2023 Winbond Product Brochure

NEXT FUTURE

winbond

"

Be a hidden champion in providing sustainable semiconductors to enrich human life.

"

— Winbond Vision Statement

winbond

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When an electronics product requires secure code storage, it needs certified TrustME® Secure Flash Memory from Winbond. The TrustME® family meets every system requirement, from the substantial protection required by simple IoT devices up to Common Criteria EAL 5+ certified memory for securing financial transactions.

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- Specialty DRAM
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- TrustME® Secure Flash Memory

1

Positioning & Advantages

A Trusted Supplier of Advanced Memory Products

From R&D through advanced manufacturing to dedicated customer service, Winbond Electronics Corporation is a total memory solutions provider.

Winbond's customer-driven memory solutions are backed by deep expertise in

- R&D
- Product design
- Wafer fabrication and device packaging, assembly and testing
- Sales and technical support provided directly to the world's largest OEMs

Winbond's product portfolio consists of Specialty DRAM, Mobile DRAM, Code Storage Flash Memory, and TrustME® Secure Flash Memory. The company serves customers in communications, consumer electronics, automotive, industrial, computer peripherals markets and the IoT, supplying its products directly or via a global network of authorized distributors.

Winbond's headquarter is in the Central Taiwan Science Park, and it operates wafer fabrication plants in Taichung and new Kaohsiung 12-inch fab in Taiwan. Subsidiaries in the USA, Japan, Israel, China, Hong Kong, and Germany perform marketing operations and provide direct support to customers.

Winbond's combination of advanced semiconductor technologies developed in-house and close relationships with customers support its position as a trusted supplier of memory products.

Trusted for Safety and High Quality

In high-technology products, the integrity of the software code and the reliable operation of memory devices are of critical importance. That's why Winbond's Quality Management Program governs every stage of a product's life, from its start in the R&D laboratory to manufacturing and device testing.

The program has three key elements

Quality Control

Meticulously monitors materials and production processes to check that they satisfy rigorous standards in automotive and industrial.

Reliability Assurance

Performs a comprehensive set of accelerated electrical, thermal, cycling, and other tests to verify the reliability of production units

Failure Analysis

Investigates the causes of product failures and proposes corrective actions

This is why Winbond is trusted by the world's largest manufacturers to provide on-time shipments of high-quality and high-reliability memory products.

Independently verified quality and safety performance

The data which Winbond provides to customers give direct assurance about the quality and reliability of its products. Comprehensive reliability test reports and quarterly average quality data are published on Winbond's website.

Customers can also take assurance from independent verification of the quality and safety of Winbond's products and processes

Quality

- IATF 16949
- ISO 9001
- AEC-Q100 Technical Committee Member

Safety

- ISO 26262
- ISO 27001
- ISO 45001
- ISO 21434

Environment

- ISO 14001
- ISO 50001
- ISO 14064
- QC 080000
- ISO 14067
- SONY Green Partner

Others

- RBA VAP Certificate

IATF 16949 | ISO 9001 | ISO 26262 | ISO 45001 | ISO 27001 | ISO 21434

ISO 14001 | QC 080000 | ISO 50001 | ISO 14064 | ISO 14067 | SONY Green Partner | RBA VAP Certificate

Reliability also extends to the supply chain: the Winbond Product Longevity Program guarantees a minimum 10-year lifetime for products supplied to automotive, industrial, consumer, medical, and industrial computing markets. Products supplied under this program are subject to extended product change notification, end-of-life and last-time buy arrangements.

Winbond Flash products offer high performance, low power consumption, and space-saving package options. Discover the latest advances in Flash memory for applications in mobile communications, automotive systems and the IoT.

2

Flash Memory Products for Any Application

Flash Memory Products for Any Application

High speed | Low power | Small board footprint

Whatever a customer chooses to optimize their design, Winbond's Flash memory portfolio has the right product.

A renowned developer of Flash memory technology, Winbond has built a broad portfolio of products which meets the needs of every type of product in the consumer, communications, automotive, and industrial markets.

High Speed

The latest OctalNAND Flash products feature fast Write speed and ultra-fast Continuous Read performance up to 240MB/s.

