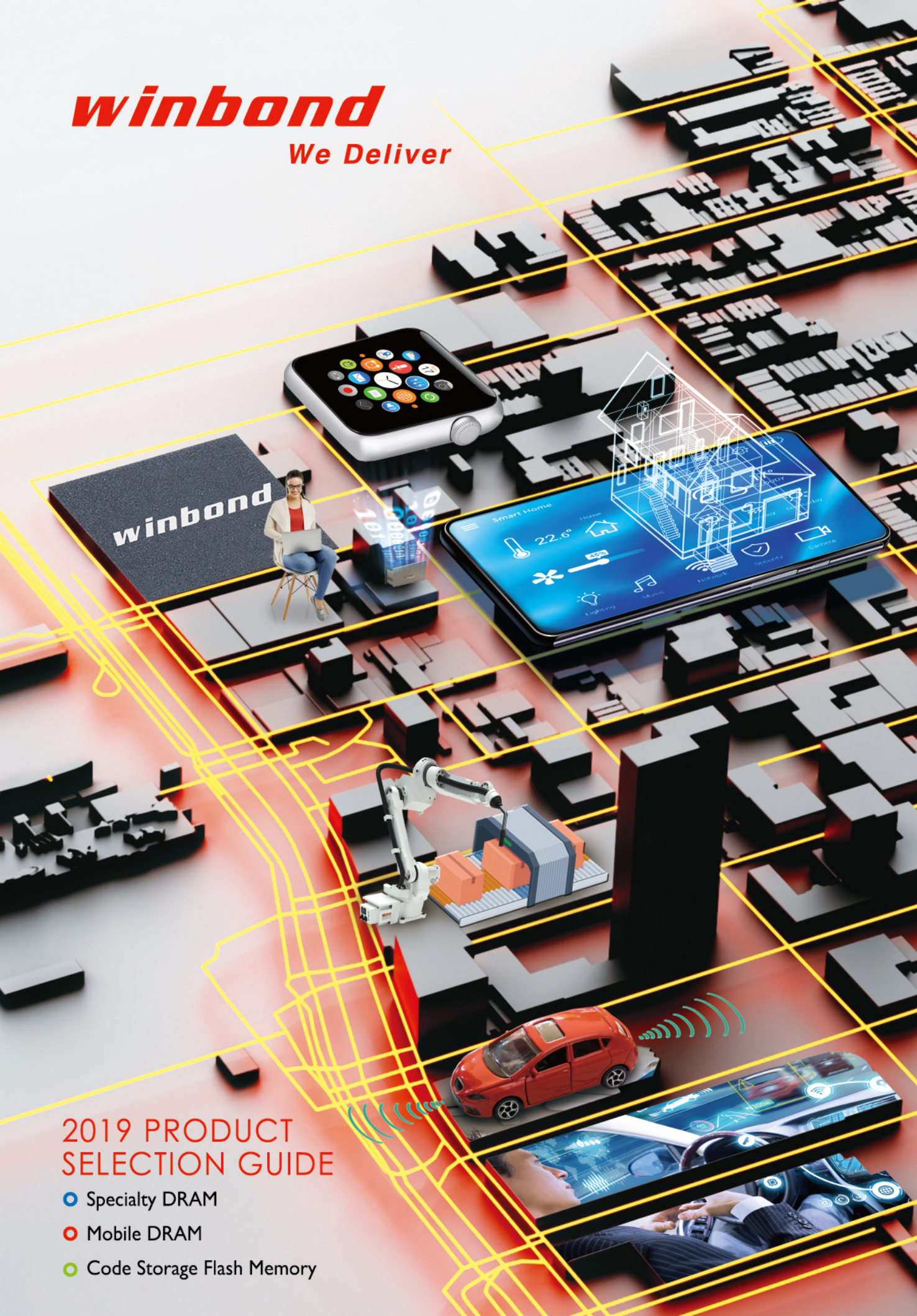


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We Deliver



2019 PRODUCT SELECTION GUIDE

- Specialty DRAM
- Mobile DRAM
- Code Storage Flash Memory

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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.



SDRAM

DDR SDRAM

DDR2 SDRAM

DDR3 SDRAM

KGD

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

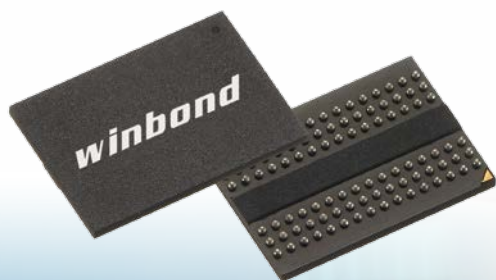
- SDR-200
- DDR-500
- DDR2-1066
- DDR3-1866
- DDR3-2133

■ Package

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

■ Interface

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



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We Deliver

- Support customized KGD solutions including RDL & Wide range power domains
- I-temp/Automotive support on SDR/DDR/DDR2/DDR3 products



Technical Support



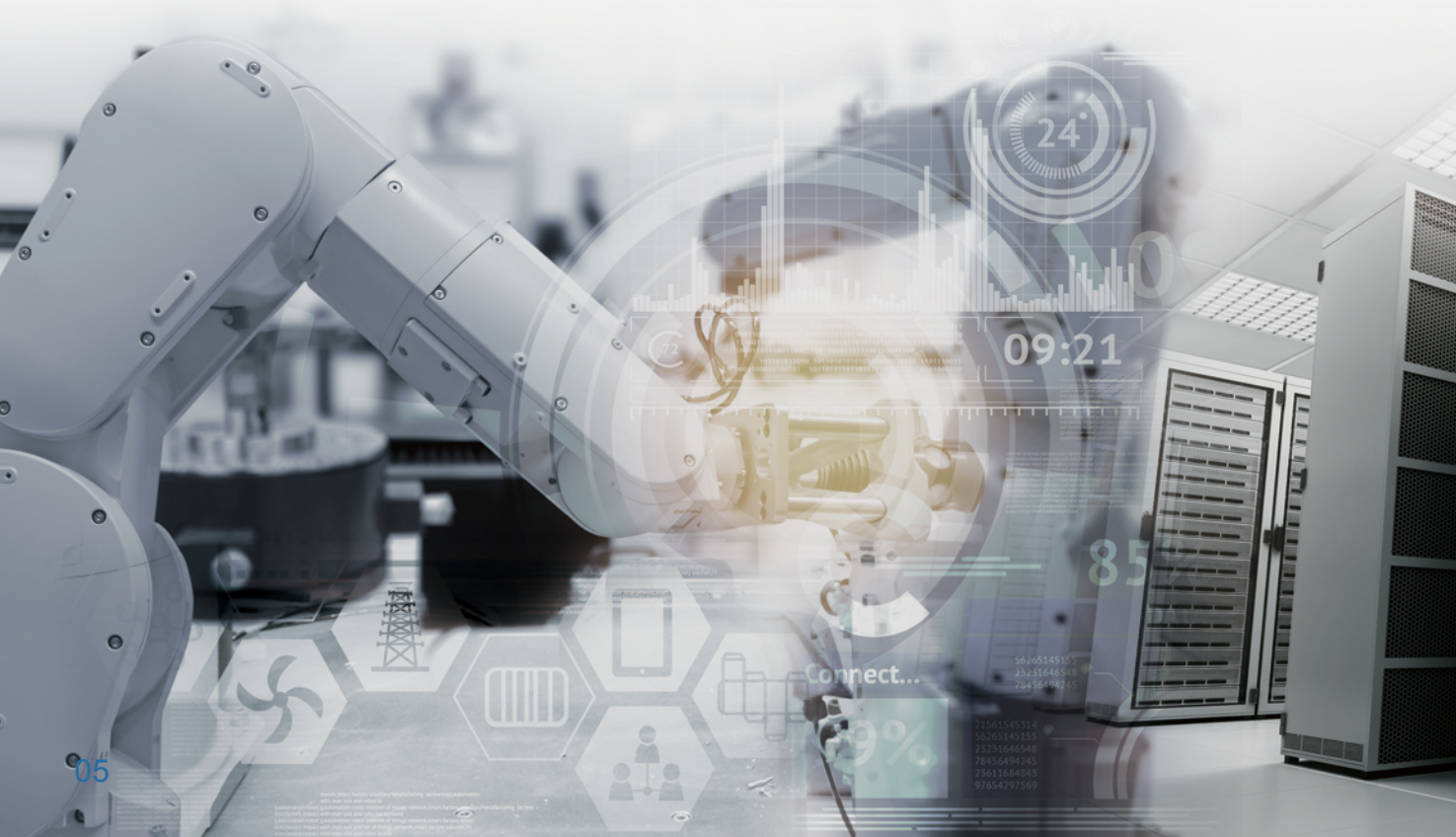
SDRAM

16Mb SDRAM

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W9816G6JH	1Mb x16	3.3V±0.3V	200MHz	C-temp, I-temp, Automotive	TSOPII 50	P	P
		2.7V~3.6V	166MHz				
			143MHz				
W9816G6JB	1Mb x16	3.3V±0.3V	200MHz	C-temp, I-temp, Automotive	FBGA 60	P	P
		2.7V~3.6V	166MHz				
			143MHz				

64Mb SDRAM

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W9864G6JB	4Mb x16	3.3V±0.3V	166MHz	C-temp, I-temp, Automotive	FBGA 60	P	P
		2.7V~3.6V	143MHz				
W9864G6JT	4Mb x16	3.3V±0.3V	166MHz	C-temp, I-temp, Automotive	FBGA 54	P	P
W9864G6KH	4Mb x16	3.3V±0.3V	200MHz	C-temp, I-temp, Automotive	TSOP II 54	P	P
			166MHz				
		2.7V~3.6V	143MHz				
W9864G2JB	2Mb x32	3.3V±0.3V	200MHz	C-temp, I-temp, Automotive	FBGA 90	P	P
		2.7V~3.6V	166MHz				
			143MHz				
W9864G2JH	2Mb x32	3.3V±0.3V	200MHz	C-temp, I-temp, Automotive	TSOPII 86	P	P
		2.7V~3.6V	166MHz				
			143MHz				



128Mb SDRAM

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W9812G6JB	8Mb x16	3.3V±0.3V	166MHz	C-temp, I-temp, Automotive	FBGA 54	P	P
W9812G6KH	8Mb x16	3.3V±0.3V	200MHz 166MHz	C-temp, I-temp, Automotive	TSOP II 54	P	P
W9812G2KB	4Mb x32	3.3V±0.3V	166MHz	C-temp, I-temp	FBGA 90	P	-

256Mb SDRAM

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W9825G2JB	8Mb x32	3.3V±0.3V	166MHz	C-temp, I-temp	FBGA 90	P	-
W9825G6JB	16Mb x16	3.3V±0.3V	166MHz	C-temp, I-temp, Automotive	FBGA 54	P	P
W9825G6KH	16Mb x16	3.3V±0.3V	200MHz 166MHz	C-temp, I-temp, Automotive	TSOP II 54	P	P

