

winbond

Product Selection Guide 2020

Vision Statement

以綠色半導體技術豐富人類生活的隱形冠軍
***Be a hidden champion in providing sustainable
semiconductors to enrich human life.***

winbond

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About Winbond

Winbond Electronics Corporation is a total memory solution provider.

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 and Code Storage Flash, is widely used by tier-1 customers in communication, consumer electronics, automotive and industrial, and computer peripheral markets.

Winbond headquarters in Central Taiwan Science Park(CTSP) and has subsidiaries in the USA, Japan, Israel, China and Hong Kong.

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.

Customers worldwide depend on Winbond to supply high-quality, high-reliability devices qualified for use in consumer and industrial applications.

1

Introduction

Ambient computing creates demand for compact and power-efficient memory products

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Ask most consumers what a computer is, and they will readily provide the answer: a desktop unit connected to a keyboard, a mouse and a display, or a laptop unit which has the user interface devices built in.

Now, however, many other types of device, from phones to watches to printers and more, are also becoming computers, because users value the additional capabilities that computing offers:

- Fast connectivity, including to the internet
- Sophisticated configuration options
- An attractive and intuitive touchscreen display
- Easy-to-learn user controls
- Interoperability with apps and with other smart, connected devices





In fact, the installed base of networked computing devices is now so large that the world is approaching a new era of ‘ambient computing’. This will transform people’s access to information, their freedom to communicate, and their ability to control devices and the environment around them. Ambient computing will have profound effects on work practices and on people’s lifestyles.



A new infrastructure for a world of ambient computing

The transformation to ambient computing will be accelerated by the roll-out of new 5G wireless networks, which will provide capacity to support billions of connected devices. The ability to connect devices to cloud computing services will fuel the development of Artificial Intelligence (AI) and machine learning. Ambient computing will also support new applications of virtual and augmented reality, made possible by the capabilities not only of today's consumer devices such as smartphones, but new device types such as 'smart frames' (glasses) and wearable computers such as smart wireless earbuds.

And this creates new demand for the kind of compact, low-power and high-performance Flash and DRAM memory products that Winbond supplies.



Customers everywhere rely on Winbond to maintain a secure and reliable supply, and to limit the risk of disruption to production schedules caused by supply shortages.

2

Flash & DRAM Focused Products



New Flash products offer better power consumption, size and cost options

- **High-performance QspiNAND for code storage saves space and cost**
- **New low-power SpiNOR Flash offers better power savings**

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Technology is being transformed as new forms of ambient computing emerge. Many ambient computing devices for end users will be mobile or wearable, powered by a battery or harvesting energy from the environment. Running increasingly sophisticated apps, they will require low-power Flash products which provide a high memory capacity for code storage. Because the space available in mobile and wearable devices is so restricted, designers will need Flash products housed in compact packages.

The infrastructure supporting ambient computing has different requirements – most of all, for high reliability, to ensure unbroken 24/7/365 operation of the computing systems on which homes, offices and entire cities will rely even for basic functions.

Flash memory technology from Winbond will provide the long data retention and high data integrity required in 5G networks and other critical elements of the ambient computing infrastructure.



