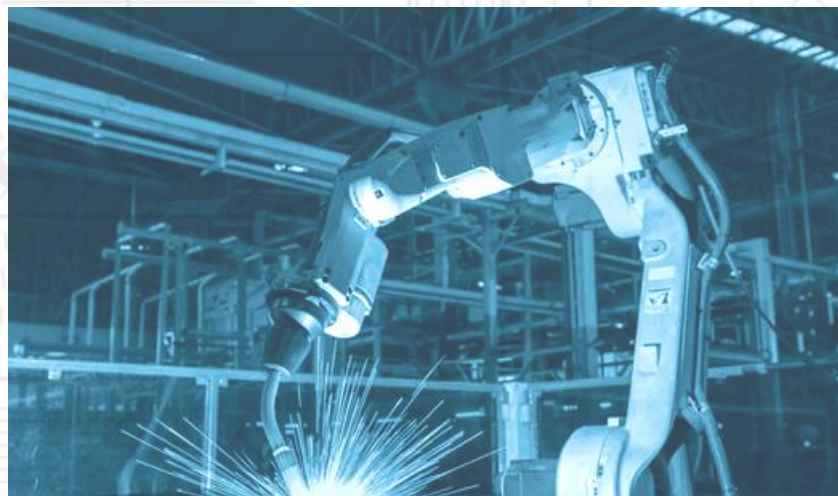




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Cypress Roadmap: Automotive Flash Memory