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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



DDR SDRAM

64Mb DDR

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W9464G6KH	4Mbx16	2.5V±0.2V	200MHz	C-temp, I-temp, Automotive	TSOP11 66	P	P

128Mb DDR

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W9412G6JB	8Mbx16	2.5V±0.2V	200MHz	C-temp, I-temp, Automotive	TFBGA 60	P	-
		2.4V~2.7V	250MHz				
W9412G6KH	8Mbx16	2.5V±0.2V	200MHz	C-temp, I-temp, Automotive	TSOP11 66	P	P

256Mb DDR

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W9425G6JB	16Mbx16	2.5V ±0.2V	200MHz	C-temp, I-temp, Automotive	TFBGA 60	P	-
		2.4V~2.7V	250MHz				
W9425G6KH	16Mbx16	2.5V ±0.2V	200MHz	C-temp, I-temp, Automotive	TSOP11 66	P	P

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DDR2 SDRAM

128Mb DDR2

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W9712G6KB	8Mbx16	1.8V±0.1V	333 / 400MHz	C-temp, I-temp, Automotive	FBGA 84	P	P

256Mb DDR2

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W9725G6KB	16Mbx16	1.8V±0.1V	333 / 400 / 533MHz	C-temp, I-temp, Automotive	FBGA 84	P	P
W9725G8KB	32Mbx8	1.8V±0.1V	333 / 400 / 533MHz	C-temp, I-temp, Automotive	FBGA 60	P	P

512Mb DDR2

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W9751G6KB	32Mbx16	1.8V±0.1V	333 / 400 / 533MHz	C-temp, I-temp, Automotive	FBGA 84	P	P
W9751G8KB	64Mbx8	1.8V±0.1V	333 / 400 / 533MHz	C-temp, I-temp, Automotive	FBGA 60	P	P

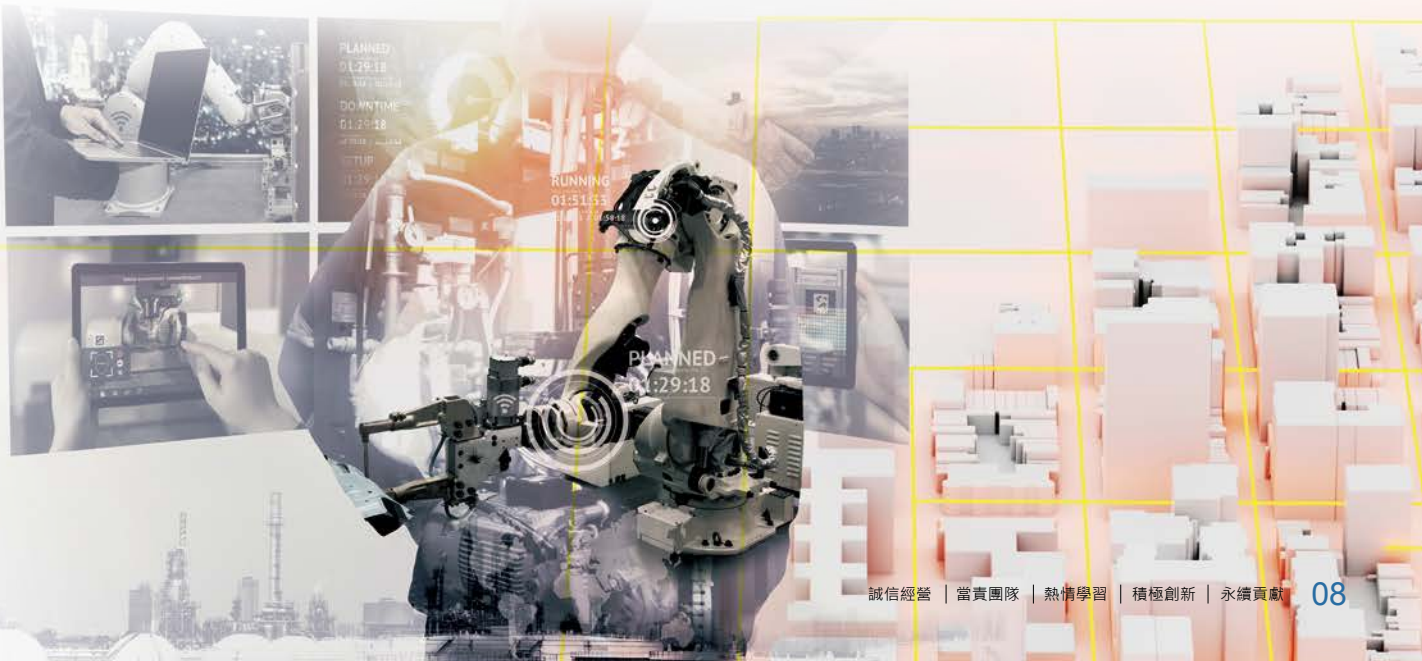
1Gb DDR2

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W971GG6SB	64Mbx16	1.8V±0.1V	333 / 400 / 533MHz	C-temp, I-temp, Automotive	FBGA 84	P	P
W971GG8SS	128Mbx8	1.8V±0.1V	333 / 400 / 533MHz	C-temp, I-temp, Automotive	FBGA 60	P	P

2Gb DDR2

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W972GG6KB	128Mbx16	1.8V±0.1V	333 / 400 / 533MHz	C-temp, I-temp, Automotive	FBGA 84	P	P
W972GG8KS	256Mbx8	1.8V±0.1V	333 / 400 / 533MHz	C-temp, I-temp, Automotive	FBGA 60	P	P

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



DDR3 SDRAM

512Mb DDR3

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W6351G6KB	64Mbx16	1.5V±0.075V	667 / 800MHz	C-temp	FBGA 96	P	-

1Gb DDR3

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W631GG6MB	64Mbx16	1.5V±0.075V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 96	P	P
W631GG8MB	128Mbx8	1.5V±0.075V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 78	P	P
W631GU6MB	64Mbx16	1.283V to 1.45V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 96	P	P
W631GU8MB	128Mbx8	1.283V to 1.45V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 78	P	P



2Gb DDR3

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W632GG6MB	128Mbx16	1.5V±0.075V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 96	P	P
W632GG8MB	256Mbx8	1.5V±0.075V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 78	P	P
W632GU6MB	128Mbx16	1.283V to 1.45V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 96	P	P
W632GU8MB	256Mbitx8	1.283V to 1.45V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 78	P	P
W632GG6NB	128Mbx16	1.5V±0.075V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 96	S (1Q'19)	UD (3Q'19)
W632GG8NB	256Mbx8	1.5V±0.075V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 78	S (1Q'19)	UD (3Q'19)
W632GU6NB	128Mbx16	1.283V to 1.45V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 96	S (1Q'19)	UD (3Q'19)
W632GU8NB	256Mbitx8	1.283V to 1.45V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 78	S (1Q'19)	UD (3Q'19)

4Gb DDR3

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W634GG6MB	256Mbx16	1.5V±0.075V	667 / 800 / 933 / 1066MHz	C-temp, I-temp	FBGA 96	N	-
W634GG8MB	512Mbx8	1.5V±0.075V	667 / 800 / 933 / 1066MHz	C-temp, I-temp	FBGA 78	N	-
W634GU6MB	256Mbx16	1.283V to 1.45V	667 / 800 / 933 / 1066MHz	C-temp, I-temp	FBGA 96	N	-
W634GU8MB	512Mbx8	1.283V to 1.45V	667 / 800 / 933 / 1066MHz	C-temp, I-temp	FBGA 78	N	-
W634GG6NB	256Mbx16	1.5V±0.075V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 96	UD (3Q'19)	UD (4Q'19)
W634GG8NB	512Mbx8	1.5V±0.075V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 78	UD (3Q'19)	UD (4Q'19)
W634GU6NB	256Mbx16	1.283V to 1.45V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 96	UD (3Q'19)	UD (4Q'19)
W634GU8NB	512Mbx8	1.283V to 1.45V	667 / 800 / 933 / 1066MHz	C-temp, I-temp, Automotive	FBGA 78	UD (3Q'19)	UD (4Q'19)

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

KGD

Fully Cover all Consumer Applications:

TV, STB, Networking, Storage, Printer, DSC/DV, GPS, Automotive...etc.

Providing KGD services to SiP customers with complete DRAM product portfolio such as SDRAM, DDR, DDR2, DDR3.

Wafer Level high speed test:

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

Winbond provides professional advices to KGD customers, including SiP package bonding & power/thermal, DRAM simulation,...etc.

Excellent KGD Quality Control:

With AEC-Q100, TS16949, ISO9001/14001, OHSAS18001 certificates for automotive customers.

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

For more product information, please contact us at Winbond Technical Support



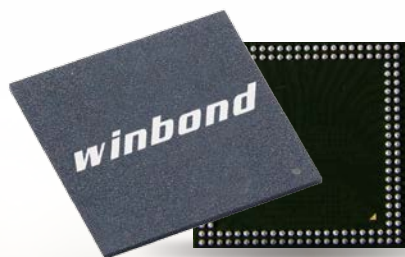
Technical Support

MOBILE DRAM

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

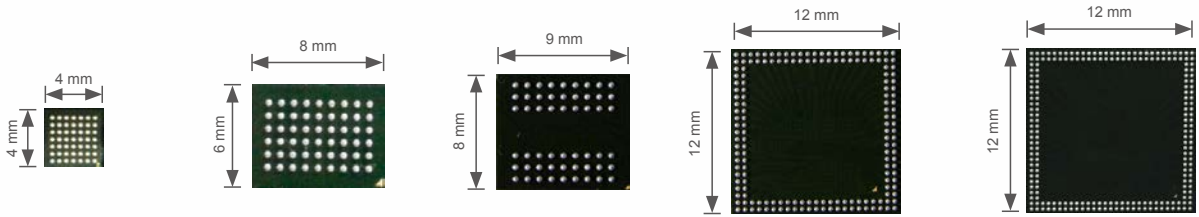
Winbond Electronics Corporation is a leading supplier of semiconductor solutions to the consumer, computer, communications, and electronics product markets. With the latest Buried Word Line technology, Winbond developed the mobile DRAM devices with a low IDD current value, which helps Winbond to extend 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 x8, 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.