High-performance, high-density NAND Flash

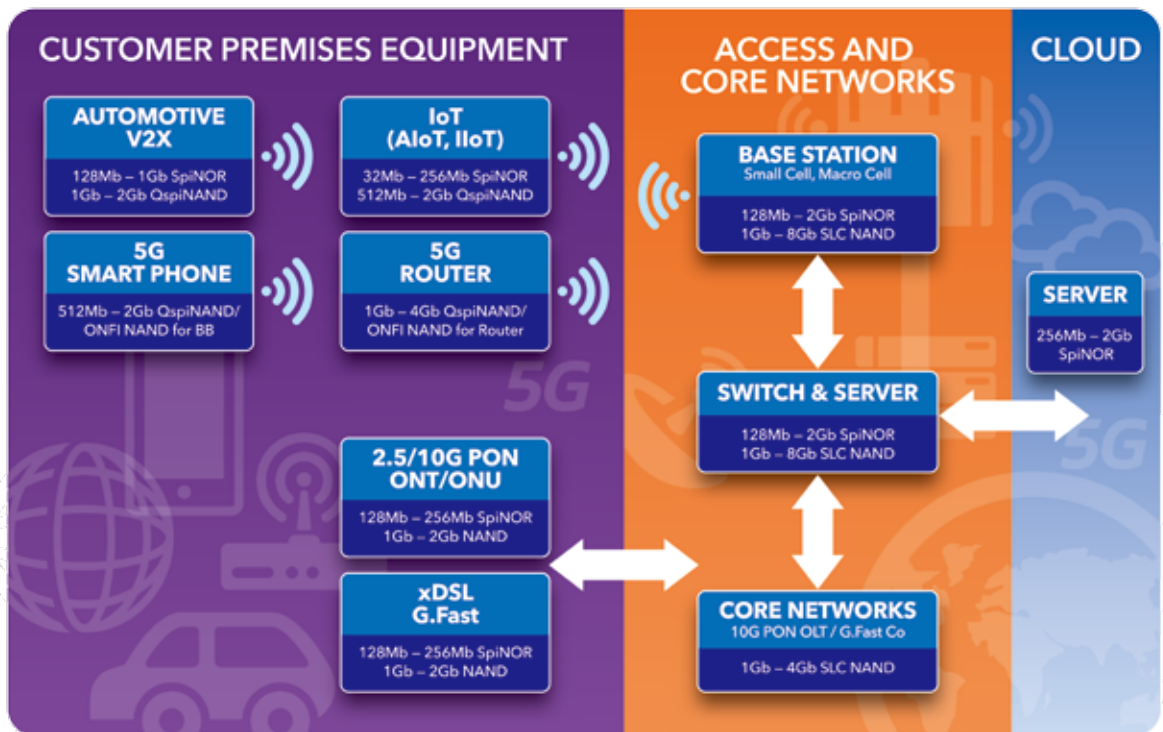
Winbond's family of high-performance QspiNAND Flash products provides a cost-effective alternative at memory capacities of 1Gb and higher to the NOR Flash traditionally used for code storage. NAND Flash scales better than NOR at these high densities, giving a substantially lower cost-per-bit. In 5G communications equipment and the IoT, as well as AI edge computing devices, high-performance QspiNAND provides a compact, low-cost and high-density memory for storing large software programs.

And robust Single-Level Cell (SLC) NAND produced at Winbond's own fabrication plant in Taiwan includes built-in Error Correction Code (ECC), providing for high data integrity and long data retention.