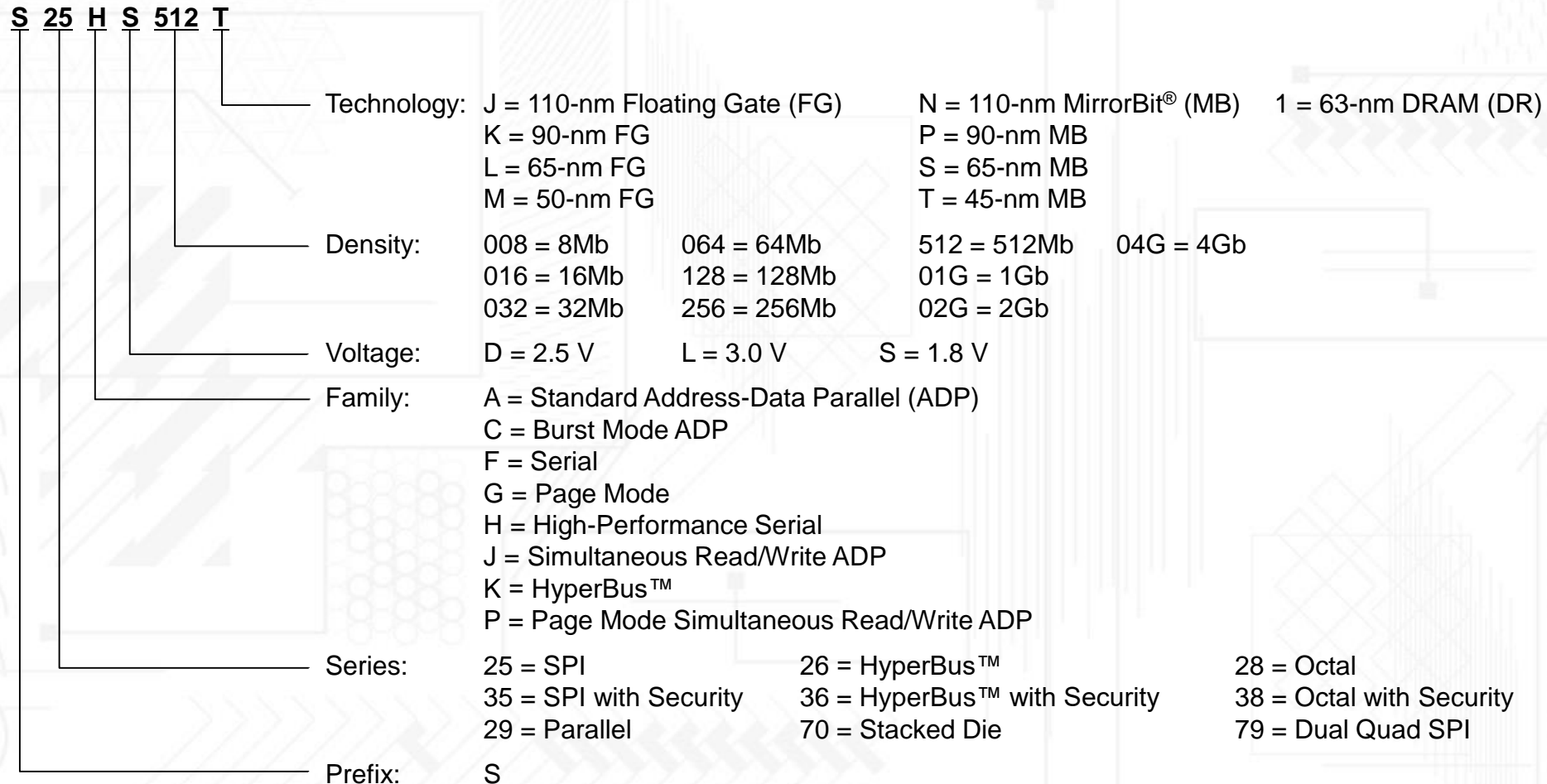
Q2 2019



NOR Flash Memory Automotive Family



NOR Flash Memory Automotive Family Decoder



NOR Flash Memory Automotive Product Portfolio: New Products

Family	Interface	Sector Size	Series	Voltage	Densities	Lead	Tech	2019	2020	2021	2022	2023	2024	2025
Semper™ Flash	Quad SPI	Hybrid	S25HS-T S25HL-T	1.8 V 3.0 V	256Mb–4Gb	512Mb	45-nm MB	■	■	■	■	■	■	■
	HyperBus™ ¹		S26HS-T S26HL-T	1.8 V 3.0 V	256Mb–4Gb	512Mb	45-nm MB	■	■	■	■	■	■	■
	Octal ¹		S28HS-T S28HL-T	1.8 V 3.0 V	256Mb–4Gb	512Mb	45-nm MB	■	■	■	■	■	■	■
QSPI	QSPI	Hybrid	S25FS-S	1.8 V	64Mb–1Gb	-	65-nm MB	■	■	■	■	■	■	■
		Uniform 4kB	S25FL-S	3.0 V	128Mb–1Gb	-	65-nm MB	■	■	■	■	■	■	■
			S25FL-L	3.0 V	64–256Mb	-	65-nm FG	■	■	■	■	■	■	■
Dual Quad SPI	QSPI	Hybrid	S79FS-S S79FL-S	1.8 V 3.0 V	256Mb–1Gb	-	65-nm MB	■	■	■	■	■	■	■
HyperFlash	HyperBus	Hybrid	S26KS-S S26KL-S	1.8 V 3.0 V	128–512Mb	-	65-nm MB	■	■	■	■	■	■	■
Parallel	Parallel	Hybrid	S29GL-T	3.0 V	512Mb-2Gb	-	45-nm MB	■	■	■	■	■	■	■

¹ JEDEC xSPI Compliant

 Concept
 Samples
 Production
 EOL

x8 Serial Memory Automotive Portfolio

	Dual Quad SPI S79FL-S ^{1,2} 65-nm MB, 3.0 V	HyperFlash S26KL-S ¹ 65-nm MB, 3.0 V	Semper™ Flash ³ S26HL-T ^{1,4} 45-nm MB, 3.0 V	Semper Flash ⁵ S28HL-T ^{1,4} 45-nm MB, 3.0 V	Dual Quad SPI S79FS-S ^{1,2} 65-nm MB, 1.8 V	HyperFlash S26KS-S ¹ 65-nm MB, 1.8 V	Semper Flash ³ S26HS-T ^{1,4} 45-nm MB, 1.8 V	Semper Flash ⁵ S28HS-T ^{1,4} 45-nm MB, 1.8 V
	Density Initial Access/DDR Clock * Temperature Range	Density (S79) SDR Clock / DDR Clock * Temperature Range						
	All parts supported by Longevity Program unless noted							
≥256Mb			4Gb ^{6,7} 80 ns/133 MHz * A, B, M	4Gb ^{6,7} 80 ns/133 MHz * A, B, M			4Gb ^{6,7} 80 ns/166 MHz * A, B, M	4Gb ^{6,7} 80 ns/166 MHz * A, B, M
			2Gb ^{6,7} 80 ns/133 MHz * A, B, M	2Gb ^{6,7} 80 ns/133 MHz * A, B, M			2Gb ^{6,7} 80 ns/166 MHz * A, B, M	2Gb ^{6,7} 80 ns/166 MHz * A, B, M
	1Gb		1Gb Q120 80 ns/166 MHz * A, B, M	1Gb Q120 80 ns/166 MHz * A, B, M	1Gb 133 MHz/102 MHz * A, B		1Gb Q120 80 ns/200 MHz * A, B, M	1Gb Q120 80 ns/200 MHz * A, B, M
	512Mb	512Mb 96 ns/166 MHz * A, B, M	512Mb Q319 80 ns/166 MHz * A, B, M	512Mb Q319 80 ns/166 MHz * A, B, M	512Mb 133 MHz/80 MHz * A, B	512Mb 96 ns/166 MHz * A, B, M	512Mb Q319 80 ns/200 MHz * A, B, M	512Mb Q319 80 ns/200 MHz * A, B, M
	256Mb	256Mb 96 ns/166 MHz * A, B, M	Q120 256Mb Q121 80 ns/166 MHz * A, B, M	Q120 256Mb Q121 80 ns/166 MHz * A, B, M	256Mb 133 MHz/80 MHz * A, B	256Mb 96 ns/166 MHz * A, B, M	Q120 256Mb Q121 80 ns/200 MHz * A, B, M	Q120 256Mb Q121 80 ns/200 MHz * A, B, M
64–128Mb		128Mb 96 ns/166 MHz * A, B, M				128Mb 96 ns/166 MHz * A, B, M		