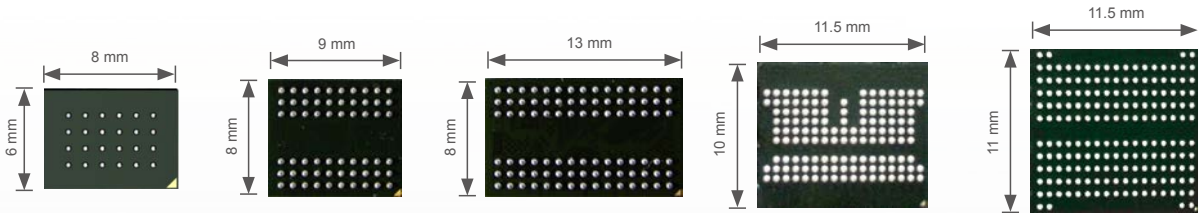


Product	I/O	Ball count	Type	Dimension	Remark
pSRAM	X16	49	BGA	4x4	-
	X8	24	BGA	6x8	-
	X16	54	BGA	6x8	-
LPSDR	X16	54	BGA	8x9	-
	X32	90	BGA	8x13	-
LPDDR	X16	60	BGA	8x9	JEDEC standard
	X32	90	BGA	8x13	JEDEC standard
LPDDR2	X16 / X32	168	PoP	12x12	JEDEC standard
		134	BGA	10x11.5	JEDEC standard
LPDDR3	X16 / X32	178	BGA	11x11.5	JEDEC standard
	X64	216	PoP	12x12	JEDEC standard
LPDDR4/4x	X16 / X32	200	BGA	10x14.5	JEDEC standard

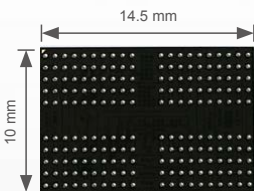
- pSRAMx16_49BGA
- pSRAMx16_54BGA
- LPSDRx16_54BGA(G)
- LPDDR2_168WFBGA(Q)
- LPDDR2/3_216WFBGA(R)



- pSRAMx8_24BGA
- LPDDRx16_60BGA(H)
- LPSDR/LPDDRx32_90BGA(J)
- LPDDR2_134VFBGA(V)
- LPDDR3_178VFBGA(V)



- LPDDR4_200VFBGA(V)



Technical Support

Low Power SDR SDRAM

128Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W987D6HBGX	8Mb x16	1.8V / 1.8V	166MHz	-25c~85c / -40c~85c	54VFBGA	P	-
W987D2HBJX	4Mb x32				90VFBGA		

256Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W988D6FBGX	16Mb x16	1.8V / 1.8V	166MHz	-25c~85c / -40c~85c	54VFBGA	P	-
W988D2FBJX	8Mb x32				90VFBGA		

512Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W989D6KBGX	32Mb x16	1.8V / 1.8V	166MHz	-25c~85c / -40c~85c	54VFBGA	N	-
W989D2KBJX	16Mb x32				90VFBGA		
W989D6DBGX	32Mb x16				54VFBGA	P	-
W989D2DBJX	16Mb x32				90VFBGA		

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



Low Power DDR SDRAM

○ 128Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W947D6HBH	8Mb x16	1.8V / 1.8V	166MHz 200MHz	-25c~85c / -40c~85c	60VFBGA	P	-
W947D2HBJ	4Mb x32				90VFBGA		

○ 256Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W948D6FBHX	16Mb x16	1.8V / 1.8V	166MHz 200MHz	-25c~85c / -40c~85c	60VFBGA	P	-
W948D2FBJX	8Mb x32				90VFBGA		
W948D6FBHA	16Mb x16			-40c~85c / -40c~105c / -40c~115c	60VFBGA	-	N
W948D2FBJA	8Mb x32				90VFBGA		
W948D6KBHX	16Mb x16			-25c~85c / -40c~85c	60VFBGA	P	-
W948V6KBHX(DSR ⁴)					60VFBGA		
W948D6KBHA	16Mb x16			-40c~85c / -40c~105c / -40c~115c	60VFBGA	-	P
W948V6KBHA(DSR ⁴)					60VFBGA		

○ 512Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W949D6KBHX	32Mb x16	1.8V / 1.8V	166MHz 200MHz	-25~85c / -40~85c	60VFBGA	N	-
W949D2KBJX	16Mb x32				90VFBGA		
W949D6DBHX	32Mb x16			-25~85c / -40~85c	60VFBGA	P	-
W949D2DBJX	16Mb x32				90VFBGA		
W949D6DBHA	32Mb x16			-40c~85c / -40c~105c / -40c~115c	60VFBGA	-	P
W949D2DBJA	16Mb x32				90VFBGA		

○ 1Gb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W94AD6KBHX	64Mb x16	1.8V / 1.8V	166MHz 200MHz	-25~85c / -40~85c	60VFBGA	P	-
W94AD2KBJX	32Mb x32				90VFBGA		
W94AD6KBHA	64Mb x16			-40c~85c / -40c~105c / -40c~115c	60VFBGA	-	P
W94AD2KBJA	32Mb x32				90VFBGA		

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

DSR⁴: With DSR(Deep Self-Refresh) mode feature which can save 70% power compared with normal one

Low Power DDR2 SDRAM

256Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W978H6KBVX	16Mb x16	1.8V / 1.2V	400MHz 533MHz	-25c~85c / -40c~85c	134VFBGA	P	-
W978H2KBVX	8Mb x32			-40c~85c / -40c~105c / -40c~115c	134VFBGA	-	P
W978H6KBVA	16Mb x16						
W978H2KBVA	8Mb x32						

512Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W979H6KBQX	32Mb x16	1.8V / 1.2V	400MHz 533MHz	-25c~85c / -40c~85c	168WFBGA(PoP)	P	-
W979H2KBQX	16Mb x32				134VFBGA		
W979H6KBVX	32Mb x16			-40c~85c / -40c~105c / -40c~115c	168WFBGA(PoP)	-	P
W979H2KBVX	16Mb x32						
W979H6KBQA	32Mb x16	1.8V / 1.2V	400MHz 533MHz	-40c~85c / -40c~105c / -40c~115c	168WFBGA(PoP)	-	P
W979H2KBQA	16Mb x32				134VFBGA		
W979H6KBVA	32Mb x16						
W979H2KBVA	16Mb x32						

1Gb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W97AH6KBQX	64Mb x16	1.8V / 1.2V	400MHz 533MHz	-25c~85c / -40c~85c	168WFBGA(PoP)	P	-
W97AH2KBQX	32Mb x32				134 VFBGA		
W97AH6KBVX	64Mb x16			-40c~85c / -40c~105c / -40c~115c	168WFBGA(PoP)	-	P
W97AH2KBVX	32Mb x32						
W97AH6KBQA	64Mb x16			-25c~85c / -40c~85c	168WFBGA(PoP)	S(Q2'19)	-
W97AH2KBQA	32Mb x32						
W97AH6KBVA	64Mb x16			-40c~85c / -40c~105c	134 VFBGA	-	S(Q4'19)
W97AH2KBVA	32Mb x32						
W97AH6NBQA	64Mb x16						
W97AH2NBQA	32Mb x32						
W97AH6NBVA	64Mb x16			-40c~85c / -40c~105c	134 VFBGA	-	S(Q4'19)
W97AH2NBVA	32Mb x32						
W97AH6NBVA	64Mb x16						
W97AH2NBVA	32Mb x32						

○ 2Gb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W97BH6LBVX	128Mb x16	1.8V / 1.2V	400MHz	-25c~85c / -40c~85c	134 VFBGA	N	-
W97BH2LBVX	64Mb x32		400MHz 533MHz				
W97BH6MBVA	128Mb x16		400MHz 533MHz	-40c~85c	134 VFBGA	S(Q1'19)	-
W97BH2MBVA	64Mb x32			-40c~85c / -40c~105c / -40c~115c	134 VFBGA	-	S(Q3'19)
W97BH6MBVA	128Mb x16		-40c~85c		168WFBGA(PoP)	S(Q1'19)	-
W97BH2MBVA	64Mb x32						
W97BH6MBQA	128Mb x16		-40c~85c	168WFBGA(PoP)	S(Q1'19)	-	
W97BH2MBQA	64Mb x32						

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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

Low Power DDR3 SDRAM

○ 1Gb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W63AH6NBV	64Mb x16	1.8V / 1.2V	800MHz	-25c~85c / -40c~85c	178 VFBGA	S(Q1' 19)	-
W63AH2NBV	32Mb x32		933MHz				

○ 2Gb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W63BH6MBV	128Mb x16	1.8V / 1.2V	800MHz	-25c~85c / -40c~85c	178 VFBGA	S(Q2' 19)	-
W63BH2MBV	64Mb x32		933MHz				

○ 4Gb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W63CH6MBV	256Mb x16	1.8V / 1.2V	800MHz	-25c~85c / -40c~85c	178 VFBGA	P	-
W63CH2MBV	128Mb x 32		933MHz				

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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



Low Power DDR4/4x SDRAM

2Gb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W66BL6NB	128Mb x16	1.8V/1.1V	1600MHz	-25c~85c	200BGA	S	-
W66BL2NQ	64Mb x32					S(Q2' 20)	-
W66BL6NB	128Mb x16	1.8V/1.1V		-40c~85c / -40c~105c		-	S(Q1' 19)
W66BL2NQ	64Mb x32					S(Q2' 20)	S(Q2' 20)
W66BQ6NB	64Mb x16	1.8V/1.1V/0.6V	-25c~85c	-	S(Q4'19)	-	

4Gb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W66CL6NB	256Mb x16	1.8V/1.1V	1600MHz	-25c~85c	200BGA	S(Q4' 19)	-
W66CL2NQ	128Mb x 32					S(Q1' 19)	
W66CQ6NQ	128Mb x 32	1.8V/1.1V/0.6V		-25c~85c		S(Q1' 19)	S(Q4' 19)
W66CL6NB	256Mb x16	1.8V/1.1V				-40c~85c / -40c~105c	-
W66CL2NQ	128Mb x 32		S(Q2' 19)				