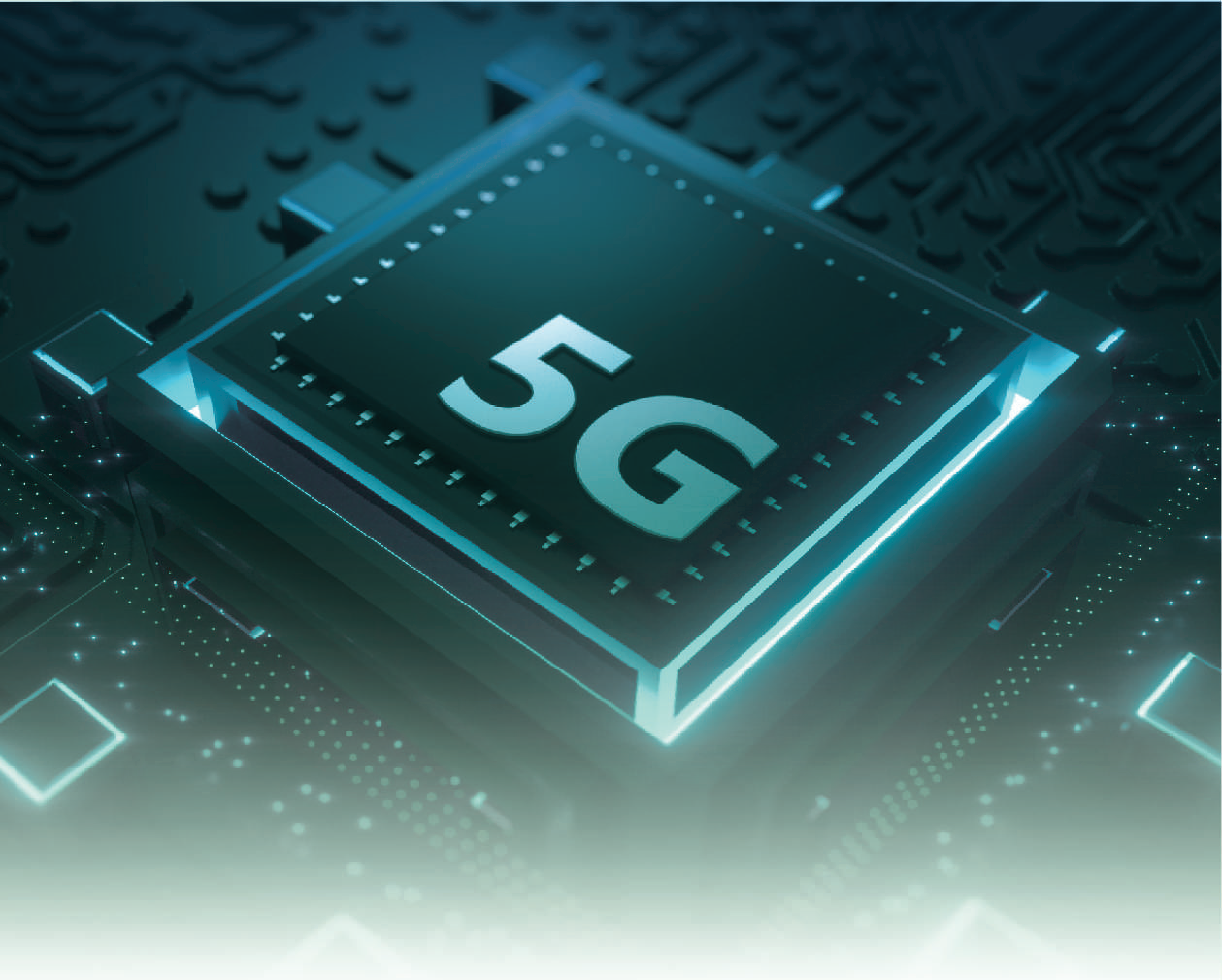
Low Power

Winbond was the first SPI NOR Flash manufacturer to supply the market with a portfolio of 1.2V devices.

