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2017 PRODUCT SELECTION GUIDE

- Mobile DRAM
- Specialty DRAM
- Code Storage Flash Memory

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ABOUT WINBOND

Winbond Electronics Corporation is a worldwide leading supplier of specialty memory IC's. The company provides memory solution backed by the expert capabilities of design, manufacturing and sales services.

Winbond's product portfolio, consisting of Mobile DRAM, Specialty DRAM and Code Storage Flash, is widely used by tier-1 customers in consumer, communication, computer peripheral and automotive markets. Our 300 mm wafer fab keeps pace with advanced process technologies to provide high-quality memory IC products.

The Company was established in September 1987 and listed on Taiwan Stock Exchange in 1995 with headquarter in Central Taiwan Science Park, Taichung, Taiwan . Winbond also has subsidiaries in China, Hong Kong, Israel, Japan and the US.



MOBILE DRAM

• The products listed above may not be available for all regions. Please contact your local Winbond Sales Representative.

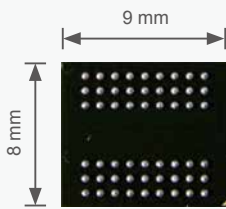
Winbond Electronics Corporation is a leading supplier of semiconductor solutions to the consumer, computer, communications, and electronics product markets. With the latest Buried Word Line technology, Winbond developed the mobile DRAM devices with a low IDD current value, which helps Winbond to extend mobile DRAM memory applications beyond the mobile phone and tablet market to areas of mobile consumer electronics and mobile communication.

Winbond mobile DRAM devices support both x16,x32 and x64 data widths. Major features for the families of products shown in the table below include the following: Sequential or Interleave burst, High Clock rate, Standard Self Refresh, Partial-Array Self Refresh (PASR), Automatic Temperature Compensated Self Refresh Rate(ATCSR), Deep Power-Down (DPD), Programmable output buffer driver strength, and Temperature sensor output (TQ). Please refer to the datasheets for specific features. They are ideal for portable multimedia players, eBook Readers, automotive applications, consumer electronics, gaming devices, and mobile devices.

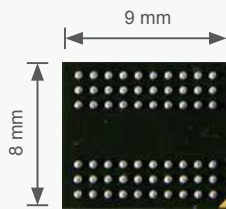


Product	Density	I/O	Ball count	Type	Dimension	Remark
LPDDR	128Mb - 512Mb	X16	54	BGA	8x9	JEDEC standard
		X32	90	BGA	8x13	JEDEC standard
LPDDR	128Mb - 1Gb	X16	60	BGA	8x9	JEDEC standard
		X32	90	BGA	8x13	JEDEC standard
LPDDR2	256Mb - 2Gb	X16 / X32	168	PoP	12x12	JEDEC standard
			134	BGA	10x11.5	JEDEC standard
	4Gb	X64	216	PoP	12x12	JEDEC standard
LPDDR3	2Gb	X16 / X32	178	BGA	12x11.5	JEDEC standard
	4Gb	X32	178	BGA	12x11.5	JEDEC standard
pSRAM	32Mb- 256Mb	X16	54	BGA	6x8	JEDEC standard

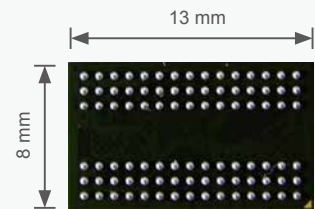
■ SDRx16_54BGA



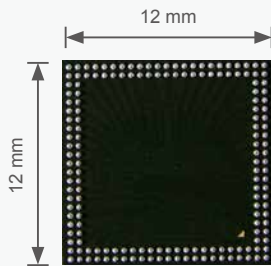
■ DDRx16_60BGA



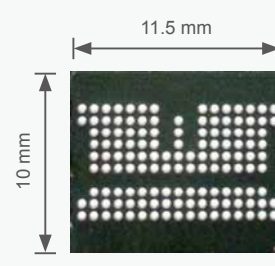
■ SDR/DDRx32_90BGA



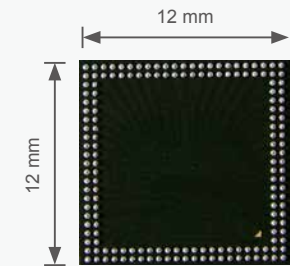
■ LPDDR2_168WFBGA



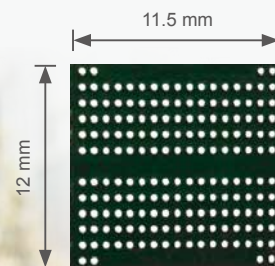
■ LPDDR2_134 VFBGA



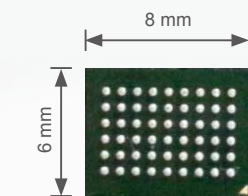
■ LPDDR2_216WFBGA



■ LPDDR3_178VFBGA



■ pSRAMx16_54BGA



Low Power SDR SDRAM

128Mb (16MB) LPDDR (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W987D6HBGX	8Mb x16	1.8V / 1.8V	-6I/-7I/-6E/-7E	54VFBGA	P	-
W987D2HBJX	4Mb x32			90VFBGA		

256Mb (32MB) LPDDR (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W988D6FBGX	16Mb x16	1.8V / 1.8V	-6I/-7I/-6E/-7E	54VFBGA	P	-
W988D2FBJX	8Mb x32			90VFBGA		

512Mb (64MB) LPDDR (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W989D6KBGX	32Mb x16	1.8V / 1.8V	-6I/-7I/-6E/-7E	54VFBGA	P	-
W989D2KBJX	16Mb x32			90VFBGA		
W989D6DBGX	32Mb x16			54VFBGA	P	-
W989D2DBJX	16Mb x32			90VFBGA		

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Status²: All Winbond products are "Green", Halogen-Free and RoHS compliant packaging. Refer to the datasheet for details and specifications.

Automotive³: If you need any information of automotive part, please send your request to DRAM-Automotive@winbond.com

Grade code⁴: I=Industrial, E=Extended

Contact us: LPDRAM@winbond.com

Low Power DDR SDRAM

128Mb (16MB) LPDDR (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W947D6HBH	8Mb x16	1.8V / 1.8V	-5I/-5E/-6I/-6E	60VFBGA	P	-
W947D2HBJ	4Mb x32			90VFBGA		

256Mb (32MB) LPDDR (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W948D6FBH	16Mb x16	1.8V / 1.8V	-5I/-5E/-5A/-5K/-5W -6I/-6E/-6A/-6K/-6W	60VFBGA	N	P
W948D2FBJ	8Mb x32			90VFBGA	P	
W948D6KBH	16Mb x16		-5I/-5E/-6I/-6E	60VFBGA	C(Q1'17)	S(Q2'17)
W948V6KBH(DSR ⁵)						

512Mb (64MB) LPDDR (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W949D6KBH	32Mb x16	1.8V / 1.8V	-5I/-5E/-6I/-6E	60VFBGA	N	-
W949D2KBJ	16Mb x32			90VFBGA		
W949D6DBH	32Mb x16		-5I/-5E/-5A/-5K/-5W -6I/-6E/-6A/-6K/-6W	60VFBGA	P	P
W949D2DBJ	16Mb x32			90VFBGA		

1Gb (128MB) LPDDR (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W94AD6KBH	64Mb x16	1.8V / 1.8V	-5I/-5E/-5A/-5K/-5W	60VFBGA	P	P
W94AD2KBJ	32Mb x32		-6I/-6E/-6A/-6K/-6W	90VFBGA		