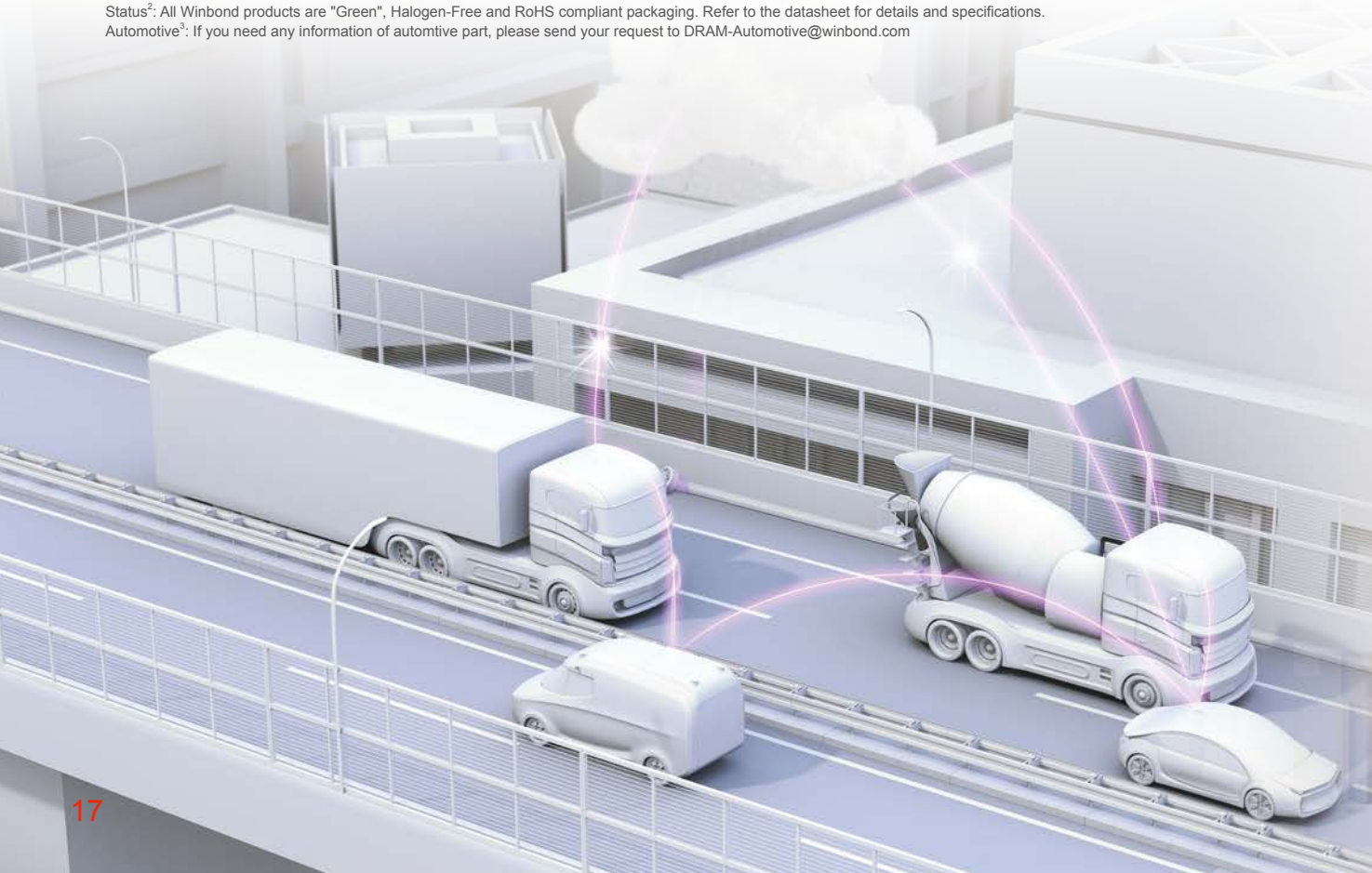
8Gb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W66DL2NB	256Mb x 32	1.8V/1.1V	1600MHz	-25c~85c	200BGA	S(Q1' 20)	-
W66DL2NB						-	S(Q1' 20)

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



Pseudo SRAM

○ 32Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W966K6HBG	2Mb x16 CRAM	1.8V / 1.8V	133MHz	-25c~85c / -40c~85c	54VFBGA	N	-
W956K6HBC	2Mb x16 CRAM-ADM		166MHz				

○ 64Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W966D6HBG	4Mb x16 CRAM	1.8V / 1.8V	133MHz	-25c~85c / -40c~85c	54VFBGA	N	-
W956D6HBC	4Mb x16 CRAM-ADM		166MHz				
W956D6KBK	4Mb x16 CRAM-ADM		49WFBGA		P		

○ 128Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W967D6HBG	8Mb x16 CRAM	1.8V / 1.8V	133MHz	-25c~85c / -40c~85c	54VFBGA	P	-
W957D6HBC	8Mb x16 CRAM-ADM		166MHz				

○ 256Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W968D6DAG	16Mb x16 CRAM	1.8V / 1.8V	133MHz	-25c~85c / -40c~85c	54VFBGA	P	-
W958D6DBC	16Mb x16 CRAM-ADM		166MHz				

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



Octal Pseudo SRAM (HyperRAM)

32Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W955D8MBY	4Mb x8	1.8V/1.8V	166MHz	-25c~85c / -40c~85c	24TFBGA	S	-

64Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W956D8MBY	8Mb x8	1.8V/1.8V	200MHz	-25c~85c / -40c~85c	24TFBGA	S(Q2'19)	-
W956A8MBY	8Mb x8	3V/3V	166MHz	-25c~85c / -40c~85c			
W956D8MBY	8Mb x8	1.8V/1.8V	200MHz	-40c~85c / -40c~105c		-	S(Q2'19)
W956A8MBY	8Mb x8	3V/3V	166MHz	-40c~85c / -40c~105c			

128Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W957D8MFYA	16Mb x8	1.8V/1.8V	200MHz	-25c~85c / -40c~85c	24TFBGA	S(Q3'19)	-
W957A8MFYA			166MHz	-40c~85c / -40c~105c			

256Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W958D8MBY	32Mb x8	1.8V/1.8V	200MHz	-25c~85c / -40c~85c	24TFBGA	UD	-
W958D8MBY				-40c~85c / -40c~105c		-	UD

512Mb

Part No.	Organization	Voltage	Speed	Temperature	Package	Status ^{1,2}	Automotive ³
W959D8MFYA	64Mb x8	1.8V/1.8V	200MHz	-25c~85c / -40c~85c	24TFBGA	UD	-

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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

Package⁴: For small form factor package, please contact us.



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: 1Gb to 4Gb

-LPDDR4: 1Gb to 4Gb

-pSRAM: 32Mb to 128Mb

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 166MHz~200MHz

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.

For more product information, please contact us at Winbond Technical Support



Technical Support



We Deliver

CODE STORAGE FLASH MEMORY

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 512K-bit to 512M-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 104MHz achieve an equivalent of 416MHz (50M-Byte/s transfer rate) when using Quad-SPI. This is more than eight 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.

Tiny Serial Flash Packages



Winbond Industrial and Automotive Grade Memory

	Industrial	Industrial Plus	Automotive Grade 3	Automotive Grade 2	Automotive Grade 1
Temperature Range	-40°C~85	-40°C~105°C	-40°C~85°C	-40°C~105°C	-40°C~125°C
Part # Example	W25Q64JVSSIQ	W25Q64JVSSJQ	W25Q64JVSSBQ	W25Q64JVSSAQ	W25Q64JVSSSQ
AEC-Q100 Compliant	No	No	Yes	Yes	Yes
Change Control (PPAP)	No	No	Optional	Optional	Optional



Technical Support



Serial NOR Flash

2Gb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q02JV	SPI / QPI	2.7V - 3.6V	133	TFBGA24 6X8mm (5x5-1 Matrix)	UD	UD

1Gb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q01JV	SPI / QPI	2.7V - 3.6V	133	SOIC16 300mil, TFBGA24 6X8mm (5x5-1 Matrix)	UD	UD

512Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M512JV	SPI / QPI Simultaneous Operation	2.7V - 3.6V	104	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix)	P	P
W25M512JW	SPI / QPI Simultaneous Operation	1.7V - 1.95V	104	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix)	P	UD
W25H512JV	SPI / QPI / DTR On-Chip ECC	2.7V - 3.6V	133	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix)	UD	UD
W25Q512JV	SPI 4 I/O Fixed	2.7V - 3.6V	133	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	S	UD
W25R512JV	SPI with Single, Dual, Quad I/O, RPMC	2.7V - 3.6V	104	WSON8 8X6mm, SOIC16 300mil	UD	UD

256Mb

Part No.	Features	Voltage	Speed(MHz)	Package	Status ^{1,2}	Automotive
W25H256JV	SPI / QPI / DTR On-Chip ECC	2.7V - 3.6V	104	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	S	UD
W25Q257JV	4-Byte Addressing Mode 4 I/O Fixed	2.7V - 3.6V	133	SOIC16 300mil, WSON8 8X6mm	P	-
W25Q256JV	3 or 4-Byte Addressing Modes 4 I/O Fixed	2.7V - 3.6V	133	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), WFLGA8 5x6mm	P	P
W25Q256JV_ DTR	SPI / QPI / DTR	2.7V - 3.6V	133/66(DTR)	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), WFLGA8 5x6mm	P	P
W25Q256JW	SPI 4 I/O Fixed	1.7V - 1.95V	133	SOIC16 300mil, WSON8 8X6mm, WSON8 6x5mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), WLCSP32	S	UD
W25Q256JW_ DTR	SPI / QPI / DTR	1.7V - 1.95V	133/66(DTR)	SOIC16 300mil, WSON8 8X6mm, WSON8 6x5mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), WLCSP32	S	UD
W25R256JV	SPI with Single, Dual, Quad I/O, RPMC	2.7V - 3.6V	133	WFLGA8 5x6mm, WSON8 8X6mm, SOIC16 300mil	P	UD
W25R256JW	SPI with Single, Dual, Quad I/O, RPMC	1.7V - 1.95V	104	SOIC16 300mil, WSON8 8X6mm, WSON8 6X5mm	P	UD

○ 128Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q128JV	SPI 4 I/O Fixed	2.7V - 3.6V	133	SOIC8 208mil, SOIC16 300mil, WS0N8 8X6mm, WSON8 6X5mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix)	P	P
W25Q128JV_ DTR	SPI / QPI / DTR	2.7V - 3.6V	133/66(DTR)	SOIC8 208mil, SOIC16 300mil, WS0N8 8X6mm, WSON8 6X5mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix)	P	P
W25Q128JW	SPI 4 I/O Fixed	1.7V - 1.95V	133	SOIC8 208mil, SOIC16 300mil, WS0N8 8X6mm, WSON8 6X5mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), WLCSP21	S	UD
W25Q128JW_ DTR	SPI / QPI / DTR	1.7V - 1.95V	133/66(DTR)	SOIC8 208mil, SOIC16 300mil, WS0N8 8X6mm, WSON8 6X5mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), WLCSP21	S	UD
W25Q128FW	SPI / QPI	1.65V - 1.95V	104	SOIC8 208mil, SOIC16 300mil, WS0N8 8X6mm, WSON8 6X5mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), VSOP8 208mil, WLCSP32	P	N
W25R128JV	SPI with Single, Dual, Quad I/O, RPMC	2.7V - 3.6V	133	SOIC8 208mil, WSON8 8X6mm, WSON8 6X5mm	P	UD
W25R128JW	SPI with Single, Dual, Quad I/O, RPMC	1.7V - 1.95V	104	SOIC8 208mil, WSON8 8X6mm, WSON8 6X5mm	S	UD

64Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q64JV	SPI 4 I/O Fixed	2.7V - 3.6V	133	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, WSON8 8X6mm, XSON8 4x4x0.45mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix)	P	P
W25Q64JV_DTR	SPI / QPI / DTR	2.7V - 3.6V	133/66(DTR)	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, WSON8 8X6mm, XSON8 4x4x0.45mm, TFBGA24 6X8mm (5x5-1 Matrix)	P	P
W25Q64JW	SPI 4 I/O Fixed	1.7V - 1.95V	133	SOIC8 208mil, WSON8 6X5mm, XSON8 4x4x0.45mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), WLCSP12	S	UD
W25Q64JW_DTR	SPI / QPI / DTR	1.7V - 1.95V	133/66(DTR)	SOIC8 208mil, WSON8 6X5mm, XSON8 4x4x0.45mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), WLCSP12	S	UD
W25Q64FW	SPI / QPI	1.65V - 1.95V	104	SOIC8 208mil, WSON8 6X5mm, VSOP8 208mil, WLCSP8, WLCSP16	P	P
W25R64JV	SPI with Single, Dual, Quad I/O, RPMC	2.7V - 3.6V	133	SOIC8 208mil, WSON8 6X5mm	P	UD



○ 32Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q32JV	SPI 4 I/O Fixed	2.7V - 3.6V	133	SOIC8 208mil, VSOP8 208mil, SOIC16 300mil, WSON8 6X5mm, WSON8 8X6mm, XSON8 4x4x0.45mm, PDIP 300-mil, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix)	P	P
W25Q32JV_DTR	SPI / QPI / DTR	2.7V - 3.6V	133/66(DTR)	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, XSON8 4x4x0.45mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix)	P	P
W25Q32JW	SPI 4 I/O Fixed	1.7V - 1.95V	133	SOIC8 208mil, VSOP8 208mil, SOIC16 300mil, WSON8 6X5mm, XSON8 4x4x0.45mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), WLCSP12	P	UD
W25Q32JW_DTR	SPI / QPI / DTR	1.7V - 1.95V	133/66(DTR)	SOIC8 208mil, VSOP8 208mil, SOIC16 300mil, WSON8 6X5mm, XSON8 4x4x0.45mm, TFBGA24 6X8mm (4x6 Matrix), TFBGA24 6X8mm (5x5-1 Matrix), WLCSP12	P	UD
W25Q32FW	SPI / QPI	1.65V - 1.95V	104	SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, VSOP8 208mil, XSON8 4x4mm, WLCSP8	N	P

○ 16Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q16JV	SPI 4 I/O Fixed	2.7V - 3.6V	133	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, VSOP8 150mil, USON8 2x3mm, WLCSP8	P	P
W25Q16JV_DTR	SPI / QPI / DTR	2.7V - 3.6V	133/66(DTR)	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, VSOP8 150mil, USON8 2x3mm	P	P
W25Q16JW	SPI 4 I/O Fixed	1.65V - 1.95V	133	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, USON8 2x3mm, WLCSP8	UD	UD
W25Q16JW_DTR	SPI / QPI / DTR	1.65V - 1.95V	133/66(DTR)	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, USON8 2x3mm, WLCSP8	UD	UD
W25Q16JL	SPI 4 I/O Fixed	2.3V - 3.6V	50/104	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, VSOP8 150mil, USON8 2x3mm	P	-
W25Q16FW	SPI / QPI	1.65V - 1.95V	104	SOIC8 150mil, SOIC8 208mil, SOIC16 300mil, WSON8 6X5mm, USON8 4x3mm, WLCSP8	P	P

8Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q80DV	SPI with Single, Dual, Quad I/O	2.7V - 3.6V	104	SOIC8 150mil, SOIC8 208mil, VSOP8 150mil, WSON8 6X5mm, USON8 2X3mm, WLCSP8	P	P
W25Q80DL	SPI with Single, Dual, Quad I/O	2.3V - 3.6V	104	SOIC8 150mil, VSOP8 150mil, WSON8 6X5mm, USON8 2X3mm, WLCSP8	P	-
W25Q80EW	SPI with Single, Dual, Quad I/O	1.65V - 1.95V	104	SOIC8 150mil, SCIC8 208mil, WSON8 6X5mm, VSOP8 150mil, USON8 2X3mm, WLCSP8	P	P

4Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25X40CL	Single / Dual SPI	2.3 - 3.6V	80/104	SOIC8 150mil, VSOP8 150mil, USON8 2X3mm, WSON8 6X5mm, SOIC8 208mil, WLCSP8	P	-
W25Q40CL	SPI with Single, Dual, Quad I/O	2.3 - 3.6V	80/104	SOIC8 150mil, SOP8 150mil, SOIC8 208mil, USON8 2X3mm, WLCSP8	P	-
W25Q40EW	SPI with Single, Dual, Quad I/O	1.65V - 1.95V	104	SOIC8 150mil, SOP8 208mil, VSOP8 150mil, WSON8 6X5mm, WLCSP8	P	P

2Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25X20CL	Single / Dual SPI	2.3 - 3.6V	80/104	SOIC8 150mil, VSOP8 150mil, USON8 2X3mm, WLCSP8	P	-
W25Q20CL	SPI with Single, Dual, Quad I/O	2.3 - 3.6V	80/104	SOIC8 150mil, WSON8 6X5mm, VSOP8 150mil, USON8 2X3mm	P	-
W25Q20EW	SPI with Single, Dual, Quad I/O	1.65 - 1.95V	104	SOIC8 150mil, WLCSP8, VSOP8 150mil, USON8 4X3mm, USON8 2X3mm	P	P

○ 1Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25X10CL	Single / Dual SPI	2.3 - 3.6V	80/104	SOIC8 150mil, USON8 2X3mm	P	-
W25Q10EW	SPI with Single, Dual, Quad I/O	1.65 - 1.95V	104	SOIC8 150mil, WLCSP8, VSOP8 150mil, USON8 2X3mm	P	P
W25X10EW	Single / Dual SPI	1.65 - 1.95V	80	SOIC8 150mil, USON8 2X3mm	UD	UD

○ 512Kb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25X05CL	Single / Dual SPI	2.3V - 3.6V	104	SOIC8 150mil, TSSOP8 173mil, USON8 2x3mm	P	-

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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.



We Deliver

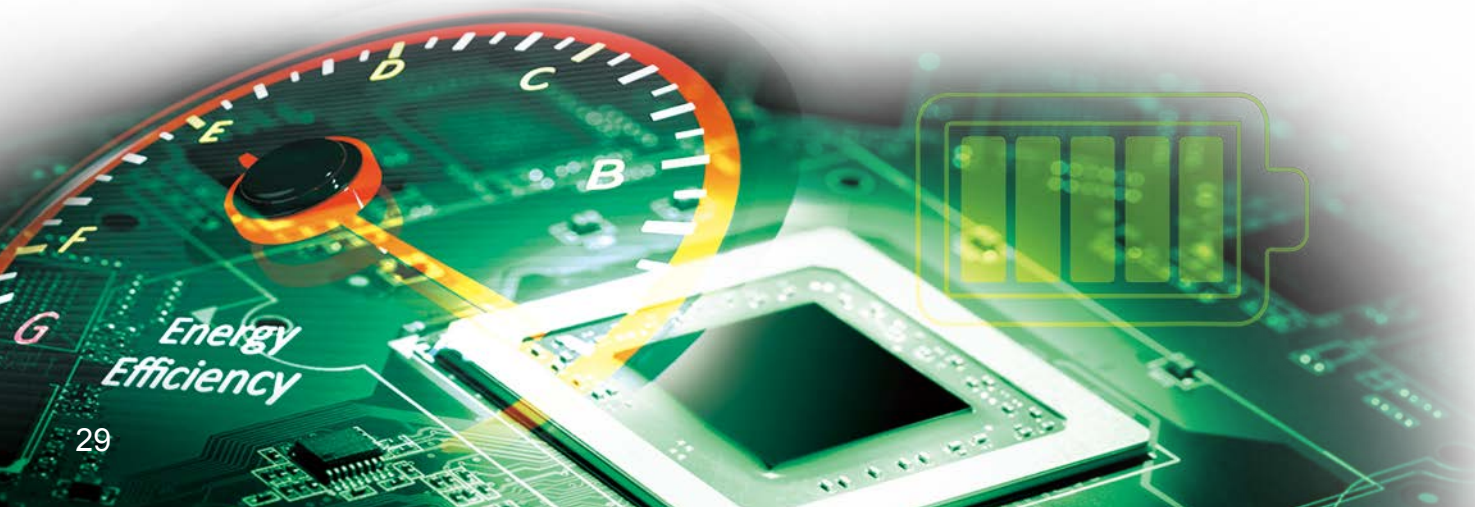
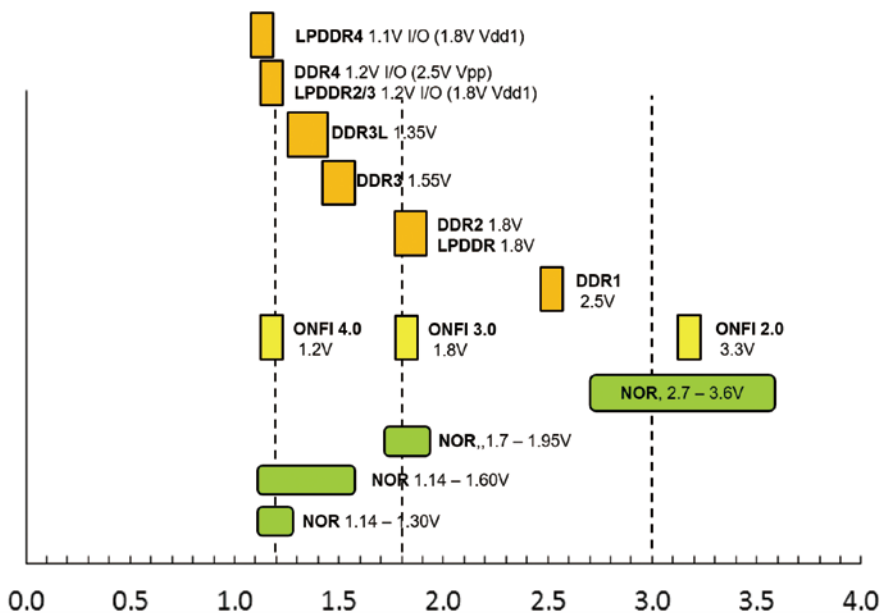
1.2V Serial NOR Flash

The W25QxxND 1.2V series parts have performance identical to the popular 3V and 1.8V families of serial flash with the added benefit of saving power. They are offered in 2mm x 3mm USON8, narrow 150mil SOP8, 6x5mm WSON 8-pin packages and KGD (Known Good Die) which provide designers with the convenience of designs in space constrained battery based applications for mobile, wearable, IoT and other demanding designs that call for low power in tiny packages. While the 1.2V series products are popular for power savings, the extended 1.5V can save battery cost by utilizing only one battery compared to similar solutions using two batteries in series to offer 3V designs.