Small Footprint

With the popular SpiStack® technology, Winbond can stack NOR+NOR, NOR+NAND or NAND+NAND die combinations in a standard package outline. SpiStack® gives the flexibility to modify a design's specifications without changing the board layout.

Whichever product the customer chooses, high quality and reliability are guaranteed. Backed by Winbond's Quality Management Program, the Flash memory portfolio includes AEC-Q100 products qualified to Grade 1 for operation at up to 125°C. On-chip ECC protects the integrity of data stored on Winbond Flash devices.



Winbond Flash memory devices for code storage are at the heart of the products in today's fastest-growing markets.

5G Mobile Infrastructure

- High-reliability SPI NOR Flash in densities up to 2Gb supports XiP operation to boot directly to a SoC or FPGA.
- A new high-density code storage option: the W25N series of QspiNAND Flash products offers a cost-effective alternative to SPI NOR Flash in densities of 1-4Gb. Maximum Continuous Read speed of 83MB/s supports the high bandwidth/low latency requirements of 5G networking.

Automotive Applications

- Winbond's automotive-grade SPI NOR Flash and Single-Level Cell NAND Flash with on-chip ECC provide ultra-high reliability.
- QspiNAND and new OctalNAND Flash products offer high Read speeds to give fast boot time in applications such as driver assistance systems and the instrument cluster. Fast Write capability supports reliable over-the-air software updating.

Industrial IoT End Points

- Ultra-low power devices such as wireless sensors can save power by using the ultra-low voltage family of SPI NOR Flash products, which are rated for operation at 1.14-1.26V.
- Space-saving SpiStack® arrangements can combine NOR Flash for long lifetime code storage and NAND Flash for high-density data storage in a single package. For over-the-air updating, SpiStack® configurations support Read-while-Write and Write-while-Write capabilities.

DRAM memory is an essential component of new AI system, IoT device and Mobility segment. New Winbond DRAM products save space and cost, and reduce power consumption, while providing super-fast performance up to 4.26Gbps.

3

Broad Portfolio of DRAM Products Offers High Bandwidth and Low Power Consumption

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Rapid adoption of AI technology drives demand for DRAM in low, mid and high densities at IoT device as AIoT segment.

Artificial Intelligence (AI) is revolutionizing products across the consumer, communications, industrial, and automotive markets. Smart door bells which recognize a resident's face, industrial machines which can automatically alert an engineer to perform a repair before they break down, and cars which can drive themselves on the highway – all use AI technology. These products need fast memory to support the advanced processors which run AI applications.

Mobility applications required LPWA connectivity chips via WiFi, Bluetooth, Mobile Network,…,etc. Also, it needs small density, lower power consumption memory to achieve the best end product performance.

And the Winbond DRAM product provides completed solutions, GP-Boost™ DRAM Series for AI, IoT, and Mobility applications.