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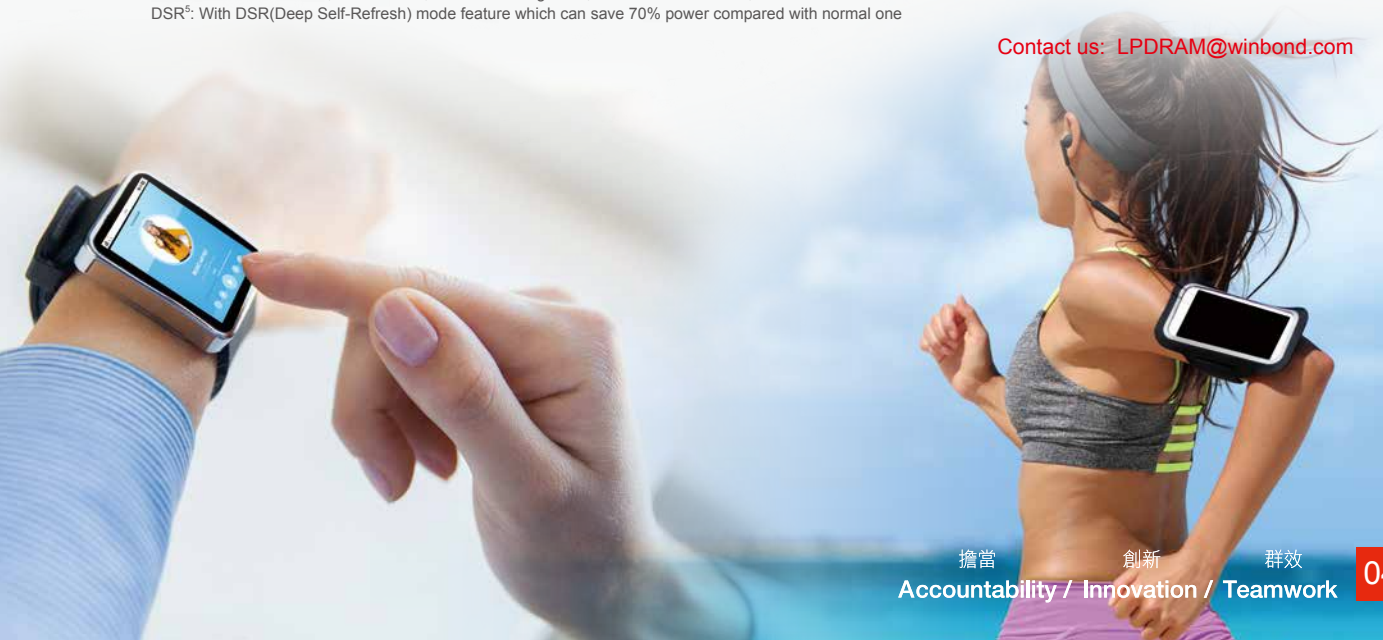
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DSR⁵: With DSR(Deep Self-Refresh) mode feature which can save 70% power compared with normal one

Contact us: LPDRAM@winbond.com



Low Power DDR2 SDRAM

256Mb (32MB) LPDDR2 (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W978H6KBQ	16Mb x16	1.8V / 1.2V	-1I/-1E/-1A/-1K/-1W -2I/-2E/-2A/-2K/-2W	168WFBGA(PoP)	P	P
W978H2KBQ	8Mb x32			134VFBGA		
W978H6KBV	16Mb x16					
W978H2KBV	8Mb x32					

512Mb (64MB) LPDDR2 (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W979H6KBQ	32Mb x16	1.8V / 1.2V	-1I/-1E/-1A/-1K/-1W -2I/-2E/-2A/-2K/-2W	168WFBGA(PoP)	P	P
W979H2KBQ	16Mb x32			134VFBGA		
W979H6KBV	32Mb x16					
W979H2KBV	16Mb x32					

1Gb (128MB) LPDDR2 (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W97AH6KBQ	64Mb x16	1.8V / 1.2V	-1I/-1E/-1A/-1K/-1W -2I/-2E/-2A/-2K/-2W	168WFPGA(PoP)	P	P
W97AH2KBQ	32Mb x32			134 VFBGA		
W97AH6KBV	64Mb x16					
W97AH2KBV	32Mb x32					

2Gb (256MB) LPDDR2 (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W97BH6LBQ	128Mb x16	1.8V / 1.2V	-1I/-1E/-2I/-2E	168WFPGA(PoP)	S(Q1' 17)	-
W97BH2LBQ	64Mb x32		-2I/-2E	134 VFBGA		
W97BH6LBV	128Mb x32					
W97BH2LBV	64Mb x32					

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Grade code⁴: I=Industrial, E=Extended, A=Automotive grade3, K= Automotive Grade2, W=Automotive Tc -40~115C

Contact us: LPDRAM@winbond.com



Low Power DDR3 SDRAM

2Gb (256MB) LPDDR3 (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W63BH6LBV	128Mb x16	1.8V / 1.2V	-BI/-BE/-CI/-CE/-DI/-DE	178 VFBGA	UD(Q4/'17)	-
W63BH2LBV	64Mb x32					

4Gb (512MB) LPDDR3 (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W63CH2LBV	64Mb x 32	1.8V / 1.2V	-BI/-BE/-CI/-CE	178 VFBGA	UD(Q1/'18)	-

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Grade code⁴: I=Industrial, E=Extended

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Pseudo SRAM

32Mb (4MB) Pseudo SRAM (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W966K6HBG	2Mb x16 CRAM	1.8V / 1.8V	-6I/-7I/-6E/-7E	54VFBGA	P	-
W956K6HBC	2Mb x16 CRAM-ADM					

64Mb (8MB) Pseudo SRAM (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W966D6HBG	4Mb x16 CRAM	1.8V / 1.8V	-6I/-7I/-6E/-7E	54VFBGA	P	-
W956D6HBC	4Mb x16 CRAM-ADM			49WFBGA		
W956D6KBK	4Mb x16 CRAM-ADM					

128Mb (16MB) Pseudo SRAM (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W967D6HBG	8Mb x16 CRAM	1.8V / 1.8V	-6I/-7I/-6E/-7E	54VFBGA	P	-
W957D6HBC	8Mb x16 CRAM-ADM					

256Mb (32MB) Pseudo SRAM (PKG)

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W968D6DAG	16Mb x16 CRAM	1.8V / 1.8V	-6I/-7I/-6E/-7E	54VFBGA	P	-
W958D6DBC	16Mb x16 CRAM-ADM					

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Automotive³: If you need any information of automotive part, please send your request to DRAM-Automotive@winbond.com

Grade code⁴: I=Industrial, E=Extended

Contact us: PSRAM@winbond.com



KGD

Fully Cover all Consumer Application:

PND/GPS, Smart Phone, Industry PDA/POS, E-Reader, Portable Game Console, 3.5G/4G Data Card, AP Router, Pico Projector, Automotive, Touch Model, Smart TV, Smart Grid, Monitor System, IP Cam...etc. Providing KGD service to SiP customers with complete mobile DRAM product such as Mobile SDR, Mobile DDR, Mobile DDR2, Mobile DDR3, pSRAM

Provide Diversification of Low Power Consumption Product:

Support DRAM density as:
-LPDDR: 128Mb to 1Gb
-LPDDR2: 256Mb to 2Gb
-LPDDR3: 2Gb to 4Gb
-pSRAM: 32Mb to 256Mb
and support stable, lower power consumption for mobile application

Wafer Level high Speed test:

Up to mobile SDR 166MHz, mobile DDR 400MHz, mobile DDR2 533MHz, mobile DDR3 1066MHz, pSRAM 133MHz
Winbond provides professional advice to KGD customers, including SiP package bonding & power thermal, mobile DRAM simulation...etc

Excellent Quality Control:

100% Burn-In and Test, and qualification of AEC-Q100, TS16949, ISO9001/14001, OHSAS18001 for automotive customers

Product Life Time and Strong Engineering Support:

Owning a 12-inch Fab to guarantee stable long term support with EFA/PFA capability.

Contact us: LPDRAM@winbond.com



SPECIALTY DRAM

• The products listed above may not be available for all regions.
Please contact your local Winbond Sales Representative.

Density

- 16~256Mb SDR
- 32~256Mb DDR
- 128Mb~2Gb DDR2
- 512Mb~4Gb DDR3

Speed

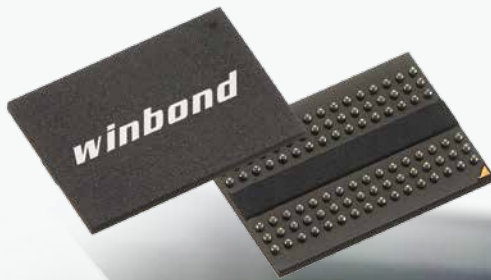
- SDR-200
- DDR-500
- DDR2-1066
- DDR3-1866

Package

- JEDEC standard
- Special BGA package support on SDR and DDR for portable devices.