● The First Ultra-Low-Voltage

New 1.2V is the next standard voltage

The newest members of the Winbond SpiFlash family are the industry's lowest voltage standard, dual and quad Serial Peripheral Interface (SPI) and Quad Peripheral Interface (QPI) NOR Flash products offering major power savings not known in the industry before.

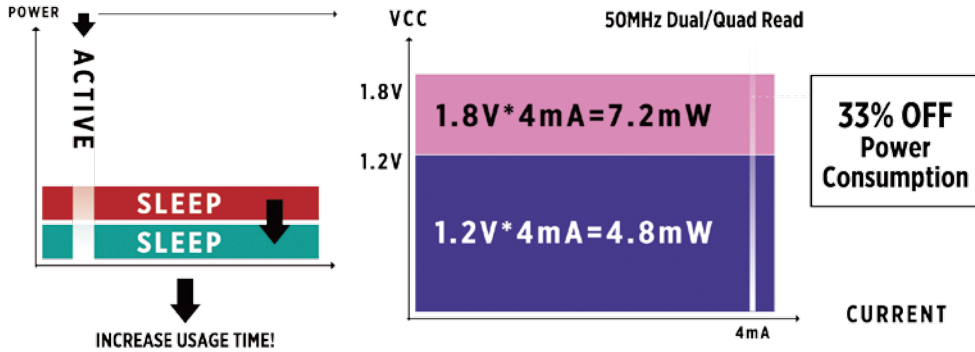


○ Better Power Consumption

Increase battery run-time / Power saving in active mode of 33%

The reduced power usage in both active and stand-by modes offered by the W25QxxND series enables system designers to increase battery run-time between charges, or to reduce the size and weight of the battery.

The W25Q80ND, an 8Mbit NOR Flash IC operating from a 1.2V supply, offers a typical power saving in active mode of 33% over the equivalent 1.8V part.

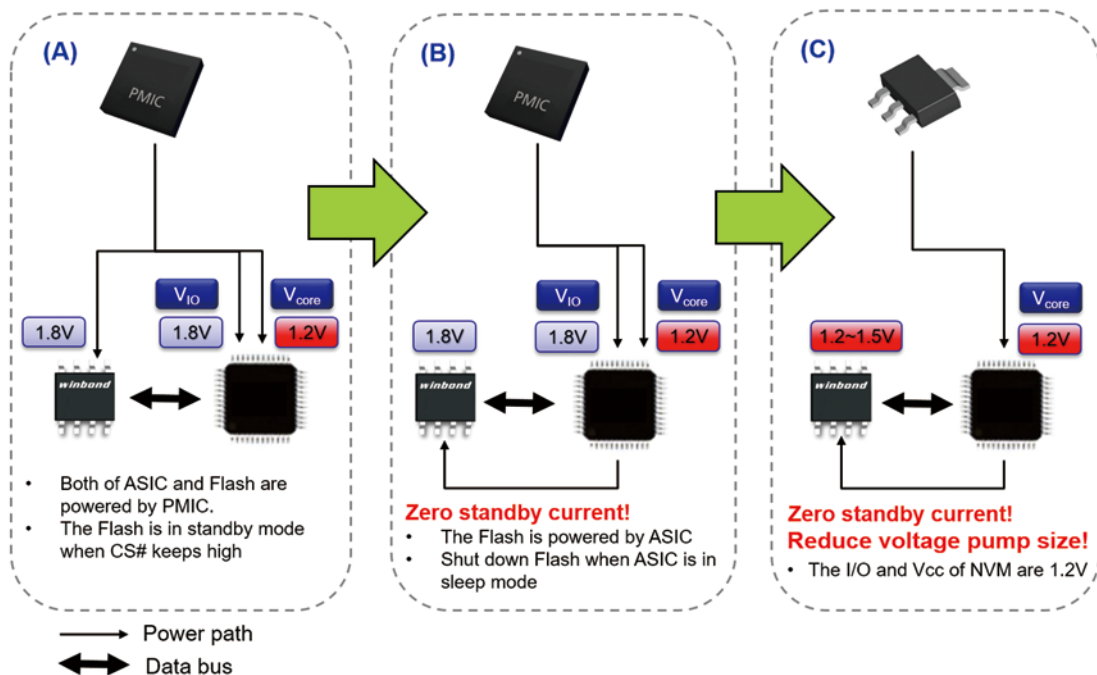


○ Simplify The System Power Domain

Reduce power consumption by turning off NOR while sleeping / Reduce system BOM cost by simple power domains

The new devices also provide additional advantages. The first is the power circuit which benefits from reduced noise coupling in the traces connecting the memory to the host SoC or processor, a direct result of the reduced power that they carry. This can help ease the requirement to implement noise mitigation measures such as shielding, and to improve the performance of noise-sensitive elements of the circuit.

The other principal advantage of the 1.2V devices is the potential, over time, to simplify the power circuit.



128Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q128ND	SPI / QPI	1.14V - 1.6V	104	SOIC8 208mil, WSON8 6X5mm, TFBGA24 8x6-mm (5x5 Ball Array), WLCSP21	UD	UD

64Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q64ND	SPI / QPI	1.14V - 1.6V	104	SOIC8 208mil, WSON8 6X5mm, XSON8 4x4x0.45mm, TFBGA24 8x6-mm (5x5 Ball Array), WLCSP12	S	UD

32Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q32ND	SPI / QPI	1.14V - 1.6V	104	SOIC8 208mil, WSON8 6X5mm, TFBGA24 8x6-mm (5x5-1 Ball Array), XSON8 4x4x0.45mm, WLCSP12	UD	UD

16Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q16ND	SPI / QPI	1.14V - 1.6V	104	SOIC8 150mil, SOIC8 208mil, WSON8 6X5mm, USON8 4x3mm, WLCSP8	UD	UD

8Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q80ND	SPI / QPI	1.14V - 1.6V	104	SOIC8 150mil, SCIC8 208mil, WSON8 6X5mm, USON8 2X3mm, WLCSP8	S	UD

4Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q40ND	SPI / QPI	1.14V - 1.6V	104	SOIC8 150mil, VSOP8 150mil, USON8 4X3mm, USON8 2X3mm, WLCSP8	UD	UD

2Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25Q20ND	SPI / QPI	1.14V - 1.6V	104	SOIC8 150mil, VSOP8 150mil, USON8 4X3mm, USON8 2X3mm, WLCSP8	UD	UD

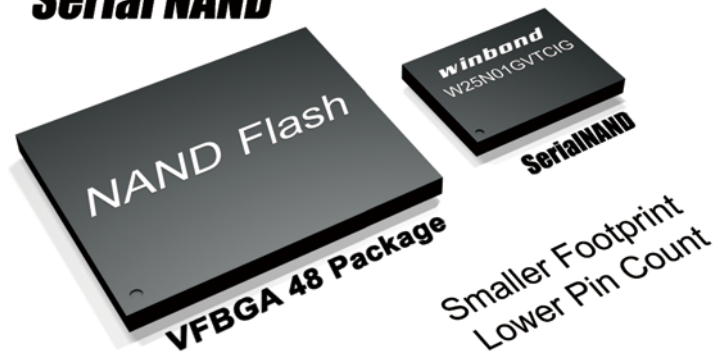
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Serial NAND Flash

Code Storage Serial NAND Memory

To simplify the life of designers looking to store code on systems at densities beyond the NOR Flash offering of 512Mb, Winbond is offering Serial NAND products with the same SPI interface with a cost effective serial NAND at 1Gb and 2Gb densities. While NOR flash is more cost effective at lower densities, NAND Flash is more cost effective at 512Mb and above.

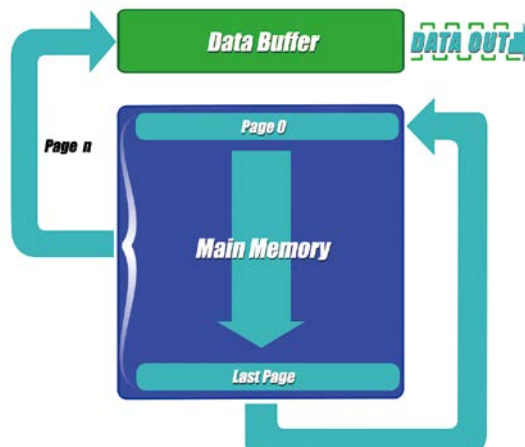
Sometimes Size Matters Serial NAND



Benefits of Using Winbond Serial NAND

NAND Flash memory requires a controller to manage functions like detecting and correcting errors in some memory locations, managing memory blocks with errors, and relocating locations with errors to new locations that are error-free. These Serial NAND family of 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. Typically in most systems, code stored in 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's "continuous read" functionality transfers the contents of NAND very quickly to the DRAM.

Continuous Read*



*Continuous Read the same as SpiFlash

○ 2Gb

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M02GV	2.7V - 3.6V	x1/x4	2KB+64B	104	WS0N8 8X6mm VFBGA24 8X6mm	P	P
W25M02GW	1.7V - 1.95V	x1/x4	2KB+64B	104	WS0N8 8X6mm VFBGA24 8X6mm	P	P