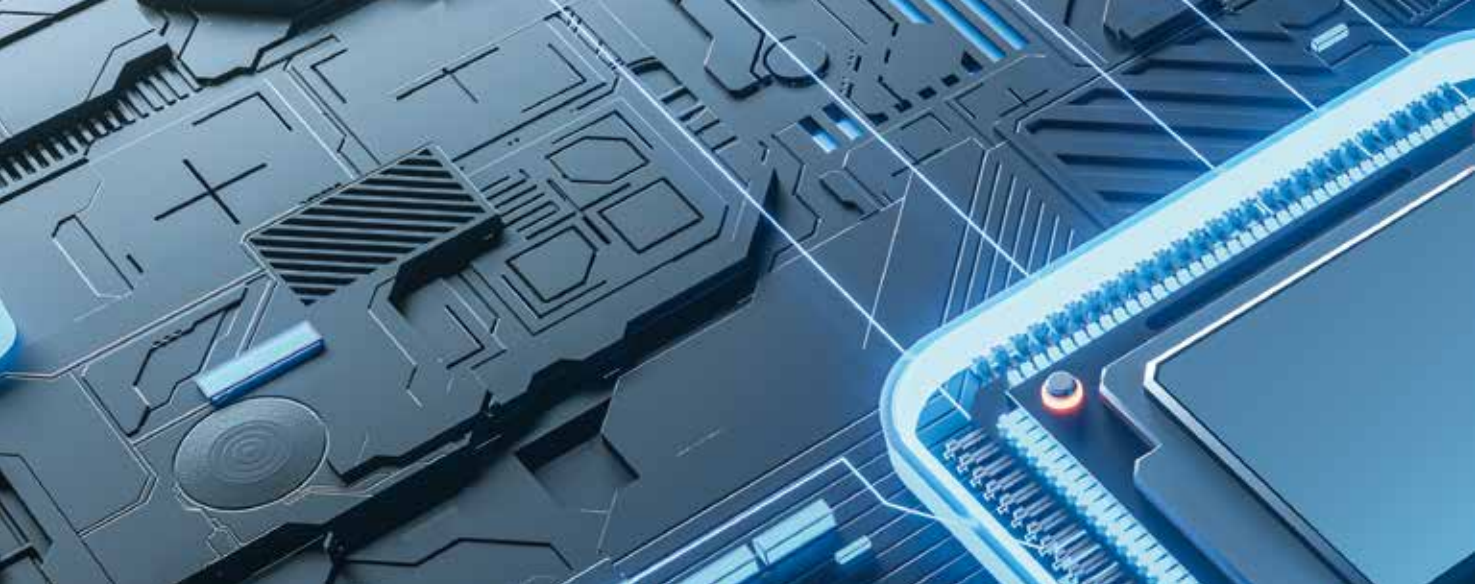
5G

WINBOND FLASH SOLUTIONS FOR 5G



Low-power SpiNOR Flash

In wearable and mobile devices, the benchmark for low-power Flash operation is set by Winbond's W25QxxND 1.2V series of parts. Offering performance identical to the popular 3V and 1.8V families of SpiNOR Flash, they are supplied in 2mm x 3mm USON8, narrow 150mil SOP8, 6mm x 5mm WSON 8-pin packages and as Known Good Die (KGD). The 1.2V SpiNOR Flash products from Winbond offer power savings of 33% over equivalent 1.8V parts.



Complete portfolio of Flash memory products for code storage

High-performance QspiNAND and low-voltage SpiNOR Flash are just the latest new products introduced by Winbond, extending a full portfolio of products suitable for any code storage application.

In SpiNOR Flash, the Winbond product offering includes SpiFlash® Multi-I/O memories in densities from 512Kb to 512Mb, featuring small erasable sectors and the industry's highest performance. Dual SPI, Dual I/O, Quad I/O and Quad Peripheral Interface (QPI) versions offer even higher performance, up to a 50MB/s data-transfer rate – fast enough to support Execute-in-Place (XiP) operation.





In QspiNAND Flash, Winbond supplies products with a standard serial interface and a x1/x2/x4 bus width in densities of 512Kb, 1Gb, 2Gb and 4Gb. They are available in a nominal operating voltage of 1.8V or 3.3V.

High-performance 1.8V QspiNAND featuring an SPI or QPI and supporting single and dual transfer rates is available in densities of 1Gb and 2Gb.





Mobile DRAM fits power and speed envelope of wearable and portable IoT devices

- Winbond's x16 and x32 LPDDR4 products, the industry's fastest, feature speeds up to 4266Mbps
- High-performance DDR4 available in 4Gb density