Interface

- x16/x32 SDR/DDR
- x8/x16 DDR2/DDR3
- x32 GDDR3



Support customized KGD solutions including RDL & wild range power domains

I-temp/Automotive support on SDR/DDR/DDR2/DDR3 products



SDRAM

16Mb (2MB) SDRAM

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W9816G6JH	1Mb x16	3.3V±0.3V	-5/-5I	TSOPII 50	P	P
		2.7V~3.6V	-6/-6I/-6A/-6K/-6W			
			-7/-7I			
W9816G6JB	1Mb x16	3.3V±0.3V	-5	VFBGA 60	P	P
		2.7V~3.6V	-6/-6I/-6A/-6K/-6W			
			-7/-7I			

64Mb (8MB) SDRAM

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W9864G6JB	4Mb x16	3.3V±0.3V	-6/-6I/-6A/-6K/-6W	VFBGA 60	P	P
		2.7V~3.6V	-7/-7I			
W9864G6JT	4Mb x16	3.3V±0.3V	-6/-6I/-6A/-6K/-6W	TFBGA 54	P	P
W9864G6KH	4Mb x16	3.3V±0.3V	-5/-5I	TSOP II 54	P	P
		2.7V~3.6V	-6/-6I/-6A/-6K/-6W			
			-7/-7I			
W9864G2JB	2Mb x32	3.3V±0.3V	-6/-6I	TFBGA 90	P	-
		2.7V~3.6V	-7			
W9864G2JH	2Mb x32	3.3V±0.3V	-5/-5I	TSOPII 86	P	P
		2.7V~3.6V	-6/-6I/-6A/-6K/-6W			
			-7/-7I			



128Mb (16MB) SDRAM

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W9812G6JB	8Mb x16	3.3V±0.3V	-6/-6I/-6A/-6K/-6W	TFBGA 54	P	P
W9812G6KH	8Mb x16	3.3V±0.3V	-5/-5I	TSOP II 54	P	P
			-6/-6I/-6A/-6K/-6W			
W9812G2KB	2Mb x32	3.3V±0.3V	-6/-6I/-6A/-6K/-6W	TFBGA 90	P	P

256Mb (32MB) SDRAM

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W9825G2JB	8Mb x32	3.3V±0.3V	-6/-6I/-6A/-6K/-6W	TFBGA 90	P	P
W9825G6JB	16Mb x16	3.3V±0.3V	-6/-6I/-6A/-6K/-6W	TFBGA 54	P	P
W9825G6KH	16Mb x16	3.3V±0.3V	-5/-5I	TSOP II 54	P	P
			-6/-6I/-6A/-6K/-6W			

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Grade code¹: I=Industrial, A=Automotive grade3, K= Automotive Grade2, W= Automotive Tc -40°C ~ 115°C.

Contact us: SDRAM@winbond.com



DDR SDRAM

64Mb (8MB) DDR

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W9464G6KH	4Mbx16	2.5V±0.2V	-5/-5I/-5A/-5K/-5W	TSOP11 66	P	P

128Mb (16MB)DDR

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W9412G6JB	8Mbx16	2.5V±0.2V	-5/-5I	TFBGA 60	P	P
W9412G6KH	8Mbx16	2.5V±0.2V	-5/-5I/5A/5K/-5W	TSOP11 66	P	P

256Mb (32MB) DDR

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W9425G6JB	16Mbx16	2.5V ±0.2V	-5/-5I	TFBGA 60	P	P
W9425G6KH	16Mbx16	2.5V ±0.2V	-5/-5I/5A/5K/-5W	TSOP11 66	P	P

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Grade code⁴: I=Industrial, A=Automotive grade3, K= Automotive Grade2, W= Automotive Tc -40°C ~ 115°C.

Contact us: SDRAM@winbond.com

DDR2 SDRAM

128Mb (16MB) DDR2

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W9712G6KB	8Mbx16	1.8V±0.1V	-18/18I/18J -25/25I/25A/25K/25W	TFBGA 84	P	P

256Mb (32MB) DDR2

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W9725G6KB	16Mbx16	1.8V±0.1V	-18/18I/18J -25/25I/25J//25A/ 25K/25W	WBGA 84	P	P
W9725G8KB	32Mbx8	1.8V±0.1V	-18/18I/18J -25/25I/25J//25A/ 25K/25W	WBGA 60	P	P

512Mb (64MB) DDR2

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W9751G6KB	32Mbx16	1.8V±0.1V	-15	WBGA 84	P	P
			-18/18I/18J			
			-25/25I/25J//25A/25K/25W			
W9751G8KB	64Mbx8	1.8V±0.1V	-18/18I/18J	WBGA 60	P	P
			-25/25I/25J//25A/25K/25W			

1Gb (128MB) DDR2

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W971GG6JB	64Mbx16	1.8V±0.1V	-18/-18I	WBGA 84	N	N
			-25/25I/25A/25K/25W			
W971GG8JB	128Mbx8	1.8V±0.1V	-18/-18I	WBGA 60	N	N
			-25/25I/25A/25K/25W			
W971GG6SB	64Mbx16	1.8V±0.1V	-18/-18I	WBGA 84	P	P
			-25/25I/25J/25A/25K/25W			
W971GG8SB	128Mbx8	1.8V±0.1V	-18/-18I	WBGA 60	P	P
			-25/25I/25J/25A/25K/25W			
W971GG8SS	128Mbx8	1.8V±0.1V	-18/-18I	WBGA 60	P	P
			-25/25I/25J/25A/25K/25W			

2Gb (256MB) DDR2

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W972GG6JB	128Mbx16	1.8V±0.1V	-18/18I	WBGA 84	N	N
			-25/25I/25A/25K/25W			
W972GG8JB	256Mbx8	1.8V±0.1V	-18/18I	WBGA 60	N	N
			-25/25I/25A/25K/25W			
W972GG6KB	128Mbx16	1.8V±0.1V	-18/18I	WBGA 84	P	P
			-25/25I/25J/25A/25K/25W			
W972GG8KB	256Mbx8	1.8V±0.1V	-18/18I	WBGA 60	P	P
			-25/25I/25J/25A/25K/25W			
W972GG8KS	256Mbx8	1.8V±0.1V	-18/18I	WBGA 60	P	P
			-25/25I/25J/25A/25K/25W			

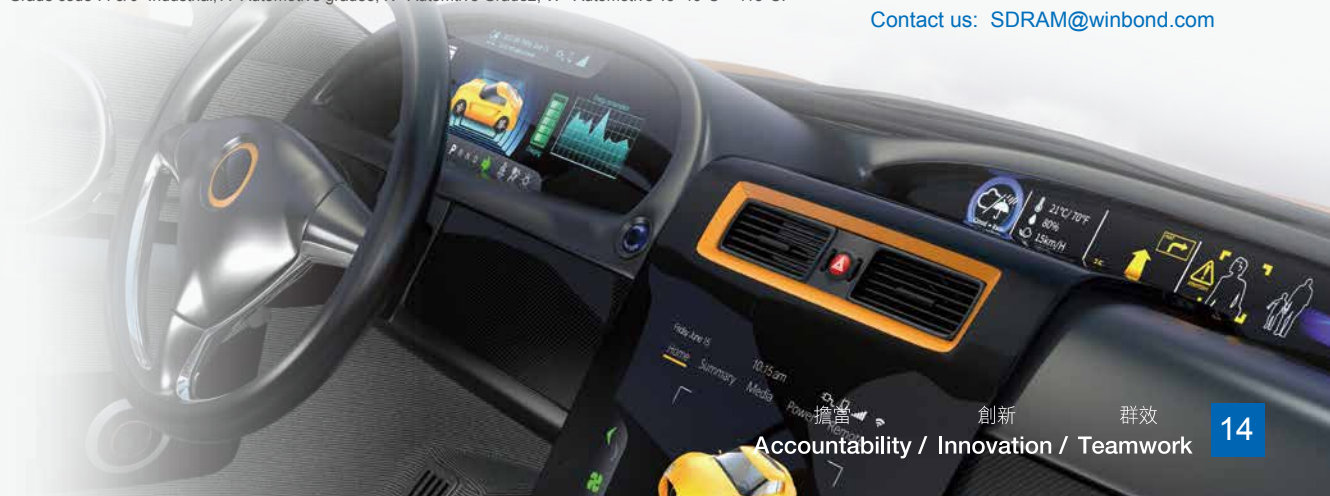
Status¹: P= Mass Production, S(Time)=Samples(Ready Time), UD (Time)= Under Development(Ready Time), N=Not Recommended For New Design.

Status²: All Winbond products are "Green", Halogen-Free and RoHS compliant packaging. Refer to the datasheet for details and specifications.

Automotive³: If you need any information of automotive part, please send your request to DRAM-Automotive@winbond.com

Grade code⁴: I & J=Industrial, A=Automotive grade3, K= Automotive Grade2, W= Automotive Tc -40°C ~ 115°C.