¹ Hybrid Sector

² S79 series (stacked die)

³ With HyperBus™ Interface

⁴ JEDEC xSPI Compliant

⁵ With Octal Interface

⁶ Contact Sales

⁷ Stacked die

* A = Automotive, AEC-Q100 Grade 3: -40°C to +85°C
 B = Automotive, AEC-Q100 Grade 2: -40°C to +105°C
 M = Automotive, AEC-Q100 Grade 1: -40°C to +125°C

Status Availability

Concept
 Development
 Sampling
 Production

QQYY
QQYY
QQYY

EOL (Last-Time-Ship)



x4 NOR Flash Memory Automotive Roadmap

Product Family	Density	(Prod ¹) [EOL]	2019				2020				2021				2022				2023				2024				2025			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
S25HS-T (1.8 V) S25HL-T (3.0 V) Semper™ Flash with QSPI 45-nm MB ²	4Gb ⁵ 2Gb ^{5,6} 1Gb 512Mb 256Mb	(TBD) (Q1'20) (Q1'20) (Q3'19) (Q1'21)																												
S25FS-S (1.8 V) S25FL-S ³ (3.0 V) QSPI 65-nm MB ²	1Gb ⁷ 512Mb 256Mb 128Mb ⁸ 64Mb ⁹																													
S25FL-L (3.0 V) QSPI 65-nm FG ⁴	256Mb 128Mb 64Mb																													
S25FL-P (3.0 V) QSPI 90-nm MB ²	256Mb ⁷ 128Mb ¹⁰ 64Mb 32Mb																													
S25FL1-K (3.0 V) QSPI 90-nm FG ⁴	64Mb 32Mb 16Mb	[Q4'19] [Q4'19] [Q4'19]																												

¹ AEC-Q100

² Hybrid Sector

³ VIO 1.8 V to 3.0 V

⁴ Uniform Sector

⁵ Stacked Die

⁶ 3.0 V QSPI only

⁷ S70 Series (stacked die)