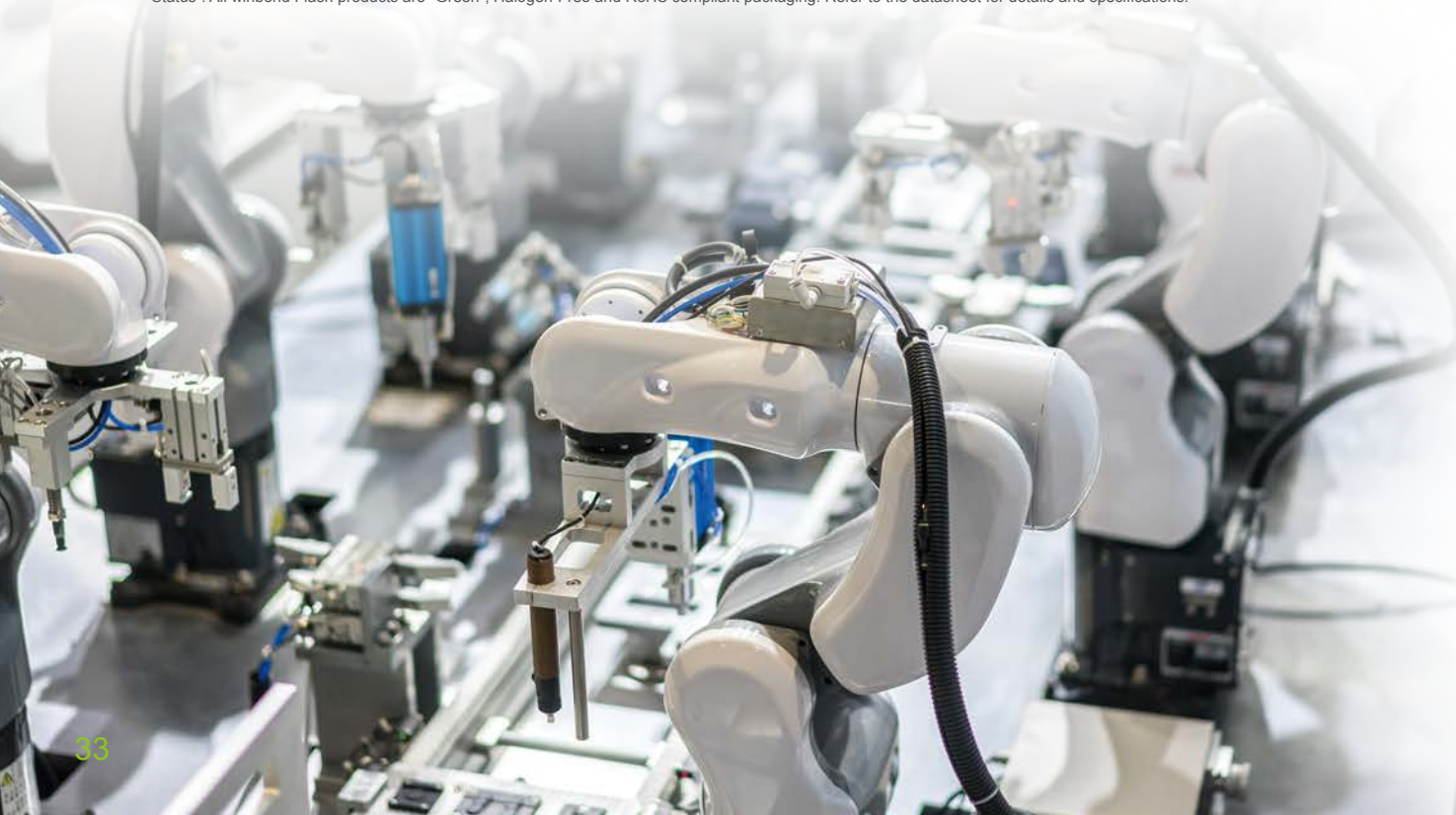
○ 1Gb

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25N01GV	2.7V - 3.6V	x1/x4	2KB+64B	104	WS0N8 8X6mm VFBGA24 8X6mm	P	P
W25N01GW	1.7V - 1.95V	x1/x4	2KB+64B	104	WS0N8 8X6mm VFBGA24 8X6mm	P	P

○ 512Mb

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25N512GV	2.7V - 3.6V	x1/x4	2KB+64B	104	WS0N8 8X6mm WS0N8 6x5mm VFBGA24 8X6mm	P	P
W25N512GW	1.7V - 1.95V	x1/x4	2KB+64B	104	WS0N8 8X6mm WS0N8 6x5mm VFBGA24 8X6mm	P	UD

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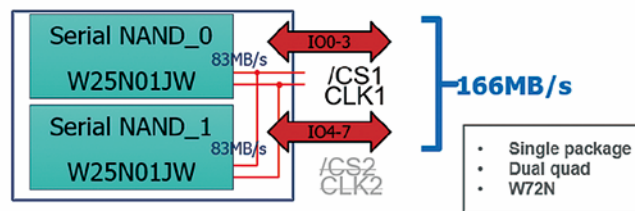
High Performance Serial NAND Flash

The new W25N / W72N is a single-level cell (SLC) serial NAND Flash IC built using Winbond's proprietary 46nm fabrication process. SLC NAND has higher reliability than the higher-density multi-level cell (MLC) and triple-level cell (TLC).

Winbond new High Performance Serial NAND enables a data transfer rate four times faster than Parallel NAND and other Serial NAND currently on the market.

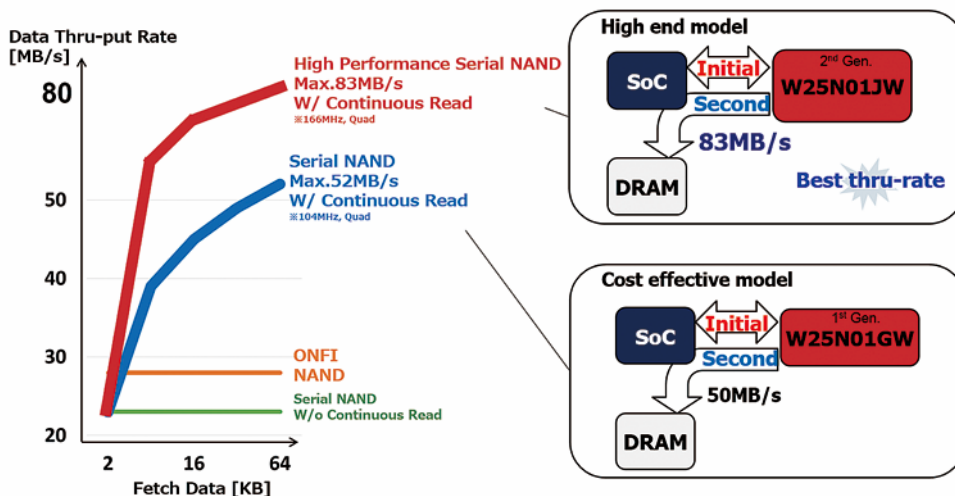
Transferring data at 83MB/s, which far exceeds competing NAND flash on the market, Winbond's new solution accelerates instrument cluster boot-up time.

TWO chips in One Package



It also supports dual-quad I/O interface to accommodate higher storage density or data transfer rate up to 166 MB/s. The selection allowing for single, dual and quad I/O means customers can enjoy more flexibility compared to what competitors can offer.

Furthermore, Winbond this new High Performance Serial NAND supports hardware reset pin which is more convenient for hardware / software design for automotive applications.



2Gb

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25N02JW	1.7V - 1.95V	x1/x4	2KB+64B	166/83	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	P	P
W72N02JW	1.7V - 1.95V	x1/x8	2KB+64B	166/83	TFBGA24 6X8mm (5x5-1 Matrix)	P	P

1Gb

Part No.	Voltage	I/O	Page Size	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25N01JW	1.7V - 1.95V	x1/x4	2KB+64B	166/83	SOIC16 300mil, WSON8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	P	P

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SLC NAND Flash

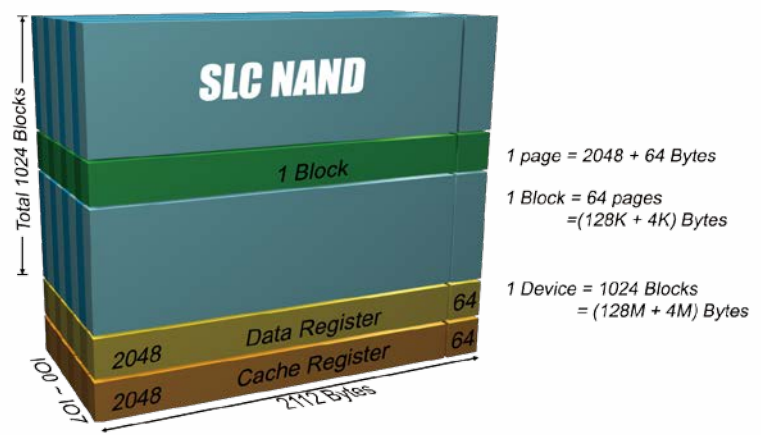
Industry Standard Compatible SLC NAND Flash Family

Winbond, is offering a family of industry standard SLC NAND Flash memories to service the lower density code storage SLC NAND segment in the 1Gb to 8Gb density range. SLC NAND Flash products are direct drop-in replacement to the equivalent products in the industry from different suppliers and products are fully compatible. The command set, the interface and the packages are the same as other suppliers provide. Winbond feature set is a superset of the features that other suppliers offer.



Competitive Advantage & Applications

Winbond SLC NAND only needs 1 bit ECC, and any platforms with NAND interface can access it directly. These NAND products offer a page size of 2048+64 Bytes which is large enough to accommodate 4-bit ECC operation and can offer a more robust NAND solution compared to the competition. Cache read/program operation on these NAND devices provide a higher performance and these are used in multiple applications including Internet of Things, Automotive, Networking, Storage, Set-Top-Box, DSL & Cable modems, Digital TV, Mobile phones, Printers, Industrial and other applications.



8Gb

Part No.	Voltage	I/O	Page Size	Page Read (ns)	Package	Status ^{1,2}	Automotive
W29N08GV	2.7V - 3.6V	x8	2KB+64B	25	TSOPI48 12X20mm VFPGA63 9X11mm	P	P
W29N08GZ	1.7V - 1.95V	x8	2KB+64B	35	TSOPI48 12X20mm VFPGA63 9X11mm	P	UD
W29N08GW	1.7V - 1.95V	x16	2KB+64B	35	TSOPI48 12X20mm VFPGA63 9X11mm	P	UD

4Gb

Part No.	Voltage	I/O	Page Size	Page Read (ns)	Package	Status ^{1,2}	Automotive
W29N04GV	2.7V - 3.6V	x8	2KB+64B	25	TSOPI48 12X20mm VFPGA63 9X11mm	P	P
W29N04GZ	1.7V - 1.95V	x8	2KB+64B	35	TSOPI48 12X20mm VFPGA63 9X11mm	P	UD
W29N04GW	1.7V - 1.95V	x16	2KB+64B	35	TSOPI48 12X20mm VFPGA63 9X11mm	P	UD

2Gb

Part No.	Voltage	I/O	Page Size	Page Read (ns)	Package	Status ^{1,2}	Automotive
W29N02GV	2.7V - 3.6V	x8	2KB+64B	25	TSOPI48 12X20mm VFPGA63 9X11mm	P	P
W29N02KV	2.7V - 3.6V	x8	2KB+128B	25	TSOPI48 12X20mm VFPGA63 9X11mm	P	UD
W29N02GZ	1.7V - 1.95V	x8	2KB+64B	35	TSOPI48 12X20mm VFPGA63 9X11mm	P	UD
W29N02GW	1.7V - 1.95V	x16	2KB+64B	35	TSOPI48 12X20mm VFPGA63 9X11mm	P	UD

1Gb

Part No.	Voltage	I/O	Page Size	Page Read (ns)	Package	Status ^{1,2}	Automotive
W29N01HV	2.7V - 3.6V	x8	2KB+64B	25	TSOPI48 12X20mm VFPGA63 9X11mm	P	P
W29N01HZ	1.7V - 1.95V	x8	2KB+64B	35	TSOPI48 12X20mm VFPGA63 9X11mm	P	UD
W29N01HW	1.7V - 1.95V	x16	2KB+64B	35	TSOPI48 12X20mm VFPGA63 9X11mm VFPGA48 6.5X8mm	P	UD

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NAND Based MCP

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 (Printed Circuit Board). This benefit becomes more critical in small PCBs for modules and space critical designs particularly for mobile and portable applications.