Contact us: SDRAM@winbond.com



DDR3 SDRAM

512Mb (64MB) DDR3

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W6351G6KB	32Mbx16	1.5V±0.075V	-12/12I	TFBGA 96	P	-
			-15/15I			

1Gb (128MB) DDR3

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W631GG6KB	64Mbx16	1.5V±0.075V	-11/11I	WBGA 96	P	P
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W631GG8KB	128Mbx8	1.5V±0.075V	-11/11I	WBGA 78	P	P
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W631GU6KB	64Mbx16	1.283V to 1.45V	-11/11I	WBGA 96	P	P
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W631GU8KB	128Mbx8	1.283V to 1.45V	-11/11I	WBGA 78	P	P
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W631GG6KS	64Mbx16	1.5V±0.075V	-11/11I	VFBGA 96	P	P
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W631GU6KS	64Mbx16	1.283V to 1.45V	-11/11I	VFBGA 96	P	P
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W631GG6MB	64Mbx16	1.5V±0.075V	-09/09I/11/11I	VFBGA 96	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W631GG8MB	128Mbx8	1.5V±0.075V	-09/09I/11/11I	VFBGA 78	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W631GU6MB	64Mbx16	1.283V to 1.45V	-09/09I/11/11I	VFBGA 96	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W631GU8MB	128Mbx8	1.283V to 1.45V	-09/09I/11/11I	VFBGA 78	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			

2Gb (256MB)DDR3

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W632GG6KB	128Mbx16	1.5V±0.075V	-11/11I	WBGA 96	P	P
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W632GG8KB	256Mbx8	1.5V±0.075V	-11/11I	WBGA 78	P	P
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			

2Gb (256MB)DDR3

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W632GU6KB	128Mbx16	1.283V to 1.45V	-11/111	WBGA 96	P	P
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W632GU8KB	256Mbitx8	1.283V to 1.45V	-11/111	WBGA 78	P	P
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W632GG6MB	128Mbx16	1.5V±0.075V	-09/09I/11/111	VFBGA 96	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W632GG8MB	256Mbx8	1.5V±0.075V	-09/09I/11/111	VFBGA 78	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W632GU6MB	128Mbx16	1.283V to 1.45V	-09/09I/11/111	VFBGA 96	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W632GU8MB	256Mbitx8	1.283V to 1.45V	-09/09I/11/111	VFBGA 78	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			

4Gb (512MB) DDR3

Part No.	Organization	Voltage	Speed Grade ⁴	Package	Status ^{1,2}	Automotive ³
W634GG6MB	256Mbx16	1.5V±0.075V	-09/09I/11/111	VFBGA 96	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W634GG8MB	512Mbx8	1.5V±0.075V	-09/09I/11/111	VFBGA 78	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W634GU6MB	256Mbx16	1.283V to 1.45V	-09/09I/11/111	VFBGA 96	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			
W634GU8MB	512Mbx8	1.283V to 1.45V	-09/09I/11/111	VFBGA 78	UD	UD
			-12/12I/12J/12A/12K/12W			
			-15/15I/15J/15A/15K/15W			

Status¹: P= Mass Production, S(Time)=Samples(Ready Time), UD (Time)= Under Development(Ready Time), N=Not Recommended For New Design.

Status²: All Winbond products are "Green", Halogen-Free and RoHS compliant packaging. Refer to the datasheet for details and specifications.

Automotive³: If you need any information of automotive part, please send your request to DRAM-Automotive@winbond.com

Grade code⁴: I=Industrial, A=Automotive grade3, K= Automotive Grade2, W= Automotive Tc -40°C ~ 115°C.

Contact us: SDRAM@winbond.com

KGD

Fully Cover all Consumer Applications:

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Up to DDR3 1600Mbps, DDR2 1066Mbps, DDR 500Mbps.

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Owning one 12-inch Fab6 to guarantee stable long-term delivery.

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CODE STORAGE FLASH MEMORY

• The products listed above may not be available for all regions.
Please contact your local Winbond Sales Representative.

Serial NOR Flash

SpiFlash® Memories with SPI, Dual-SPI, Quad-SPI and QPI

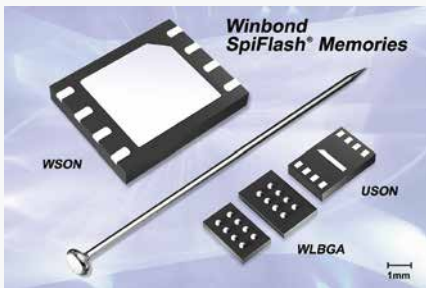
Winbond's W25X and W25Q SpiFlash® Multi-I/O Memories feature the popular Serial Peripheral Interface (SPI), densities from 512M-bit to 512K-bit, small erasable sectors and the industry's highest performance. The W25X family supports Dual-SPI effectively doubling standard SPI clock rates. The W25Q family is a "superset" of the 25X family with Dual-I/O and Quad-I/O SPI for even higher performance. Clock rates up to 133MHz achieve an equivalent of 532MHz (66M-Byte/S transfer rate) when using Quad-SPI. This is multiple times the performance of ordinary Serial Flash (50MHz) and even surpasses asynchronous Parallel Flash memories while using fewer pins and less space. Faster transfer rates mean controllers can execute code (XIP) directly from the SPI interface or further improve boot time when shadowing code to RAM. Additionally, some SpiFlash devices offer the new Quad Peripheral Interface (QPI) supporting true Quad Commands for improved XIP performance and simpler controller circuitry. Additionally, new ultra-small form factor packages are ideal for space constrained mobile and handheld applications.



Leading the Serial Flash Market in unit sales and revenue, Winbond TS16949 certified AEC-Q100 qualified memories now support automotive applications. The automobile has transformed into the most sophisticated electronic device in the market. Digital displays in automotive dashboards provide more information about the car, and improve safety. Instant-on and real time 2D/3D image rendering is achieved with fast processors and SpiFlash memories. ADAS (Advanced Driver Assist Systems), comfort, entertainment, and navigation is now available in the center console and this is addressed with SpiFlash memories using small packages for space constrained systems and high density for advanced applications.

Please contact Winbond for automotive datasheet and support.

Tiny Serial Flash Packages



Winbond Industrial and Automotive Grade Memory

	Industrial	Industrial Plus	Automotive Grade 3	Automotive Grade 2
Temperature Range	-40°C ~85°C	-40°C ~105°C	-40°C ~85°C	-40°C ~105°C
Part# Example	W25Q80BVSSIG	W25Q80BVSSJG	W25Q80BVSSBG	W25Q80BVSSAG
AEC-Q100 Compliant	No	No	Yes	Yes
Change Control	No	No	Optional	Optional



Serial NOR Flash

512Mb (64MB)

Part No.	Features	Voltage	Speed (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25M512JV	Dual/Quad-SPI, QPI, DTR, Enhanced ³	2.7V - 3.6V	104	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴	P	UD

256Mb (32MB)

Part No.	Features	Voltage	Speed (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25Q256FV	Dual/Quad-SPI, QPI, Enhanced ³	2.7V - 3.6V	104	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴	P	UD
W25Q257FV	Dual/Quad-SPI, QPI, Enhanced ³ , 4-byte addressing	2.7V - 3.6V	104	SOIC16 300mil, WSON8 8X6mm	P	N
W25Q256JV-DTR	Dual/Quad-SPI, QPI, DTR, Enhanced ³	2.7V - 3.6V	133	16-pin SOIC 300 mil, 24-ball TFBGA 8x6mm (6x4 Ball Array), 8-pad WSON 8x6mm, 24-ball TFBGA 8x6mm (5x5 Ball Array)	P	UD
W25Q256JV	Dual/Quad-SPI, QPI, DTR, Enhanced ³	2.7V - 3.6V	133	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴	P	UD
W25Q256JW-DTR	Dual/Quad-SPI, QPI, Enhanced ³	1.65V - 1.95V	133	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴	S	UD
W25Q256JW	Dual/Quad-SPI, QPI, Enhanced ³	1.65V - 1.95V	133	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴	S	UD



128Mb (16MB)

Part No.	Features	Voltage	Speed (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25Q128BV	Dual/Quad-SPI, QPI, Enhanced ³	2.7V - 3.6V	104	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm	N	P
W25Q128FV	Dual/Quad-SPI, QPI, Enhanced ³	2.7V - 3.6V	104	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴ , VSOP8 208mil ⁴	P	UD
W25R128FV	Dual/Quad-SPI, QPI, RPMC, Enhanced ³	2.7V - 3.6V	104	SOIC8 208mil, SOIC16 300mil ⁴ , WSON8 6X5mm ⁴ , VSOP8 208mil ⁴	P	N
W25Q128JV	Dual/Quad-SPI, QPI, DTR, Enhanced ³	2.7V - 3.6V	133	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴ , VSOP8 208mil ⁴	P	UD
W25Q128JW	Dual/Quad-SPI, QPI, DTR, Enhanced ³	1.65V - 1.95V	104	SOIC8 208mil, SOIC16 300mil ⁴ , WSON8 6X5mm	UD	UD
W25Q128JV-DTR	Dual/Quad-SPI, QPI, DTR, Enhanced ³	2.7V - 3.6V	133	8-pin SOIC 208mil, 16-pin SOIC 300mil, 24 ball TFBGA 8x6mm (6x4 Ball Array), 8-pad WSON 6x5mm, 8-pad WSON 8x6mm, 24-ball TFBGA 8x6mm (5x5 Ball Array), 8-pin PDIP 300mil	P	UD
W25Q128FW	Dual/Quad-SPI, QPI, Enhanced ³	1.65V - 1.95V	104	SOIC8 208mil, SOIC16 300mil ⁴ , WSON8 6X5mm	P	UD