⁸ S25FL127S and S25FL128S

⁹ FS-S only

¹⁰ S25FL128P and S25FL129P

Products supported by
Longevity Program unless noted

Concept

Samples

Production

EOL - LTB

EOL - LTS



x4 NOR Flash Memory Automotive Portfolio

	QSPI S25FL1-K ¹ 90 nm, 3.0 V	QSPI S25FL-P ¹ 90 nm, 3.0 V	QSPI S25FL-S ¹ 65 nm, 3.0 V	QSPI S25FL-L ² 65 nm, 3.0 V	Semper™ Flash ³ S25HL-T ¹ 45 nm, 3.0 V	QSPI S25FS-S ¹ 65 nm, 1.8 V	Semper Flash ³ S25HS-T ¹ 45 nm, 1.8 V
≥256Mb	Density (Name) SDR Clock / DDR Clock * Temp Range				4Gb ⁴ 133 MHz / 80 MHz * A, B, M		4Gb ⁴ 133 MHz / 80 MHz * A, B, M
	All parts supported by Longevity Program unless noted				2Gb ^{4,10} Q120 133 MHz / 80 MHz * A, B, M		2Gb ⁴ 133 MHz / 80 MHz * A, B, M
64–128Mb			1Gb ⁵ 133 MHz / 80 MHz * A, B, M		1Gb Q120 166 MHz / 102 MHz * A, B, M	1Gb ⁵ 133 MHz / 80 MHz * A, B, M	1Gb Q120 166 MHz / 102 MHz * A, B, M
			512Mb 133 MHz / 80 MHz * A, B, M		512Mb Q319 166 MHz / 102 MHz * A, B, M	512Mb 133 MHz / 80 MHz * A, B, M	512Mb Q319 166 MHz / 102 MHz * A, B, M
		256Mb ⁵ 104 MHz / -- * A	256Mb 133 MHz / 80 MHz * A, B, M	256Mb 133 MHz / 66 MHz * A, B, M	Q120 256Mb Q121 166 MHz / 102 MHz * A, B, M	256Mb 133 MHz / 80 MHz * A, B, M	Q120 256Mb Q121 166 MHz / 102 MHz * A, B, M
≤32Mb		128Mb ⁶ 104 MHz / -- * A, B	128Mb ⁸ 133 MHz / 80 MHz * A, B, M	128Mb 133 MHz / 66 MHz * A, B, M		128Mb 133 MHz / 80 MHz * A, B, M	
		128Mb ⁷ 104 MHz / -- * A, B	128Mb ⁹ 108 MHz / -- * A, B				
	64Mb Q419 108 MHz / -- * A, B	64Mb 104 MHz / -- * A, B		64Mb 108 MHz / 54 MHz * A, B, M		64Mb 133 MHz / 80 MHz * A, B, M	
	32Mb Q419 108 MHz / -- * A, B	32Mb 104 MHz / -- * A, B					
	16Mb Q419 108 MHz / -- * A, B						

¹ Hybrid Sector

² Uniform Sector

³ With QSPI

⁴ Stacked die

⁵ S70 series (stacked die)

⁶ S25FL129P Quad SPI

⁷ S25FL128P Dual SPI

⁸ S25FL128S 133-MHz SDR / 80-MHz DDR

⁹ S25FL127S 108-MHz SDR

¹⁰ Contact Sales

* A = Automotive, AEC-Q100 Grade 3: -40°C to +85°C

B = Automotive, AEC-Q100 Grade 2: -40°C to +105°C

M = Automotive, AEC-Q100 Grade 1: -40°C to +125°C

Engineering AEC-Q100/
Production

Concept Development Sampling Production

Status Availability

EOL (Last-Time-Ship)

QQYY
QQYY
QQYY



Parallel and Burst Parallel NOR Flash Memory Automotive Roadmap

Product Family	Density	(Prod ¹) [EOL]	2019				2020				2021				2022				2023				2024				2025			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
S29GL-T ² (3.0 V) 45-nm MB	2Gb ⁴ 1Gb 512Mb		[Green bar]																											
S29GL-S ² (3.0 V) 65-nm MB	2Gb ⁴ 1Gb 512Mb 256Mb 128Mb 64Mb		[Green bar]																											
S29GL-N ² (3.0 V) 110-nm MB	64Mb 32Mb		[Green bar]																											
S29PL-J ^{2,3} (3.0 V) 110-nm FG	128Mb 64Mb 32Mb		[Green bar]																											
S29JL-J ³ (3.0 V) 110-nm FG	64Mb 32Mb		[Green bar]																											
S29AL-J (3.0 V) 110-nm FG	16Mb 8Mb		[Green bar]																											
S29AS-J (1.8 V) 110-nm FG	16Mb		[Green bar]																											
S29CD-J (2.5 V) Burst Parallel 110-nm FG	32Mb 16Mb		[Green bar]																											
S29CL-J (3.0 V) Burst Parallel 110-nm FG	32Mb 16Mb		[Green bar]																											

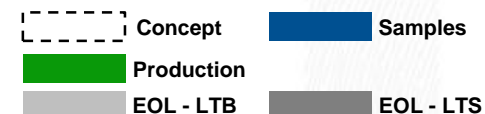
¹ AEC-Q100

³ Supports Simultaneous Read/Write Operation

² Supports Page Mode

⁴ S70 series (stacked die)