HYPERRAM™

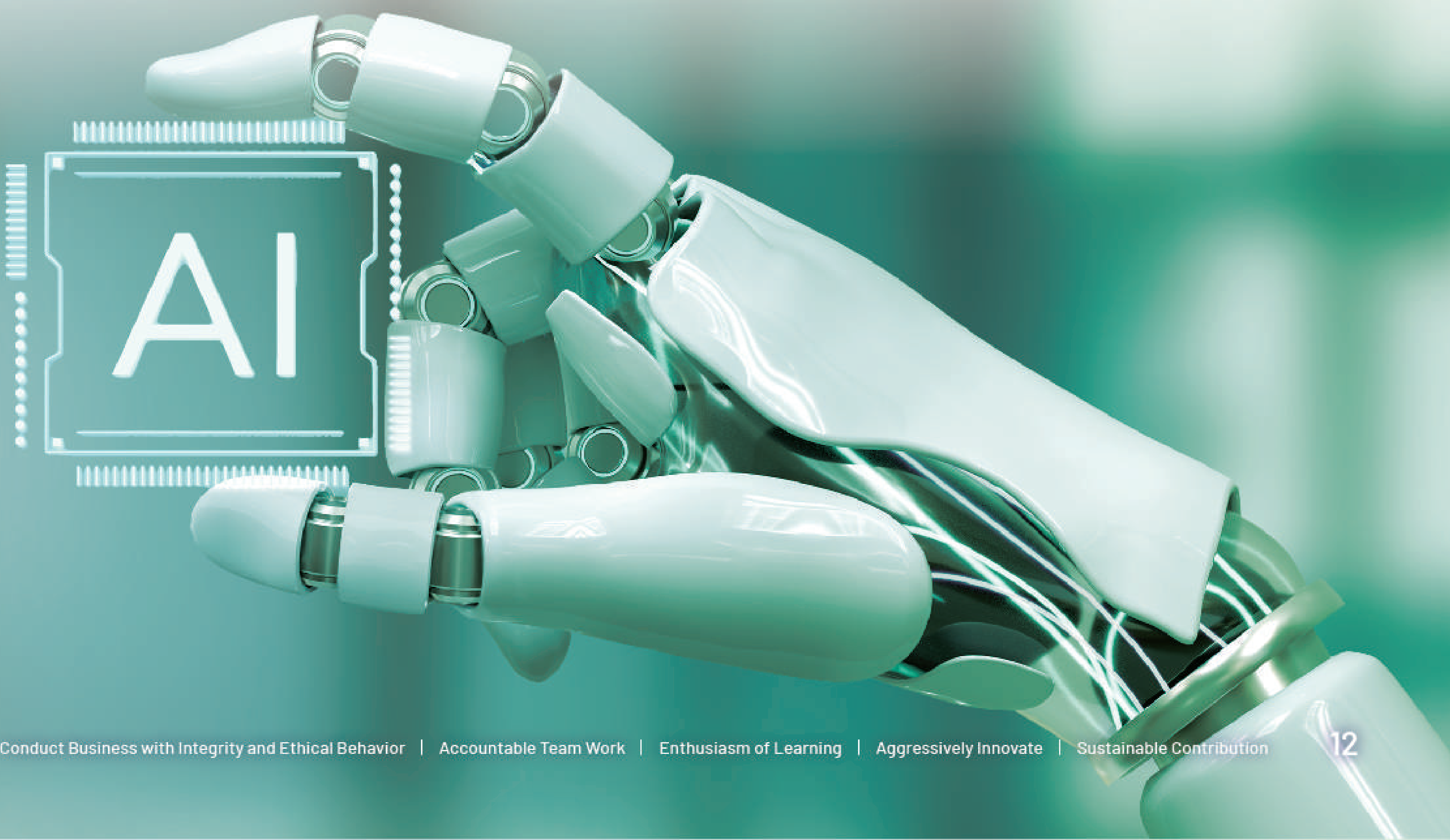
An ultra-low power, space saving solution for simple AI applications such as keyword recognition and SD image processing. Available in densities up to 512Mb, these products are ideal for use in battery-powered and energy-saving devices.

SDRAM / LPSDR, DDR / LPDDR, DDR2 / LPDDR2, and DDR3 / LPDDR3

Data rate options up to 2.13Gbps support advanced microprocessors which run a Linux® operating system. Ideal for applications involving FHD video processing, face recognition or object detection, especially for 1Gb LPDDR3.

LPDDR4/4X

Supports high-bandwidth operation for 4K and even 8K video processing, AI inference processing and Mobility applications , at maximum data rate up to 4.26Gbps. Available in densities from 1Gb to 4Gb DDP, LPDDR4 are suitable for advanced applications such as autonomous driving.



HYPERRAM™: space-saving solution and ultra-low power consumption

Winbond HYPERRAM™ products provide a compact alternative to traditional pseudo-SRAM in IoT and consumer devices, automotive and industrial equipment. The introduction in 2021 of HYPERRAM™ devices produced on Winbond's 25nm process extends densities up to 256Mb and 512Mb.

Ultra-low Power Consumption

Winbond's Hybrid Sleep Mode (HSM) gives standby power consumption as low as 35μW, and operating power less than half that of equivalent pSRAM products.

Design Simplicity

HYPERRAM™ devices use just 13 signal pins, compared to 31 signal pins in pSRAM. This makes the board layout much simpler to design and manufacture.