64Mb (8MB)

Part No.	Features	Voltage	Speed (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25Q64CV	Dual/Quad-SPI, QPI, Enhanced ³	2.7V - 3.6V	80	SOIC8 208mil, WSON8 6X5mm, TFBGA24 6X8mm (5x5 Matrix) ⁴	N	P
W25Q64FV	Dual/Quad-SPI, QPI, Enhanced ³	2.7V - 3.6V	104	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5 Matrix) ⁴ , VSOP8 208mil ⁴	P	UD
W25R64FV	Dual/Quad-SPI, QPI, RPMC, Enhanced ³	2.7V - 3.6V	104	SOIC8 208mil, SOIC16 300mil ⁴ , WSON8 6X5mm ⁴ , VSOP8 208mil ⁴	P	N
W25Q64JV	Dual/Quad-SPI, QPI, DTR, Enhanced ³	2.7V - 3.6V	133	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5 Matrix) ⁴ , VSOP8 208mil ⁴	P	UD
W25Q64JV-DTR	Dual/Quad-SPI, QPI, DTR, Enhanced ³	2.7V - 3.6V	133	SOIC8 208mil, VSOP8 208mil, SOIC16 300mil, PDIP8 300mil, WSON8 6x5 mm, WSON8 8x6mm	P	N
W25Q64FW	Dual/Quad-SPI, QPI, Enhanced ³	1.65V - 1.95V	104	SOIC8 208mil, WSON8 6X5mm, VSOP8 208mil ⁴ , SOIC16 300mil ⁴ , WLCSP8	P	UD

32Mb (4MB)

Part No.	Features	Voltage	Speed (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25Q32BV	Dual/Quad-SPI, QPI, Enhanced ³	2.7V - 3.6V	104	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, WSON8 8X6mm, PDIP8 300mil ⁴ , TFBGA24 6X8mm (4x6 Matrix) ⁴	N	P
W25Q32FV	Dual/Quad-SPI, QPI, Enhanced ³	2.7V - 3.6V	104	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴ , VSOP8 208mil ⁴	P	UD
W25Q32JV	Dual/Quad-SPI, QPI, DTR, Enhanced ³	2.7V - 3.6V	133	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴ , VSOP8 208mil ⁴ , XSON8 4x4mm ⁴	P	UD
W25Q32JV-DTR	Dual/Quad SPI, QPI, DTR, Enhanced ³	2.7V - 3.6V	133	8-pin SOIC8 208mil, 8-pin VSOP 208mil, 8-pin WSON 6x5mm	P	UD
W25Q32FW	Dual/Quad SPI, QPI, Enhanced ³	1.65V - 1.95V	104	SOIC8 208mil, WSON8 6X5mm, SOIC16 300mil ⁴ , VSOP8 208mil ⁴ , WSON8 8X6mm ⁴ , XSON8 4x4mm, WLCSP8 ⁴	P	UD



16Mb (2MB)

Part No.	Features	Voltage	Speed (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25Q16DV	Dual/Quad-SPI, Enhanced ³	2.7V - 3.6V	80/104	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴ , VSOP8 150mil ⁴ , VSOP8 208mil ⁴ , USON8 4x3mm	N	P
W25Q16JV	Dual/Quad-SPI, DTR, Enhanced ³	2.7V - 3.6V	80/104	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, TFBGA24 6X8mm (4x6 Matrix) ⁴ , TFBGA24 6X8mm (5x5 Matrix) ⁴ , VSOP8 150mil ⁴ , VSOP8 208mil ⁴ , USON8 4x3mm	P	UD
W25Q16JV-DTR	Dual/Quad-SPI, DTR, Enhanced ³	2.7V - 3.6V	80/104	8-pin SOIC 208mil, 8-pin VSOP 208mil, 8-pad WSON 6x5mm	P	N
W25Q16CL	Dual/Quad SPI, Enhanced ³	2.3V - 3.6V	50/80	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, VSOP8 150mil ⁴	P	N
W25Q16JL	Dual/Quad SPI, Enhanced ³	2.3V - 3.6V	50/80	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, VSOP8 150mil ⁴	UD	N
W25Q16DW	Dual/Quad SPI, QPI, Enhanced ³	1.65V - 1.95V	104	SOIC8 150mil, SOIC8 208mil, SOIC16 300mil ⁴ , WSON8 6X5mm, VSOP8 208mil ⁴ , USON8 4x3mm, WLCSP8	N	P
W25Q16FW	Dual/Quad SPI, QPI, Enhanced ³	1.65V - 1.95V	104	SOIC8 208mil, WSON8 6X5mm, VSOP8 208mil ⁴ , USON8 2x3mm, USON8 4x3mm, USON8 4x4mm, WLCSP8	P	UD



8Mb (1MB)

Part No.	Features	Voltage	Speed (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25Q80DV	Dual/Quad-SPI, Enhanced ³	2.7V - 3.6V	80/104	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, VSOP8 150mil, USON8 2X3mm, WLCSP8 ⁴	P	P
W25Q80DL	Dual/Quad-SPI, Enhanced ³	2.3V - 3.6V	80/104	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, VSOP8 150mil, USON8 2x3mm	P	N
W25Q80EW	Dual/Quad SPI, Fast Write, Enhanced ³	1.65V - 1.95V	104	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, VSOP8 150mil, USON8 2x3mm, USON8 4x3mm ⁴ , WLCSP8 ⁴	P	UD

4Mb (512KB)

Part No.	Features	Voltage	Speed (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25X40CV	Fast Write, Dual SPI	2.7V - 3.6V	104	SOIC8 150mil, VSOP8 150mil, USON8 2X3mm, WSON8 6X5mm, SOIC8 208mil	N	P
W25Q40CV	Fast Write, Dual SPI	2.7V - 3.6V	104	SOIC8 150mil, VSOP8 150mil, USON8 2X3mm, WSON8 6X5mm, SOIC8 208mil	N	P
W25X40CL	Fast Write, Dual SPI	2.3V - 3.6V	104	SOIC8 150mil, VSOP8 150mil, USON8 2X3mm, WSON8 6X5mm, SOIC8 208mil	P	P
W25Q40CL	Dual/Quad-SPI, Fast Write, Enhanced ³	2.3V - 3.6V	104	SOIC8 150mil, SOIC8 208mil, USON8 2X3mm ⁴	P	P
W25Q40EW	Dual/Quad-SPI, Fast Write, Enhanced ³	1.65V - 1.95V	104	SOIC8 150mil, SOIC8 208mil ⁴ , WSON8 6X5mm, VSOP8 150mil, USON8 2X3mm, USON8 4x3mm ⁴ , WLCSP8 ⁴	P	UD

2Mb (256KB)

Part No.	Features	Voltage	Clock (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25X20CV	Fast Write, Dual SPI	2.7-3.6V	80/104	SOIC8 150mil, WSON8 6X5mm, VSOP8 150mil, USON8 2X3mm	N	P
W25X20CL	Fast Write, Dual SPI	2.3 - 3.6V and 2.7-3.6V	50/104	SOIC8 150mil, WSON8 6X5mm, VSOP8 150mil, USON8 2X3mm	P	P
W25Q20CL	Fast Write, Dual SPI	2.3 - 3.6V and 2.7-3.6V	50/104	SOIC8 150mil, WSON8 6X5mm, VSOP8 150mil, USON8 2X3mm	P	N
W25Q20EW	Dual/Quad SPI, Fast Write, Enhanced ³	1.65 - 1.95V	104	SOIC8 150mil, WSON8 6X5mm ⁴ , VSOP8 150mil, USON8 2X3mm, WLCSP8 ⁴	P	UD

1Mb (128KB)

Part No.	Features	Voltage	Speed (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25X10CL	Fast Write, Dual SPI	2.3 – 3.6V and 2.7 – 3.6V	50/104	SOIC8 150mil, USON8 2X3mm	P	N
W25Q10EW	Dual/Quad SPI, Fast Write	1.65 - 1.95V	104	SOIC8 150mil, WSON8 6X5mm ⁴ , VSOP8 150mil ⁴ , USON8 2X3mm, WLCSP8 ⁴	P	UD

512Kb (64KB)

Part No.	Features	Voltage	Speed (MHz)	Package(s)	Status ^{1,2}	Automotive ⁵
W25X05CL	Fast Write, Dual SPI	2.3V - 3.6V	104	SOIC8 150mil, TSSOP8 173mil ⁴ , USON 2x3mm	P	N

Status¹: P= Mass Production, S (Time)=Samples (Ready Time), UD (Time)=Under Development (Ready Time), N=Not recommended for new designs
 Status²: All Winbond Flash products are "Green", Halogen-Free and RoHS compliant packaging. Refer to the datasheet for details and specifications.
 Enhanced³ = SFDP, Security Registers, Program/Erase Suspend/Resume, Word Read Quad I/O, Burst Read with Wrap, Non-Volatile & Volatile Registers, Complement Array Protection
 Special Order Packages⁴ = These packages are available, but as special order only and will need a longer lead time prior to production.
 Automotive Packages⁵ = Contact Winbond sales for availability of packages on Automotive products.