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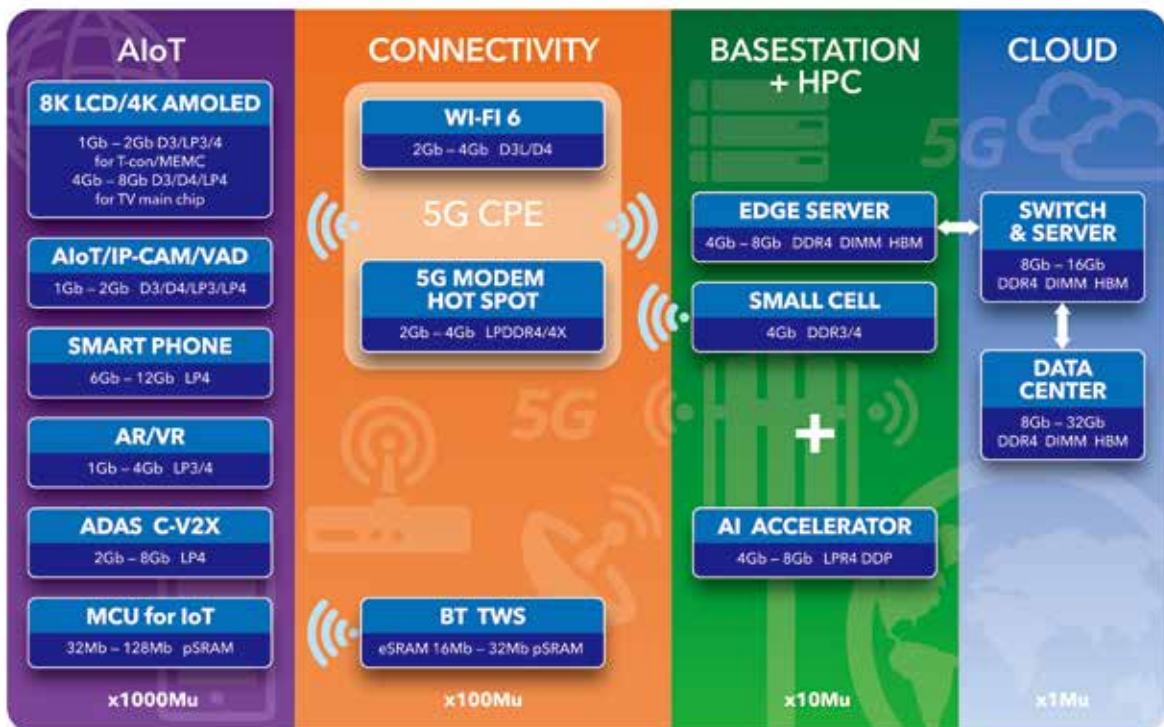
Conventional PCs and servers rely on arrays of high-speed synchronous DRAM devices to provide a buffer memory supporting a high-speed CPU or GPU. The equipment which forms the ambient computing ecosystem – end-user devices such as mobile handsets and smart watches, and infrastructure equipment such as 5G routers and base stations – is also based on high-performance processors.



But these devices are much more constrained, in terms of power and size. They require specialty DRAM devices – the types of low- and mid-density DRAM and low-power mobile DRAM products that Winbond supplies.

Winbond has pioneered the development of JEDEC-compliant LPDDR products providing the highest performance with low power consumption. Winbond also offers a performance advantage in DDR3 and DDR4.

WINBOND DRAM SOLUTIONS FOR 5G/AIoTT





DRAM for highest performance

Winbond DDR3 in a new high capacity of 4Gb became available for sampling now. Supporting data widths of x8 and x16, Winbond's DDR3 fabricated in-house in a 25nm process offers the market's fastest data rate of up to 2133Mbps.

Wide I/O x32 LPDDR3 devices, and the new 2Gb W63BHANQRA in an x64 data width, meet the high-bandwidth requirements of next-generation display devices such as 8K TVs.

Low-power DRAM in density up to 4Gb

The JEDEC-compliant LPDDR4 products from Winbond provide for high-speed memory operations at a low supply voltage of 1.8V/1.1V, and just 0.6V in quiescent mode, making them ideal for use in battery-powered mobile and wearable devices.

The latest LPDDR4 products from Winbond include a 2Gb LPDDR4 device with a x16 interface, and a 4Gb, x32 LPDDR4. LPDDR4 products in densities up to 8Gb and with data width up to x32 are under development. High-performance LPDDR4 offers a maximum data rate of 4266Mbps.

The Specialty DRAM portfolio from Winbond is backed by guaranteed arrangements for longevity to support the long product lifetimes of industrial and telecoms applications.

Extended portfolio of high-value DRAM products

Winbond's portfolio of DRAM products extends beyond the latest, highest-performance DDR3 and LPDDR4 devices to provide a comprehensive offering, to meet any requirement for low- and mid-density DRAM and low-power DRAM.

In Specialty DRAM, Winbond provides SDR, DDR, DDR2, and DDR3 products in densities from 16Mb to 4Gb for use in the consumer, communication, computer peripheral and industrial markets. Winbond also provides a comprehensive implementation service to customers who choose its specialty DRAM in Known Good Die (KGD) format, including support with SiP package bonding and power/thermal issues, DRAM simulation, and wafer-level speed testing.






In Mobile DRAM, Winbond has developed devices which operate from a low supply current, and which offer the low power consumption needed not only in mobile phones and tablets but in many types of portable consumer electronics and communications devices.

