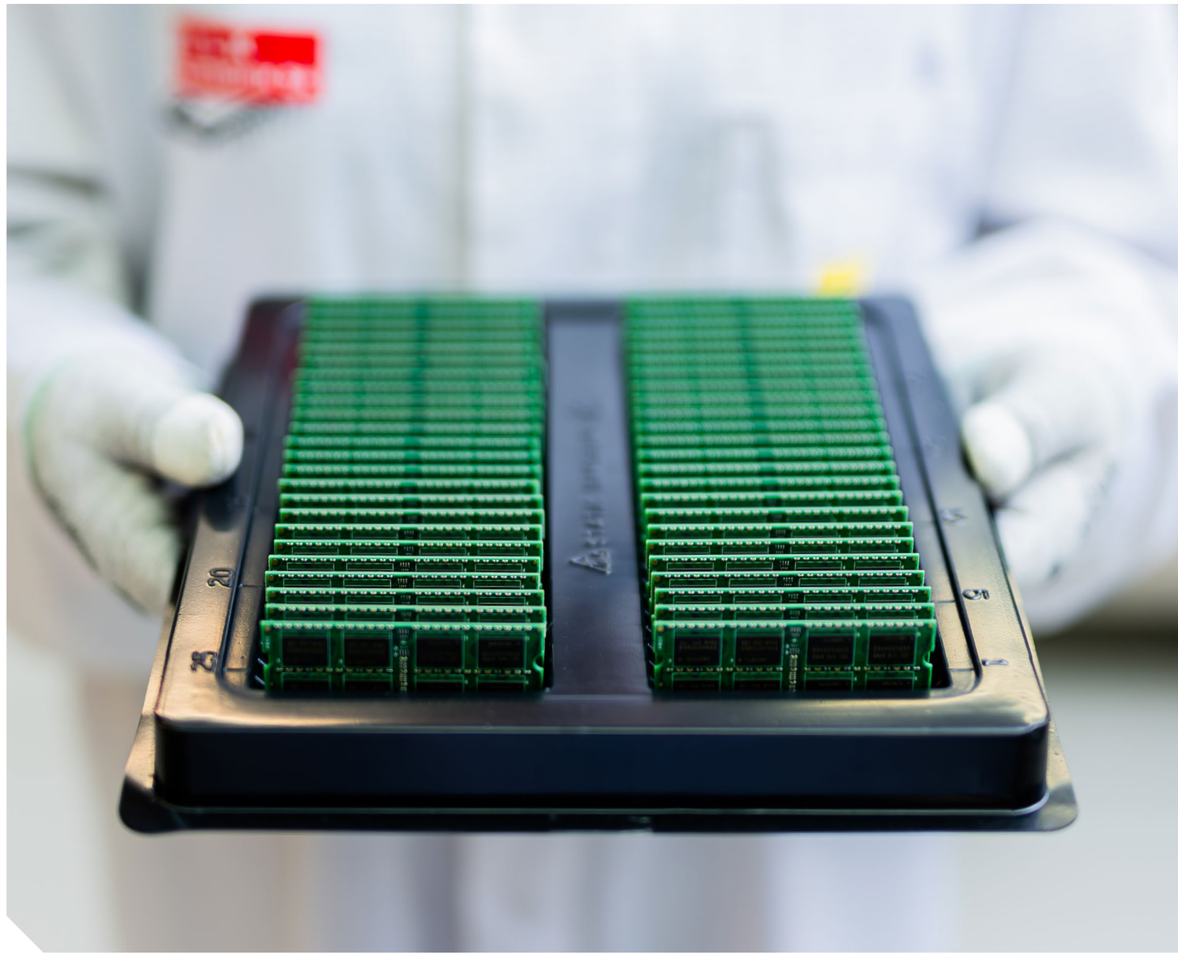
Speed / performance
333: DDR1 333
400: DDR1 400
667: DDR2 667
800: DDR2 800
106: DDR3 1066
133: DDR3 1333
160: DDR3 1600
186: DDR3 1866
213: DDR4 2133
240: DDR4 2400
266: DDR4 2666
293: DDR4 2933
320: DDR4 3200
480: DDR5 4800
560: DDR5 5600
640: DDR5 6400

*very low profile

PARTNER WITH GOODRAM

Goodram is more than a supplier of SSD drives and DRAM modules. We support customers at every stage of the infrastructure lifecycle — from component selection and qualification, through deployment, to supply planning and engineering after-sales support.

Whether you are designing a new server platform, building industrial equipment or upgrading existing infrastructure, our team will help you select, validate and deploy the right solution.



Wilk Elektronik S.A.
ul. Mikołowska 42
43-173 Łaziska Górne, Poland

https://goodram-industrial.com
industrial@goodram.com

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