Contact us: Spiflash@winbond.com



Parallel NOR Flash

Parallel Flash Memory – W29GL Family

Winbond's W29GL family of 3-Volt Page-Mode Parallel Flash memories are offered in densities from 256Mb to 32Mb. These products support industry standard interfaces, architectures and packages. They are drop-in replacements to the popular "x29GL" products available in the industry, with no firmware change. The W29GL family also offers faster program and erase times, which can improve production throughput and enable faster firmware updates. Winbond's Parallel Flash products are ideal for a wide variety of applications requiring the higher performance of a parallel bus width and page mode operation.

W29GL Page Mode Parallel Flash Family

- 256Mb to 32Mb densities
- Compatible with Industry Standard x29GL products
- 2.7V to 3.6V operation; also supports VIO at 1.8V
- x8/x16 data bus configuration
- 70/90ns read access time, 25ns page mode access time
- Provides many sector protection mechanisms
 - Offers additional security of code/data
- -40 to +85 operation range



Package Options

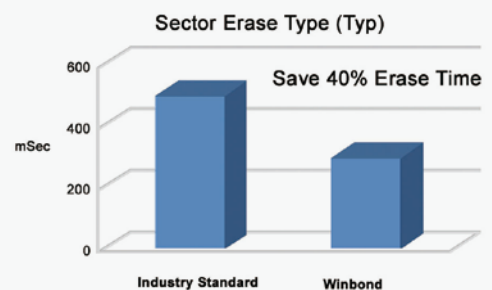
- Industry standard packages for 32Mb & 64Mb densities
 - 48-pin TSOP (Top/Bottom Boot)
 - 48-ball VFBGA (Top/Bottom Boot)
 - 56-pin TSOP (High/Low Sector protect)
 - 64-ball LFBGA (Top/Bottom Boot, High/Low Sector protect)
- Industry standard packages for 128Mb & 256Mb densities
 - 56-pin TSOP (High/Low Sector protect)
 - 56-ball TFBGA (High/Low Sector protect)
 - 64-ball LFBGA (High/Low Sector protect)

Special Features

- Drop-in replacement of Industry Standard x29GL
 - No firmware change needed
- Saves 40% erase time and 60% program time
 - Improves production throughput
 - Faster firmware updates

Wide Range of Applications

- Networking, Storage, Set-Top-Box, DSL and Cable modems
- Wireless routers, Digital TV, Industrial, Automotive
- PC peripherals, Printer, Mobile phones, Cameras and more



256Mb³ (32MB)

Part No.	Secure Sectors		Speed (ns)	Package(s)	Status ^{1,2}	Automotive		
	Boot/Uniform Sectors	Sector Location						
W29GL256P	Uniform Sector	High Sector	90	LFBGA64 TSOP56	P	UD		
		Low Sector						
W29GL256S		High Sector		TFBGA56 LFBGA64 TSOP56			P	UD
		Low Sector						

128Mb (16MB)

Part No.	Secure Sectors		Speed (ns)	Package(s)	Status ^{1,2}	Automotive		
	Boot/Uniform Sectors	Sector Location						
W29GL128C	Uniform Sector	High Sector	90	TFBGA56 LFBGA64 TSOP56	P	UD		
		Low Sector						
W29GL128S	Uniform Sector	High Sector	90	TFBGA56 LFBGA64 TSOP56			S	UD
		Low Sector						

64Mb (8MB)

Part No.	Secure Sectors		Speed (ns)	Package(s)	Status ^{1,2}	Automotive
	Boot/Uniform Sectors	Sector Location				
W29GL064C	Bottom Boot	Bottom two sectors	70/90	LFBGA64 TFBGA48 TSOP48	P	UD
	Uniform Sector	High Sector		LFBGA64 TSOP56		
		Low Sector				
	Top Boot	Top two sectors		LFBGA64 TFBGA48 TSOP48		

32Mb (4MB)

Part No.	Secure Sectors		Speed (ns)	Package(s)	Status ^{1,2}	Automotive
	Boot/Uniform Sectors	Sector Location				
W29GL032C	Bottom Boot	Bottom two sectors	70/90	LFBGA64 TFBGA48 TSOP48	P	UD
	Uniform Sector	High Sector		LFBGA64 TSOP56		
		Low Sector				
	Top Boot	Top two sectors		LFBGA64 TFBGA48 TSOP48		

Status¹: P= Mass Production, S (Time)=Samples (Ready Time), UD (Time)=Under Development (Ready Time), N=Not recommended for new designs

Status²: All winbond Flash products are "Green", Halogen-Free and RoHS compliant packaging. Refer to the datasheet for details and specifications.

Availability³: Please contact Winbond for availability of these products and packages.

Contact us: ParallelFlash@winbond.com

擔當 創新 群效

Accountability / Innovation / Teamwork

SLC NAND Flash

Industry Standard Compatible SLC NAND Flash Family

These SLC NAND Flash products are a direct drop-in replacement to the SLC NAND products available in the industry from different suppliers at this time and the products are fully compatible. The command set, the interface and the packages are the same and the feature set that Winbond offers is a superset of the features that other suppliers offer.

Competitive Advantage:

The Winbond SLC NAND products offer a page size of 2048+64 Bytes which is large enough to accommodate 4-bit or 8-bit ECC operation and hence can offer a more robust NAND solution compared to the competition. These NAND devices provide higher performance because of cache read/program operation. Most of these products offer 1-bit ECC and hence can support several platforms that need products with 1-bit ECC built-in. These products will be supported for a long period of time and customers can expect to receive long term support of these products for several more years.

Applications:

NAND Flash memory products from Winbond are used in multiple applications including the Internet of Things, Automotive, Networking, Storage, Set-Top-Box, DSL and Cable modems, Digital TV, Mobile phones, Printers, Industrial as well as other applications.



1Gb (128MB)

Part No.	Voltage	I/O	Page Size	Speed (ns)	Package	Status ^{1,2}	Automotive
W29N01GV	2.7V - 3.6V	x8	2KB+64B	25	TSOP48 VFBGA48 8x6.5mm VFBGA63 9x11mm	N	-
W29N01HV	2.7V - 3.6V	x8	2KB+64B	25	TSOP48 VFBGA48 8x6.5mm	P	P
W29N01GZ	1.7V - 1.95V	x8	2KB+64B	35	VFBGA48 8x6.5mm	P	-
W29N01GW	1.7V - 1.95V	x16	2KB+64B	35	VFBGA48 8x6.5mm	P	-
W29N01HZ	1.7V - 1.95V	x8	2KB+64B	35	VFBGA48 8x6.5mm VFBGA63 9x11mm	P	UD
W29N01HW	1.7V - 1.95V	x16	2KB+64B	35	VFBGA48 8x6.5mm VFBGA63 9x11mm	P	UD

2Gb (256MB)

Part No.	Voltage	I/O	Page Size	Speed (ns)	Package	Status ^{1,2}	Automotive
W29N02GV	2.7V - 3.6V	x8	2KB+64B	25	TSOP48 VFBGA63 9x11mm	P	P
W29N02GZ	1.7V - 1.95V	x8	2KB+64B	35	VFBGA63 9x11mm	P	UD
W29N02GW	1.7V - 1.95V	x16	2KB+64B	35	VFBGA63 9x11mm	P	UD

4Gb (512MB)

Part No.	Voltage	I/O	Page Size	Speed (ns)	Package	Status ^{1,2}	Automotive
W29N04GV	2.7V - 3.6V	x8	2KB+64B	25	TSOP48 VFBGA63 9x11mm	P	UD
W29N04GZ	1.7V - 1.95V	x8	2KB+64B	35	VFBGA63 9x11mm	P	UD
W29N04GW	1.7V - 1.95V	x16	2KB+64B	35	VFBGA63 9x11mm	P	UD

8Gb (1GB)

Part No.	Voltage	I/O	Page Size	Speed (ns)	Package	Status ^{1,2}	Automotive
W29N08GV	2.7V - 3.6V	x8	2KB+64B	25	TSOP48 VFBGA63 9x11mm	P	UD

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 Status²: All winbond Flash products are "Green", Halogen-Free and RoHS compliant packaging. Refer to the datasheet for details and specifications.