Products supported by
Longevity Program unless noted



Parallel and Burst Parallel NOR Flash Memory Automotive Portfolio

	Burst Parallel S29CL-J ¹ 110 nm, 3.0 V	Burst Parallel S29CD-J ¹ 110 nm, 2.5 V	S29AS-J 110 nm, 1.8 V	S29AL-J 110 nm, 3.0 V	S29JL-J ² 110 nm, 3.0 V	S29PL-J ^{2, 3} 110 nm, 3.0 V	S29GL-N ³ 110 nm, 3.0 V	S29GL-S ³ 65 nm, 3.0 V	S29GL-T ³ 45 nm, 3.0 V
≥256Mb	Density Initial / Page Access * Temp Range All parts supported by Longevity Program unless noted							2Gb⁴ 110 ns / 20 ns * A, B 1Gb 100 ns / 15 ns * A, B 512Mb 100 ns / 15 ns * A, B 256Mb 90 ns / 15 ns * A, B	2Gb⁴ 110 ns / 20 ns * A, B 1Gb 100 ns / 15 ns * A, B 512Mb 100 ns / 15 ns * A, B
64–128Mb						128Mb 60 ns / 20 ns * A 64Mb 55 ns / -- * A	64Mb 55 ns / 20 ns * A 64Mb 90 ns / 25 ns * A	128Mb 90 ns / 15 ns * A, B 64Mb 70 ns / 15 ns * A, B	
≤32Mb	32Mb 54 ns / 75 MHz * A, M, T 16Mb 54 ns / 66 MHz * A, M, T	32Mb 54 ns / 75 MHz * A, M, T 16Mb 54 ns / 66 MHz * A, M, T	16Mb 70 ns / -- * A	16Mb 55 ns / -- * A, M 8Mb 55 ns / -- * A, M	32Mb 60 ns / -- * A	32Mb 55 ns / 20 ns * A	32Mb 90 ns / 25 ns * A		

¹ Address Data Parallel (ADP) Burst

² Supports Simultaneous Read/Write Operation

³ Supports Page Mode

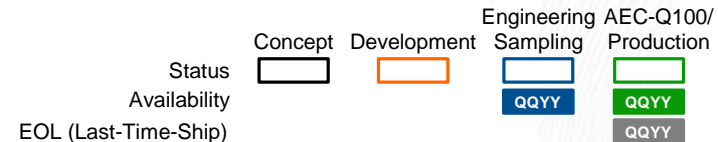
⁴ S70 series (stacked die)