Space-saving

Low pin-count packages and a lower number of connections to the host controller reduce the memory system's board footprint and save space in consumer devices such as smart watches.

DDR2 / DDR3: shift to 25/20nm process

For industrial products and networking equipment, Winbond's 1.5V and 1.35V DDR3 products support data rates up to 2133Mbps in x8 and x16 configurations.

After completing a migration from 46nm and 38nm to the Winbond 25nm and 25Snm process, DDR2 and DDR3 products are now available. DDR2 is available for 25nm 512Mb and 1Gb, DDR3 is available in densities of 1Gb, 2Gb, 4Gb and 8Gb. In 2023, Winbond do a further migration to 20nm, which DDR3 is available 1Gb, 2Gb and 4Gb. Winbond also supplies DDR2/DDR3 products in Known Good Die (KGD) form.

When an electronics product requires secure code storage, it needs certified TrustME® Secure Flash Memory from Winbond. The TrustME® family meets every system requirement, from the substantial protection required by simple IoT devices up to Common Criteria EAL 5+ certified memory for securing financial transactions.

4

TrustME® Family: The Right Fit for All Security Requirements

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Whether an application requires a Substantial or High level of protection, Winbond's Secure Flash Memory has a corresponding solution to match.

Today, almost every electronic product is a connected product. In the age of the IoT, connected and autonomous cars and Industry 4.0, manufacturers can create more value by connecting products to the cloud to support new, sophisticated applications and to enable software updates.

But with the connection to the network comes risk: the network provides an entry point for attackers to disable or compromise devices or services, to steal private data or to perform illegal transactions. So every connected device must be secured. This security must extend to the protection of code and data stored in external memory outside the main microcontroller or processor.

TrustME® Security Products from Winbond meet various requirements for secure storage.

W77Q Secure Flash Memory

Provides Substantial Levels of security as defined by various Cybersecurity regulations. It is ideal for use in IoT end points and connected vehicles to protect code, data integrity, privacy and any credentials, also to maintain product life cycle and enable secure over-the-air updates.

W75F Secure Memory Element

Meets the EU's requirement for a High Level of protection. It may be used to secure payments and to protect safety-critical applications, including in vehicles to mandate higher functional safety and cybersecurity.

W76S Secure Element

Provides the same secure memory as the W75F, and adds secure microcontroller functionality. It can be used to secure electronic payments, protect crypto-wallets and any property sensitive applications.

Strong security capabilities for all connected devices

W77Q Secure Flash Memory

The W77Q for IoT end points and other types of connected devices provides important security functions, including hardware root-of-trust, secure boot, platform resilience, and strong data protection. The W77Q can also implement secure over-the-air software updates, even when the host processor is compromised.

Security certificates for 16/32Mbit include:

- ISO 15408 Common Criteria EAL 2+
- SESIP Level 2 (with IEC 62443 and NIST 8259A Ready)
- ISO 26262 ASIL-C Ready
- ISO 21434 Automotive Cybersecurity Certification [1)]
- FIPS 140-3 CAVP (Cryptographic Algorithm Validation Program)

[1)] *in progress*

Security certificates for 64/128Mbit include ***(in progress)*****:**

- ISO 15408 Common Criteria EAL 2+
- SESIP Level 2 (with IEC 62443, NIST 8259A, WP.29 Ready)
- ISO 26262 ASIL-C Ready
- ISO 21434 Automotive Cybersecurity Certification
- FIPS 140-3 CMVP (Cryptographic Module Validation Program) L1

W75F Secure Memory Element

The 4Mb, 16Mb or 32Mb W75F provides the industry's most secure and safe external storage solution for code and data in applications such as payments, iSIM cards, system security, biometric, eIDs and automotive modules. It defends products against threats such as replay, roll-back, man-in-the-middle, sniffing, side-channel, and fault injection attacks. The W75F can construct a robust and flexible secure memory sub-system with Secure Flash Interface IP of SoC (provided by Winbond), or can be the complementary embedded security system to Arm®v8-M architecture-based systems.