Winbond mobile DRAM products support both x16 and x32 data widths. Key features of the Winbond mobile DRAM products include:

- Sequential or interleaved burst
- High clock rate
- Standard self-refresh
- Partial-array self refresh (PASR)
- Automatic temperature-compensated self refresh (ATCSR)
- Deep power-down (DPD)
- Programmable output buffer driver strength



A person wearing a white cleanroom suit and mask is seated at a workstation in a cleanroom. The workstation features multiple computer monitors and a keyboard. The person is holding a pen and looking at a document or screen. The background shows rows of similar workstations extending into the distance, with overhead lighting and structural elements of the cleanroom.

*Inspired by a passion
for customer service, the
Winbond engineering
team commonly shares its
expertise with customers
to help them optimize their
circuit designs.*

3

Positioning & Advantages

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A trusted memory supplier to the world's leading industrial and consumer device OEMs

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Winbond is the world leader in the market to supply NOR Flash and robust Single Level Cell (SLC) NAND Flash products. In addition, it is responsible for many of the most important innovations in low-power mobile DRAM technology.

Customers worldwide depend on Winbond to supply high-quality, high-reliability devices qualified for use in consumer and industrial applications. Winbond has a long track record of semiconductor production at its own 12" wafer fabrication plant in Taiwan. The company continues to invest in new process technologies and equipment at this fab, most recently introducing a 25nm line for production of low-power mobile DRAM.





Investment in security of supply

Winbond's investment in its fabrication plant provides an assurance of security of supply to customers, whatever the market conditions. Unlike competitors which rely exclusively on foundry partners for wafer supplies, Winbond is in control of its own production, and can deliver on supply commitments that it makes to customers.

Customers everywhere rely on Winbond to maintain a secure and reliable supply, and to limit the risk of disruption to production schedules caused by supply shortages.

Support for long product life cycles

For industrial customers, the WPLP (Winbond Product Longevity Program) offers assurance of the sustained availability of Winbond memory products that are designed into products with a long production lifetime.

Under the WPLP, Winbond guarantees that selected products will be available in mass production for a minimum of ten years from the date of the product's introduction. Under the WPLP, memory products are subject to 12 months' notice of end-of-life (EOL) and the placement of final orders, and 24 months' notice of the final shipment date.