* A = Automotive, AEC-Q100 Grade 3: -40°C to +85°C

B = Automotive, AEC-Q100 Grade 2: -40°C to +105°C

M = Automotive, AEC-Q100 Grade 1: -40°C to +125°C

T = Automotive, AEC-Q100 Grade 0: -40°C to +145°C

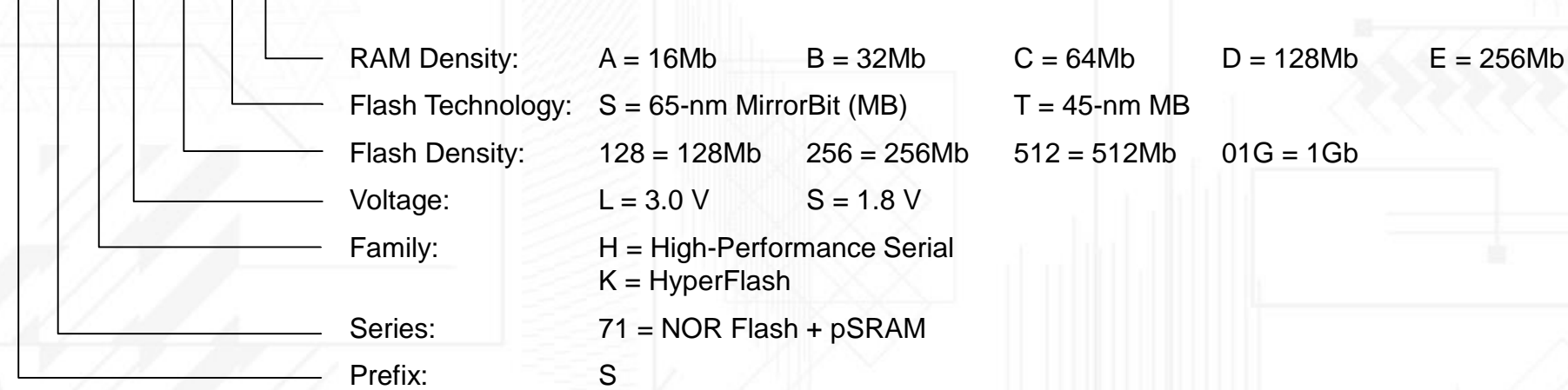


Flash and RAM Memory Automotive MCP



Flash and RAM Memory Automotive MCP Decoder

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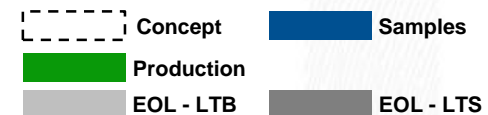


Flash and RAM Memory Automotive MCP Roadmap

Product Family Flash / RAM	Flash / RAM Density	(Prod ¹) [EOL]	2019				2020				2021				2022				2023				2024				2025							
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
S71HS-T (1.8 V) 45-nm Semper™ Flash / HyperRAM™	1Gb / 64Mb 512Mb / 64Mb	(TBD) (TBD)																																
S71KS-S (1.8 V) 65-nm HyperFlash / HyperRAM	512Mb / 64Mb 256Mb / 64Mb 128Mb / 64Mb	(TBD) (TBD) (TBD)																																
S71HL-T (3.0 V) 45-nm Semper Flash / HyperRAM	1Gb / 64Mb 512Mb / 64Mb	(TBD) (TBD)																																
S71KL-S (3.0 V) 65-nm HyperFlash / HyperRAM	512Mb / 64Mb 256Mb / 64Mb 128Mb / 64Mb	(TBD) (TBD) (TBD)																																

¹AEC-Q100

Products supported by
Longevity Program unless noted



x8 NOR Flash Memory Packages

Family	Interface	Series	Density	Device	SOIC-16 300 mil	BGA24 8 x 8 mm 5 x 5 Ball	BGA24 8 x 6 mm 5 x 5 Ball	KGD	
Semper™ Flash	HyperBus™	HS-T	256Mb	S26HS256T & S28HS256T			CF	CF	
			512Mb	S26HS512T & S28HS512T			UD	CF	
			1Gb	S26HS01GT & S28HS01GT		UD		CF	
			2Gb	S26HS02GT & S28HS02GT		CF			
			4Gb	S26HS04GT & S28HS04GT		CF			
		HL-T	256Mb	S26HL256T & S28HL256T				CF	CF
			512Mb	S26HL512T & S28HL512T				UD	CF
			1Gb	S26HL01GT & S28HL01GT			UD		CF
			2Gb	S26HL02GT & S28HL02GT			CF		
			4Gb	S26HL04GT & S28HL04GT			CF		
HyperFlash	HyperBus™	KS-S	128Mb	S26KS128S			✓	CF	
			256Mb	S26KS256S			✓	CF	
			512Mb	S26KS512S			✓	CF	
			1Gb	S70KS01GS			✓		
		KL-S	128Mb	S26KL128S				✓	CF
			256Mb	S26KL256S				✓	CF
			512Mb	S26KL512S				✓	CF
			1Gb	S70KL01GS				✓	
Dual Quad SPI	QSPI	FS-S Dual Quad	256Mb	S79FS256S	✓				
			512Mb	S79FS512S	✓				
			1Gb	S79FS01GS				✓	
		FL-S Dual Quad	256Mb	S79FL256S	✓				
			512Mb	S79FL512S	✓				
			1Gb	S79FL01GS				✓	