Owned DRAM and SLC NAND Flash Technology

Winbond Electronics Corp. is a Memory IC Company engaged in DRAM & 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.

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)	Part No.	Density		I/O Bus		DRAM Type	Status ^{1,2}
			Flash	DRAM	Flash	DRAM		
130	8x9x1.0	W71NW11HC1DW	1Gb	512Mb	16	16	LPDDR1	P

○ NAND + LPDDR2

Ball	Package Size (mm)	Part No.	Density		I/O Bus		DRAM Type	Status ^{1,2}
			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	W71NW10HE3FW	1Gb	512Mb	8	32	LPDDR2	P
		W71NW10GE3FW	1Gb	512Mb	8	32	LPDDR2	P
		W71NW10HF3FW	1Gb	1Gb	8	32	LPDDR2	P
		W71NW20GF3FW	2Gb	1Gb	8	32	LPDDR2	P

○ NAND + LPDDR4x

Ball	Package Size (mm)	Part No.	Density		I/O Bus		DRAM Type	Status ^{1,2}
			Flash	DRAM	Flash	DRAM		
149	8x9.5x0.8	W71NW20KK1KW	2Gb	2Gb	8	16	LPDDR4	UD
		W71NW40KK1KW	4Gb	2Gb	8	16	LPDDR4	UD
		W71NW40KL1KW	4Gb	4Gb	8	16	LPDDR4	UD
		W71SW10GK1KW	1Gb	2Gb	1/2/4	16	LPDDR4	UD
		W71SW20KK1KW	2Gb	2Gb	1/2/4	16	LPDDR4	UD

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SpiStack Flash

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.

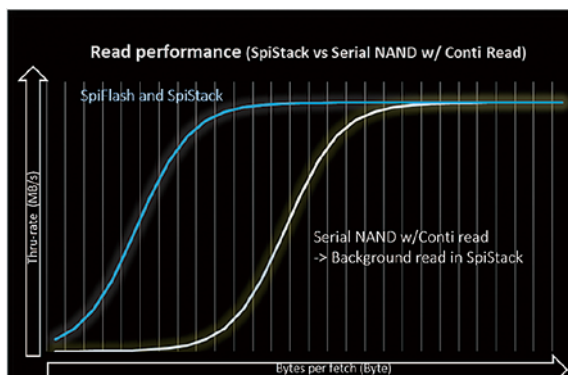
SpiStack homogeneous memories are formed by stacking SpiFlash dies – for example, two 256Mb dies combining to form a single SpiFlash 512Mb NOR memory in the industry-standard 8-pin 8x6mm WSON package. This stacked product, W25M512JV, is also available now in 16-pin SOIC or 24-pad BGA packages. SpiStack 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.

Why Stacked Die?



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

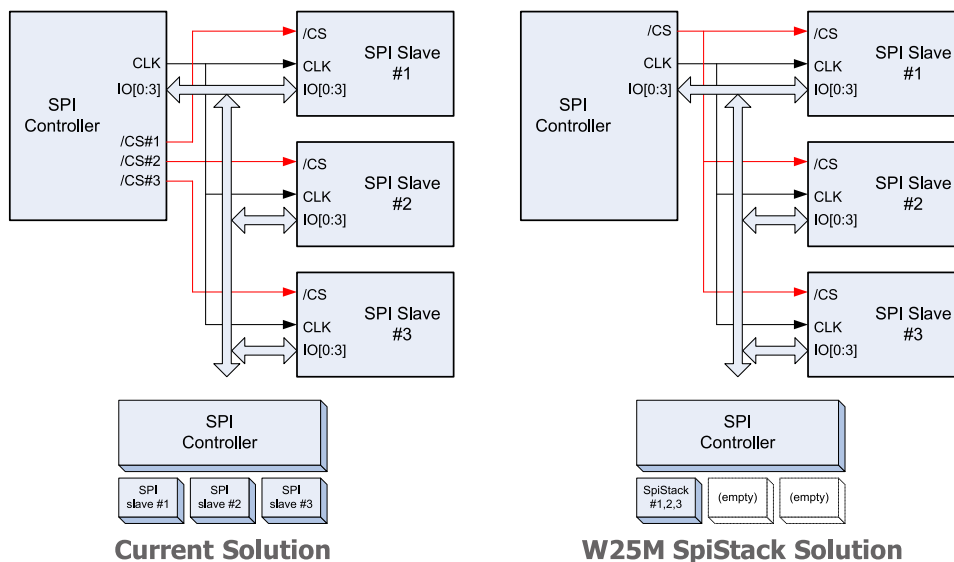
Concurrent Operation

- 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



256Mb Serial NOR + 1Gb Serial NAND

Part No.	Voltage	I/O	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M261AW	1.7V - 1.95V	x4/x4	104	WSO8 8X6mm	S	UD

128Mb Serial NOR + 1Gb Serial NAND

Part No.	Voltage	I/O	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M121AV	2.7V - 3.6V	x4/x4	104	WSO8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	P	P
W25M121AW	1.7V - 1.95V	x4/x4	104	WSO8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	S	UD

64Mb Serial NOR + 1Gb Serial NAND

Part No.	Voltage	I/O	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M641AV	2.7V - 3.6V	x4/x4	104	WSO8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	P	UD
W25M641AW	1.7V - 1.95V	x4/x4	104	WSO8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	UD	UD

32Mb Serial NOR + 1Gb Serial NAND

Part No.	Voltage	I/O	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M321AV	2.7V - 3.6V	x4/x4	104	WSO8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	P	UD
W25M321AW	1.7V - 1.95V	x4/x4	104	WSO8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	UD	UD

16Mb Serial NOR + 1Gb Serial NAND

Part No.	Voltage	I/O	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M161AV	2.7V - 3.6V	x4/x4	104	WSO8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	P	UD
W25M161AW	1.7V - 1.95V	x4/x4	104	WSO8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	P	UD

16Mb Serial NOR + 512Mb Serial NAND

Part No.	Voltage	I/O	Speed (MHz)	Package	Status ^{1,2}	Automotive
W25M165AV	2.7V - 3.6V	x4/x4	104	WSO8 8X6mm, TFBGA24 6X8mm (5x5-1 Matrix)	P	UD

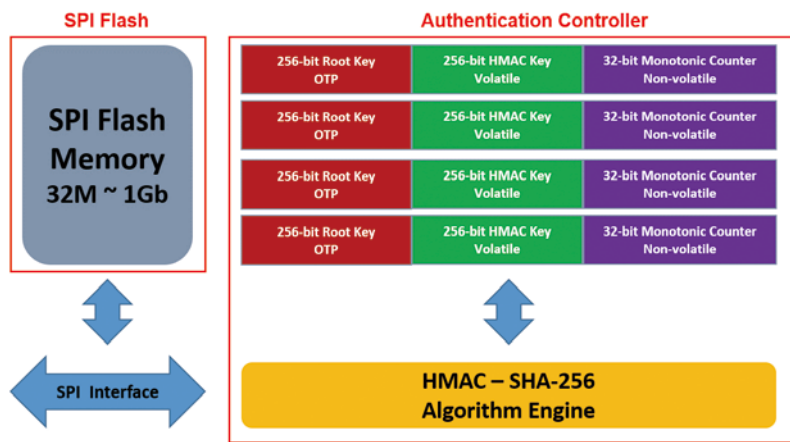
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Authentication Flash

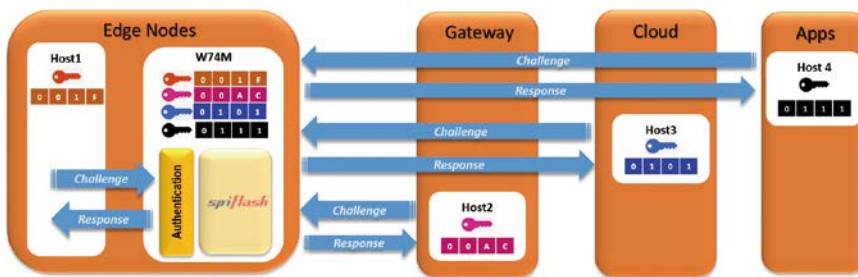
Flash Memories that provide handshake between the controller and the memory to ensure enhanced security of the data transmitted between the two devices. These products in the W74M family come with standard HMAC-SHA-256 crypto accelerator and 4 separate Monotonic Flash Counters that are HMAC-signed by individual secret keys.

Systems utilizing each Monotonic Flash Counter can not only verify the integrity and authenticity of the counter values, but also add a timestamp to the message/information transmitted as well as provide resistance to replay attacks.



Block diagram of authentication flash

W74M products enable system designers to strengthen code/data storage as well as deliver increased security with multi-layered authenticity for emerging IoT devices on the edge and outside the cloud. These security products also provide enhanced security to gateways, sensors, doorbells, cameras and other similar devices.



Multi-layer authentication

1Gb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M01GV	Device and/or Module Authentication Flash Command and Socket Compatible	2.7V - 3.6V	104	WSO8 8X6mm	P	UD

512Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M51JV	Device and/or Module Authentication Flash Command and Socket Compatible	2.7V - 3.6V	104	WSO8 8X6mm, SOIC16 300mil	UD	UD

○ 256Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M25JV	Device and/or Module Authentication Flash Command and Socket Compatible	2.7V - 3.6V	104	WFLGA8 5x6mm, WSO8 8X6mm, SOIC16 300mil	P	UD
W74M25JW	Device and/or Module Authentication Flash Command and Socket Compatible	1.7V - 1.95V	104	WSO8 6X5mm, WSO8 8X6mm, SOIC16 300mil	P	UD

○ 128Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M12JV	Device and/or Module Authentication Flash Command and Socket Compatible	2.7V - 3.6V	104	WSO8 6X5mm, WSO8 8X6mm, SOIC8 208mil	P	UD
W74M12JW	Device and/or Module Authentication Flash Command and Socket Compatible	1.7V - 1.95V	104	WSO8 6X5mm, WSO8 8X6mm, SOIC8 208mil	S	UD

○ 64Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M64JV	Device and/or Module Authentication Flash Command and Socket Compatible	2.7V - 3.6V	104	SOIC8 208mil	P	UD

○ 32Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M32FV	Device and/or Module Authentication Flash Command and Socket Compatible	2.7V - 3.6V	104	SOIC8 208mil	P	-

○ 0Mb

Part No.	Features	Voltage	Speed (MHz)	Package	Status ^{1,2}	Automotive
W74M00AV	One-Time-Password Authentication Standard SPI Interface	2.7V - 3.6V	80	SOIC8 150mil, SOIC8 208mil	P	S
W74M00AW	One-Time-Password Authentication Standard SPI Interface	1.7V - 1.95V	104	SOIC8 150mil, SOIC8 208mil, USO8 2x3mm	P	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.

KGD

We offer various types of KGD products.

For more product information, please contact us at Winbond Technical Support:



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winbond

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