Comprehensive support for customers' engineering requirements

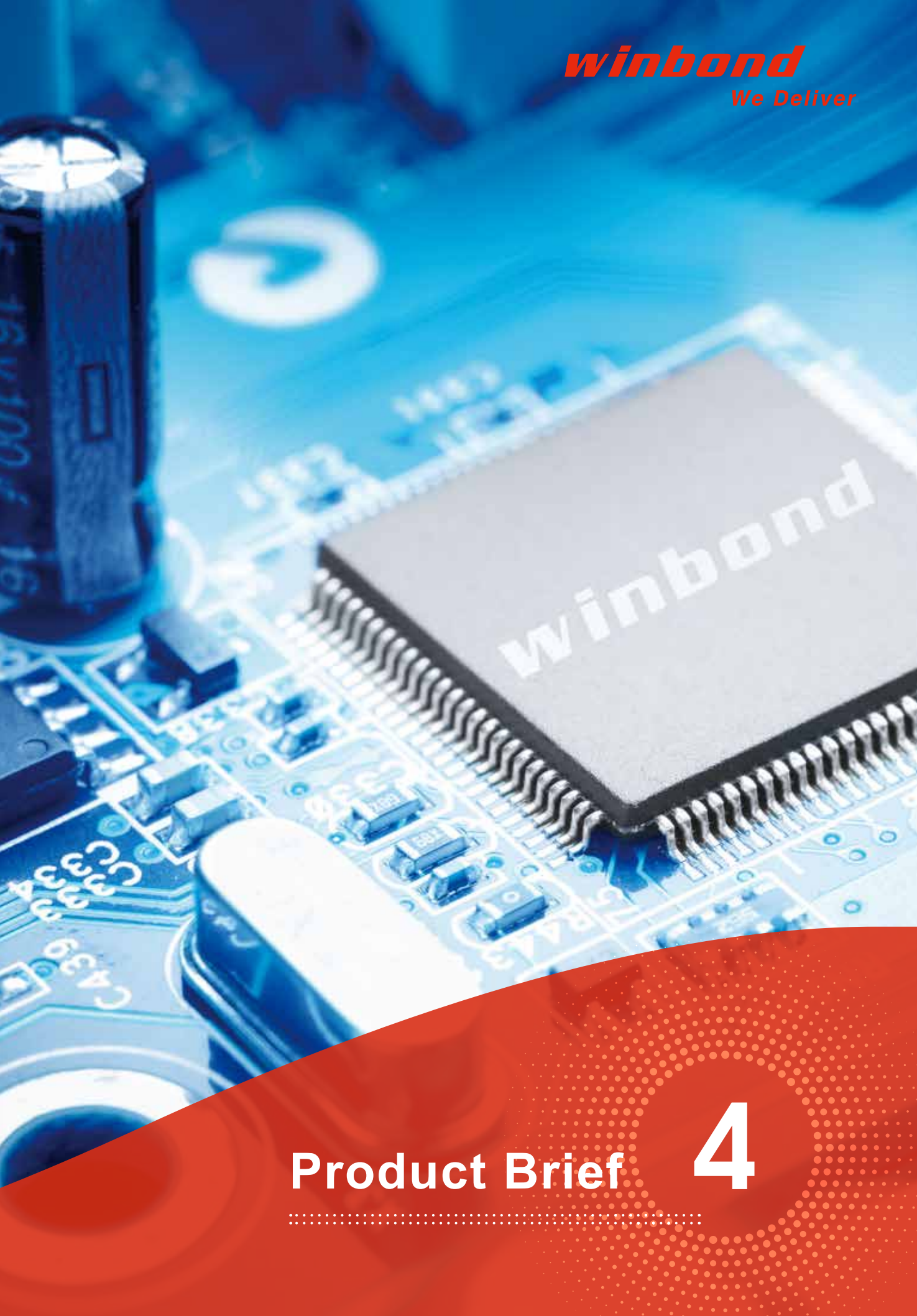
Winbond's engineers are among the world's foremost authorities in memory semiconductor technology. Inspired by a passion for customer service, the Winbond engineering team commonly shares its expertise with customers to help them optimize their circuit designs.

Winbond's commitment to meeting customer needs extends to the flexibility of its product offer. NOR Flash, NAND Flash and DRAM products are all available in all popular industry-standard package outlines for easy integration into board layouts.

Winbond can also supply most products as Known Good Die (KGD), a form factor which enables customers to minimize their board footprint, reduce bill-of-materials cost, or integrate Winbond memory technology into a proprietary or non-standard package.

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Product Brief 4



Product Brief



Code Storage Flash Memory

Product Line	Density/Combination	Voltages	Data Width
Serial NOR Flash	512Kb to 2Gb	1.8V & 3V	x1, x2, x4
1.2V Serial NOR Flash	8Mb to 128Mb	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 256Mb, S-NAND 1Gb to 2Gb	1.8V & 3V	x1, x2, x4



Specialty DRAM

Product Line	Density	Voltages	Data Width
SDRAM	16Mb to 256Mb	2.5V/3.3V	x16, x32
DDR SDRAM	32Mb to 256Mb	2.5V	x8, x16
DDR2 SDRAM	128Mb to 2Gb	1.8V	x8, x16
DDR3 SDRAM	512Mb to 4Gb	1.5V, 1.35V	x8, x16
DDR4 SDRAM	4Gb	1.2V	x8, x16



Mobile DRAM

Product Line	Density	Voltages	Data Width
PSRAM	32Mb to 256Mb	1.8V/1.8V	x16
HyperRAM™	32Mb to 128Mb	1.8V, 3V	x8
LPSDR SDRAM	128Mb to 512Mb	1.8V/1.8V	x16, x32
LPDDR1 SDRAM	128Mb to 1Gb	1.8V/1.8V	x16, x32
LPDDR2 SDRAM	256Mb to 2Gb	1.8V/1.2V	x16, x32
LPDDR3 SDRAM	1Gb and 4Gb	1.8V/1.2V	x16, x32
LPDDR4 SDRAM	2Gb to 8Gb	1.8V/1.1V/1.1V	x16, x32
LPDDR4X SDRAM	2Gb to 8Gb	1.8V/1.1V/0.6V	x16, x32



Technical Support



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