Contact us: NANDFlash@winbond.com

Serial NAND Flash

Code Storage Serial NAND Memory

Winbond, the worldwide leader in Serial NOR Flash memories, is offering a new family of Serial NAND Flash memory with an SPI interface. These products are an extension of the Serial NOR Flash products at higher densities. To simplify the life of designers looking to store code on their systems at densities beyond the NOR Flash offering of 512Mb density, Winbond is offering Serial NAND products with the same SPI interface with a cost effective NAND based solution at higher densities like 512Mb, 1Gb and 2Gb.

Benefits of using Winbond Serial NAND

While NOR flash is more cost effective at lower densities, NAND Flash is a more cost effective memory at densities in the 1Gb and above range.

NAND Flash memory requires a controller to manage the functionality of NAND such as detecting errors in some locations of memory and correcting these errors, managing blocks of memory that have errors in them, and being able to relocate or map the locations with errors to new locations that are error-free.

The Serial NAND family of products are designed to take some of the burden of the controller off its shoulders. These products have built-in ECC (Error Correcting Code that detects and corrects errors) and offer contiguous good memory (bad block management), and hence off loads these functions from the controller.

The added advantage from the Winbond Serial NAND is that it offers continuous read functionality. Typically in most systems, code stored in non-volatile memory, like flash, is transferred to DRAM for faster execution of code with the processor. This is known as code shadowing. System designers are always looking for products that can transfer the code very quickly from flash to DRAM. Winbond Serial NAND offers a continuous read mode that transfers the contents of NAND very quickly to the DRAM. Continuous read mode is also beneficial for XiP (eXecute in Place) operations when larger chunks of data are being transferred.

Key Features of the Serial NAND Family

- 46nm SLC NAND technology in Winbond's 12" Fab
- First offering is 1Gb, with 2Gb and 512Kb on roadmap
- Continuous 52MB/s Read Data Throughput ideal for Code-Shadowing applications
- Fully backward-compatible SpiFlash Instruction Set with minor additions
- Low pin-count SpiFlash packages (WSON-8, TFBGA-24) with MCP options
- On Chip 1-Bit ECC correction and Bad Block Management
- Flexible device configurations by customers' need (Buffer/Continuous Read, Array/Device Lock-Down/OTP/write protection)
- Industrial grades



512Mb (64MB)

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25N512GV	2.7V - 3.6V	x1/x4	2KB+64B	104	SOP16 WSON8 8x6 VFPGA24 8x6	UD	UD
W25N512GW	1.7V - 1.95V	x1/x4	2KB+64B	104	WSON8 8x6 VFPGA24 8x6	UD	UD

1Gb (128MB)

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25N01GV	2.7V - 3.6V	x1/x4	2KB+64B	104	SOP16 WSON8 8x6 VFPGA24 8x6	P	P
W25N01GW	1.7V - 1.95V	x1/x4	2KB+64B	104	WSON8 8x6 VFPGA24 8x6	UD	UD

2Gb (256MB)

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M02GV	2.7V - 3.6V	x1/x4	2KB+64B	104	WSON8 8x6 VFPGA24 8x6	P	UD
W25N02KV	2.7V - 3.6V	x1/x4	2KB+64B	104	WSON8 8x6 ³ VFPGA24 8x6 ³	UD	UD
W25N02KW	1.7V - 1.95V	x1/x4	2KB+64B	104	WSON8 8x6 ³ VFPGA24 8x6 ³	UD	UD

Status¹: P= Mass Production, S (Time)=Samples (Ready Time), UD (Time)=Under Development (Ready Time), N=Not recommended for new designs.
 Status²: All winbond Flash products are "Green", Halogen-Free and RoHS compliant packaging. Refer to the datasheet for details and specifications.

Contact us: NANDFlash@winbond.com



NAND MCP Memory

Multi-Chip Package (MCP) memory product family consists of a 1.8V NAND Flash Memory device combined with a 1.8V Low Power SDRAM device in one package to provide the most space effective solution for saving area on the PCB. This benefit becomes more critical in small PCBs for applications like modules and designs with a small PCB area, particularly for mobile and portable applications.

Self-owned DRAM and SLC NAND Flash Technology

Winbond Electronics Corp. is a Memory IC Company engaged in DRAM and Flash design, manufacturing and sales services. From product design, research and development, wafer fabrication to marketing of brand name products, Winbond endeavors to provide its global clientele top quality of low to medium density memory solutions.

Self-owned 12-inch fab

Winbond specializes in the design of high-performance, low-power memory, and riding on the strength of having a 12-inch fab, offers a whole series of SLC code storage NAND flash memory and Mobile DRAM products. Our in house wafer fabrication provides customers with full commitment in capacity support as well as delivery flexibility.

Longevity Support

Winbond Electronics Corporation, a longtime provider of memory semiconductors, is now offering a Winbond Product Longevity Program (WPLP) for applications that require long-term support which offers stability and longevity for long-life applications that need support for 5+ to 10 years



NAND + LPDDR

Ball	Package Size (mm)	MCP Part Number	Density		I/O Bus		DRAM Type	Status
			Flash	DRAM	Flash	DRAM		
130	8x9x1.0	W71NW10GC3DW	1Gb	512Mb	8	32	LPDDR1	P
		W71NW10GC1DW	1Gb	512Mb	8	16	LPDDR1	P
		W71NW11GC1DW	1Gb	512Mb	16	16	LPDDR1	N
		W71NW11HC1DW	1Gb	512Mb	16	16	LPDDR1	P
		W71NW20GD3DW	2Gb	1Gb	8	32	LPDDR1	P
		W71NW20GD1DW	2Gb	1Gb	8	16	LPDDR1	P
		W71NW21GD1DW	2Gb	1Gb	16	16	LPDDR1	P

NAND + LPDDR2

Ball	Package Size (mm)	MCP Part Number	Density		I/O Bus		DRAM Type	Status
			Flash	DRAM	Flash	DRAM		
121	8x8x0.8	W71NW11GE1EW	1Gb	512Mb	16	16	LPDDR2	P
		W71NW11GF1EW	1Gb	1Gb	16	16	LPDDR2	P
162	8x10.5x1.0	W71NW10GE3FW	1Gb	512Mb	8	32	LPDDR2	P
		W71NW10GF3FW	1Gb	1Gb	8	32	LPDDR2	P
		W71NW20GF3FW	2Gb	1Gb	8	32	LPDDR2	P

Status¹: P= Mass Production, S (Time)=Samples (Ready Time), UD (Time)=Under Development (Ready Time), N=Not recommended for new designsRoHS²: All winbond Status²: All winbond Flash products are "Green", Halogen-Free and RoHS compliant packaging. Refer to the datasheet for details and specifications.

Contact us: NANDFlash@winbond.com



SpiStack Flash (NOR+NAND)

Winbond is the first company to offer the new SpiStack® W25M Memory Series for “stacking” of homogeneous or heterogeneous flash, thus achieving memories of varying densities for code and data storage, while providing designers with flash solutions most appropriate for their design requirements. SpiStack architecture offers designers maximum flexibility in tailoring flash solutions to meet their specific memory-density and application requirements. The W25M Series provides a wide range of densities in the well-established 8-pin package to which designers are accustomed. W25M memories also feature the popular, multi-IO SpiFlash® interface featuring the popular Serial Peripheral Interface (SPI) and command set.

SpiStack homogeneous memories are formed by stacking SpiFlash dies – for example, two 256Mb dies combining to form a single SpiFlash 512Mb NOR memory in the industry-standard 8-pin 8x6mm WSON package. This stacked product, W25M512JV, is also available now in 16-pin SOIC or 24-pad BGA packages. SpiStack heterogeneous memories are formed by stacking a NOR die with a NAND die, such as a 64Mb SpiFlash NOR blended with a 1Gb Serial NAND die, which gives designers the flexibility to store code in the NOR die and data in the NAND memory.