The W75F is the first Secure Flash Memory device to obtain certificates for:

- Common Criteria EAL 5+
- ISO 26262 ASIL-D Ready
- SESIP Level 3 with Physical Attack Resistance and Software Attacker Resistance: Isolation of Platform
- Platform Security Architecture (PSA) Certified Level 2 Ready
- Compliant with 3S in SoC Protection Profile PP0117 for integrated SE and SIM functionality
- ISO 21434 Automotive Cybersecurity Certification *(in progress)*

W76S Secure Element

The W76S Secure Element is an innovative combination of an external memory and a Tamper-Resistant microcontroller. Based on a 32Mb W75F Secure Flash, it offers the highest security capabilities required for eSIM, biometric, eIDs and ePayment applications. It may also be used to protect blockchain and crypto-wallet transactions and Android™ StrongBox processes.

The W76S's security certificates include:

- Common Criteria EAL 5+
- EMVCo for Financial Transactions
- CFNR (China Financial National Rising Authentication): Technology Certification of Mobile Financial Service

5

Product Brief

Code Storage Flash Memory

Product Line	Density/Combination	Voltages	Data Width
Serial NOR Flash	2Mb to 2Gb	1.8V & 3V	x1, x2, x4
1.2V Serial NOR Flash	8Mb to 256Mb	1.2V	x1, x2, x4
QspiNAND Flash	512Mb to 4Gb	1.8V & 3V	x1, x2, x4
High Performance QspiNAND Flash	1Gb to 2Gb	1.8V	x1, x2, x4
OctalNAND Flash	1Gb to 4Gb	1.8V	x1, x8
SLC NAND Flash	1Gb to 8Gb	1.8V & 3V	x8, x16
NAND Based MCP	Combos SLC NAND + Low Power DRAM	1.8V	x16, x32
SpiStack® Flash	Combos S-NOR and S-NAND	1.8V & 3V	x1, x2, x4
Authentication Flash	S-NOR 32Mb to 512Mb, S-NAND 1Gb	1.8V & 3V	x1, x2, x4

Mobile DRAM

Product Line	Density	Voltages	Data Width
PSRAM	64Mb	1.8V/1.8V	x16
HYPERRAM™	32Mb to 512Mb	1.8V (32Mb to 128Mb also support 3.0V)	x8
	256Mb and 512Mb	1.8V	x16
LPSDR SDRAM	512Mb	1.8V/1.8V	x16, x32
LPDDR1 SDRAM	256Mb to 1Gb	1.8V/1.8V	x16 for 256Mb, x32 for 512Mb to 1Gb
LPDDR2 SDRAM	512Mb to 2Gb	1.8V/1.2V	x16, x32
LPDDR3 SDRAM	1Gb	1.8V/1.2V	x16, x32
LPDDR4 SDRAM	1Gb to 4Gb	1.8V/1.1V/1.1V	x16, x32
LPDDR4X SDRAM	1Gb to 4Gb	1.8V/1.1V/0.6V	x16, x32

Specialty DRAM

Product Line	Density	Voltages	Data Width
SDRAM	16Mb to 256Mb	2.5V/3.3V	x16, x32
DDR SDRAM	64Mb to 256Mb	2.5V	x8, x16
DDR2 SDRAM	128Mb to 2Gb	1.8V	x8, x16
DDR3 SDRAM	1Gb to 4Gb	1.5V, 1.35V	x8, x16

TrustME® Secure Flash Memory

[1] *Certification in progress*

Product Line	Description	Density	Security Level
W77Q	Secure Flash Memory	16Mb, 32Mb, 64Mb[1], 128Mb[1]	**Substantial:** • ISO 15408 CC EAL 2+ • SESIP Level 2 (with IEC 62443 and NIST 8259A Ready) • ISO 26262 ASIL-C Ready • FIPS 140-3 CAVP/CMVP • ISO 21434 Automotive Cybersecurity [1]
W75F	Secure Memory Element	4Mb, 16Mb, 32Mb	**High:** • CC EAL 5+ • ISO 26262 ASIL-D Ready • PSA Certified Level 2 Ready • ISO 21434 Automotive Cybersecurity [1] • SESIP Level 3 with Physical Attack Resistance and Software Attacker Resistance: Isolation of Platform • Compliant with 3S in SoC Protection Profile PP0117 for integrated SE and SIM functionality
W76S	Secure Element	32Mb	**High:** • CC EAL 5+ • EMVCo • CFNR: Technology Certification of Mobile Financial Service