CF = Contact Factory
UD = Under Development

x4 NOR Flash Memory Packages

Family	Interface	Series	Density	Device	SOIC-8 150 mil	SOIC-8 208 mil	SOIC-16 300 mil	WSON 4 x 4 mm	WSON 6 x 5 mm	WSON 8 x 6 mm	BGA24 8 x 8 mm 5 x 5 Ball	BGA24 8 x 6 mm 5 x 5 Ball	BGA24 8 x 6 mm 4 x 6 Ball	KGD		
Semper™ Flash	QSPI	HS-T	256Mb	S25HS256T			CF			CF		CF		CF		
			512Mb	S25HS512T			UD			UD		UD		CF		
			1Gb	S25HS01GT			UD					UD		CF		
			2Gb	S25HS02GT								CF				
			4Gb	S25HS04GT								CF				
		HL-T	256Mb	S25HL256T					CF			CF		CF	CF	
			512Mb	S25HL512T					UD			UD		UD	CF	
			1Gb	S25HL01GT					UD				UD		CF	
			2Gb	S25HL02GT									UD			
			4Gb	S25HL04GT									CF			
QSPI	QSPI	FS-S	64Mb	S25FS064S		✓			✓			✓		✓		
			128Mb	S25FS128S		✓	CF		✓	✓		✓	✓	CF		
			256Mb	S25FS256S			✓			✓	✓		✓	✓	✓	
			512Mb	S25FS512S			✓			✓	✓		✓	✓	CF	
			1Gb	S70FS01GS			✓						✓			
		FL-S	128Mb	S25FL127S			✓	✓		✓			✓	✓		
			128Mb	S25FL128S				✓			✓		✓	✓		
			256Mb	S25FL256S				✓			✓		✓	✓		
			512Mb	S25FL512S				✓					✓	✓	✓	
			1Gb	S70FL01GS				✓					✓			
		FL-P	32Mb	S25FL032P				✓	✓		✓	✓		✓	✓	
			64Mb	S25FL064P					✓			✓		✓	✓	
			128Mb	S25FL128P					✓			✓		✓		
			128Mb	S25FL129P					✓			✓		✓		
			256Mb	S70FL256P					✓			✓		✓		
		FL-L	64Mb	S25FL064L				✓	UD	✓	UD			✓	✓	CF
			128Mb	S25FL128L				✓	UD		✓			✓	✓	CF
			256Mb	S25FL256L					✓			✓		✓	✓	CF
		FL1-K	16Mb	S25FL116K			✓	✓			✓			✓	✓	✓
			32Mb	S25FL132K			✓	✓		✓	✓			✓	✓	✓
64Mb	S25FL164K					✓	✓		✓			✓	✓	✓		

CF = Contact Factory
UD = Under Development

Parallel and Burst Parallel NOR Flash Memory Packages

Series	Density	Device	48-Ball FBGA (0.8-mm pitch)	48-Ball FBGA (0.5-mm pitch)	56-Ball BGA (0.8-mm pitch)	64-Ball BGA (0.8-mm pitch)	64-Ball Fortified BGA (1.0-mm pitch)	48-Pin TSOP	56-Pin TSOP	80-Ball FBGA (1.0-mm pitch)	80-Pin PQFP	KGD
GL-T	512Mb	S29GL512T			✓		✓		✓			
	1Gb	S29GL01GT			✓		✓		✓			
	2Gb	S70GL02GT					✓					
GL-S	64Mb	S29GL064S	✓				✓	✓	✓			
	128Mb	S29GL128S			✓		✓		✓			
	256Mb	S29GL256S			✓		✓		✓			
	512Mb	S29GL512S			✓		✓		✓			
	1Gb	S29GL01GS					✓		✓			
	2Gb	S70GL02GS					✓					
GL-N	32Mb	S29GL032N	✓				✓	✓	✓			
	64Mb	S29GL064N	✓				✓	✓	✓			
PL-J	32Mb	S29PL032J	✓		✓							
	64Mb	S29PL064J	✓		✓							
	128Mb	S29PL127J				✓			✓			
JL-J	32Mb	S29JL032J	✓					✓				
	64Mb	S29JL064J	✓					✓				
AL-J	8Mb	S29AL008J	✓					✓				
	16Mb	S29AL016J	✓				✓	✓				
AS-J	16Mb	S29AS016J	✓	✓				✓				
CD-J	16Mb	S29CD016J								✓	✓	✓
	32Mb	S29CD032J								✓	✓	
CL-J	16Mb	S29CL016J								✓	✓	
	32Mb	S29CL032J								✓	✓	

Flash and RAM Memory MCP Packages

Family	Flash Density	RAM Density	BGA24 8 x 6 mm, 1.0 mm pitch 5 x 5 Ball
S71HS-T	512Mb	64Mb	CF
	1Gb	64Mb	CF
S71KS-S	128Mb	64Mb	✓
	256Mb	64Mb	✓
	512Mb	64Mb	✓
S71HL-T	512Mb	64Mb	CF
	1Gb	64Mb	CF
S71KL-S	128Mb	64Mb	✓
	256Mb	64Mb	✓
	512Mb	64Mb	✓

CF = Contact Factory



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EMBEDDED IN TOMORROW[™]