Individual components forming the stacked solution have clock rates up to 104MHz achieving an equivalent of 416MHz (50M-Byte/S transfer rate) when using Quad-SPI. Multiple SpiFlash dies, each with density ranging from 16Mb to 2Gb, can be stacked with any combination of NOR and NAND dies. A NOR die can be used to store the boot code, which offer better endurance and retention, and fast random access time. A NAND memory can be used to store data and to back up the boot code. A NAND die can also be used to upload the working memory data quickly whenever the system power goes down, since its programming time is much faster than NOR. It improves the system quality by storing up-to-date code residing in the working memory for later usage.

SpiStack supports concurrent operation so that code execution is not interrupted for data updates. All SpiStack features are supported so that backward compatibility is conserved with the addition of a simple software die select instruction (C2h) and a factory-assigned die ID number.

W25M SpiStack Family

- Stack flash dies to form a higher density part of choice
- User can select based on specific density requirement
- Serial Peripheral Interface (SPI)
- Backward compatible to existing SpiFlash

Homogeneous stacking – Two or more dies

- NOR dies combined using 1Mb to 256M-bit dies
- NAND dies combined using 512Mb to 2Gb dies

Heterogeneous stacking – Two or more dies

- NOR and NAND dies stacked together

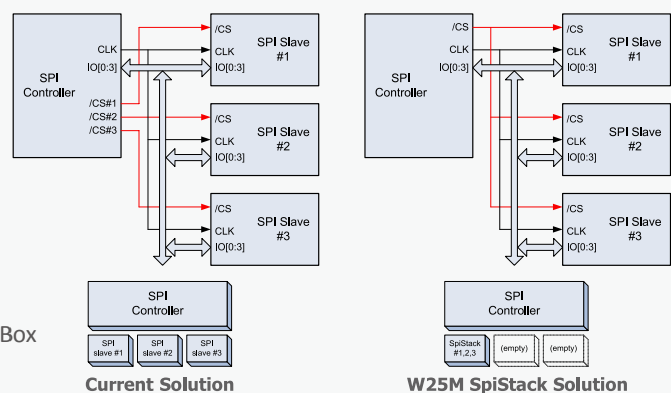
Concurrent Operation

- Read operation on one die + Write / Erase operation on another die
- Code execution not interrupted for data updates

Wide Range of Applications

- Mobile phones, Cameras, Printer, Servers, Set Top Box
- Automotive, Bluetooth, GPS, Digital-TV, DSP, FPGA
- WLAN, DSL/Cable Modem, Gateway, Industrial and more

W25M *spistack* Memory



16Mb(2MB) Serial NOR + 1Gb(128MB) Serial NAND

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M161AV	2.7V - 3.6V	x4/x4	2KB+64B	104	WSON8 8x6	P	UD
W25M161AW	1.7V - 1.95V	x4/x4	2KB+64B	104	WSON8 8x6	P	UD

32Mb(4MB) Serial NOR + 1Gb(128MB) Serial NAND

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M321AV	2.7V - 3.6V	x4/x4	2KB+64B	104	WSON8 8x6	P	UD
W25M321AW	1.7V - 1.95V	x4/x4	2KB+64B	104	WSON8 8x6	P	UD

64Mb(8MB) Serial NOR + 1Gb(128MB) Serial NAND

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M641AV	2.7V - 3.6V	x4/x4	2KB+64B	104	WSON8 8x6	S	UD
W25M641AW	1.7V - 1.95V	x4/x4	2KB+64B	104	WSON8 8x6	S	UD

128Mb(16MB) Serial NOR + 1Gb(128MB) Serial NAND

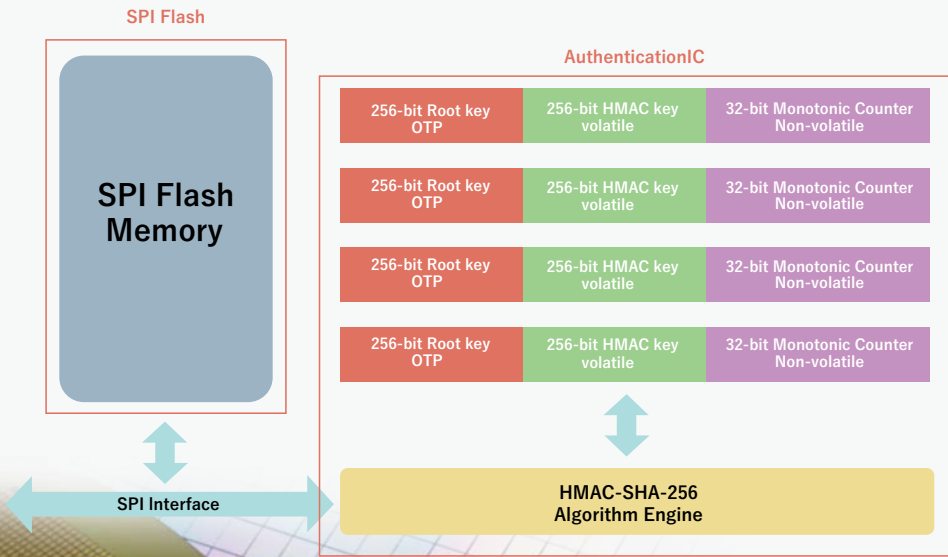
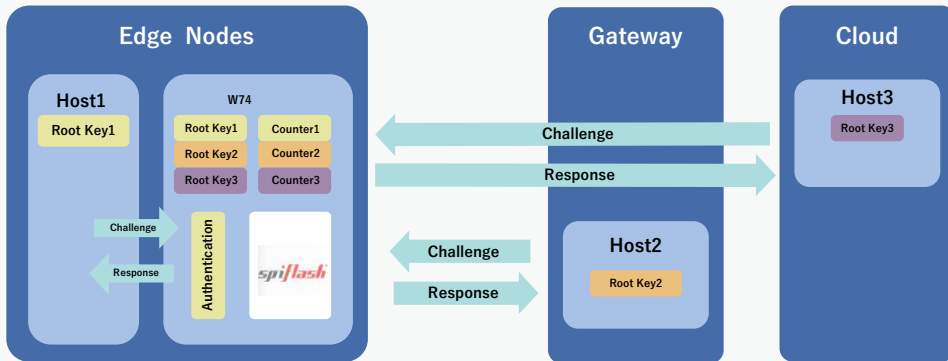
Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M121AV	2.7V - 3.6V	x4/x4	2KB+64B	104	WSON8 8x6	S	UD
W25M121AW	1.7V - 1.95V	x4/x4	2KB+64B	104	WSON8 8x6	S	UD

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 Status²: All winbond Flash products are "Green", Halogen-Free and RoHS compliant packaging. Refer to the datasheet for details and specifications.

Contact us: NANDFlash@winbond.com

Authentication Flash

Winbond W74M product family comes with standard HMAC-SHA-256 crypto accelerator and 4 separate Monotonic Flash Counters that are HMAC-signed by individual secret keys. A system utilizing each Monotonic Flash Counter can not only verify the integrity and authenticity of the counter values, but also adds a timestamp to the message/information transmitted with resistance to replay attacks. W74M enables system designers to strengthen code/data storage as well as delivers increased security for emerging IoT devices demanding multi-layered authentication.



1Gb (128MB)

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M01GV	2048+64Byte page size 128K+4KByte block size Dual/Quad-SPI, HW authentication x 4	2.7V - 3.6V	80	WSO8 8x6	UD	UD

256Mb (32MB)

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M25FV	131072pages, 4KB sectors, 32/64KB blocks, Dual/Quad- SPI, QPI, Enhanced [^] 3, HW authentication x 4	2.7V - 3.6V	80	WSO8 8x6	P	UD

128Mb (16MB)

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M12FV	65536 pages, 4KB sectors, 32/64KB blocks, Dual/Quad- SPI, QPI, Enhanced [^] 3, HW authentication x 4	2.7V - 3.6V	80	WSO8 6x5, SOP8-208 mil	P	UD

64Mb (8MB)

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M64FV	32768 pages, 4KB sectors, 32/64KB blocks, Dual/Quad- SPI, QPI, Enhanced [^] 3, HW authentication x 4	2.7V - 3.6V	80	SOP8-208 mil	P	UD

32Mb (4MB)

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M32FV	16384 pages, 4KB sectors, 32/64KB blocks, Dual/Quad- SPI, QPI, Enhanced [^] 3, HW authentication x 4	2.7V - 3.6V	80	SOP8-208 mil	P	UD

0Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M00AV	HW authentication x 4	2.7V - 3.6V	80	SOP8-208 mil, SOP8-150 mil	P	UD

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Contact us: NANDFlash@winbond.com

KGD

We offer various types of Parallel Flash and Serial Flash KGD products.

Contact us: Flash-KGD@winbond.com.

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