Code Storage Flash Memory | **Mobile DRAM** | **Specialty DRAM** | **TrustME® Secure Flash Memory**

About Winbond

Winbond Electronics Corporation is a leading global supplier of semiconductor memory solutions. The Company provides customer-driven memory solutions backed by the expert capabilities of product design, R&D, manufacturing, and sales services.Winbond's product portfolio, consisting of Specialty DRAM, Mobile DRAM, Code Storage Flash, and TrustME® Secure Flash, is widely used by tier-1 customers in communication, consumer electronics, automotive and industrial, and computer peripheral markets.

Winbond is headquartered in Central Taiwan Science Park (CTSP) and it has subsidiaries in the USA, Japan, Israel, China, Hong Kong, and Germany. Based on Taichung and new Kaohsiung 12-inch fabs in Taiwan, Winbond keeps pace to develop in-house technologies to provide high-quality memory IC products.

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RD SALES

America

Winbond Electronics Corporation America

RD SALES

China

Winbond Electronics (Suzhou) Limited

SALES

Japan

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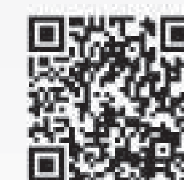
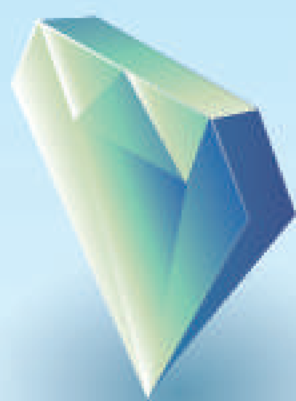
Sales Support


Technical Support

Winbond Innovations



High Quality

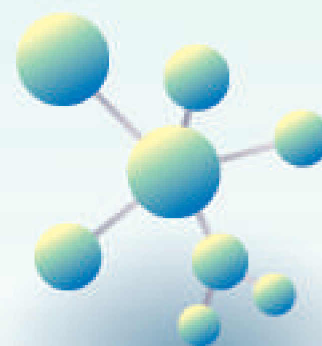
- 125°C Serial NOR Flash
- 105°C QspiNAND Flash
- On-chip ECC NOR Flash
- Automotive DRAM

Security Future

- TrustME® Secure Flash
- Authentication Flash

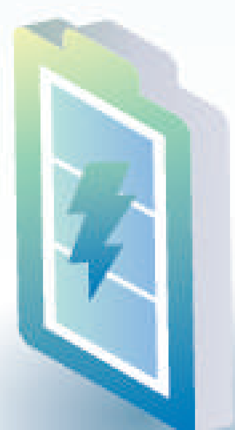
High Speed

- Octal NOR Flash
- OctalNAND Flash
- DTR NOR/NAND Flash
- LPDDR4/4X
- DDR2



More Flexibility

- SpiStack® NOR+NAND Flash
- NAND Based MCP
- HYPERRAM™
- PSRAM
- KGD



Low Power

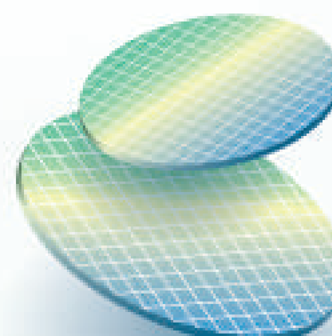
- 1.2V Serial NOR Flash
- 1.8V Serial NOR/NAND Flash
- LPDDR with DSR Mode
- HYPERRAM™

High Reliability

As a trusted memory supplier, Winbond commits to providing comprehensive support for customers' engineering requirements.

Longevity Support

Winbond offers Product Longevity Program to help customers select the most appropriate part for applications that require stable life cycles support.



Own 12-inch Fab

Winbond's in house wafer fabrication provides customers with full commitment in capacity support as well as delivery flexibility.

Official Website

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