

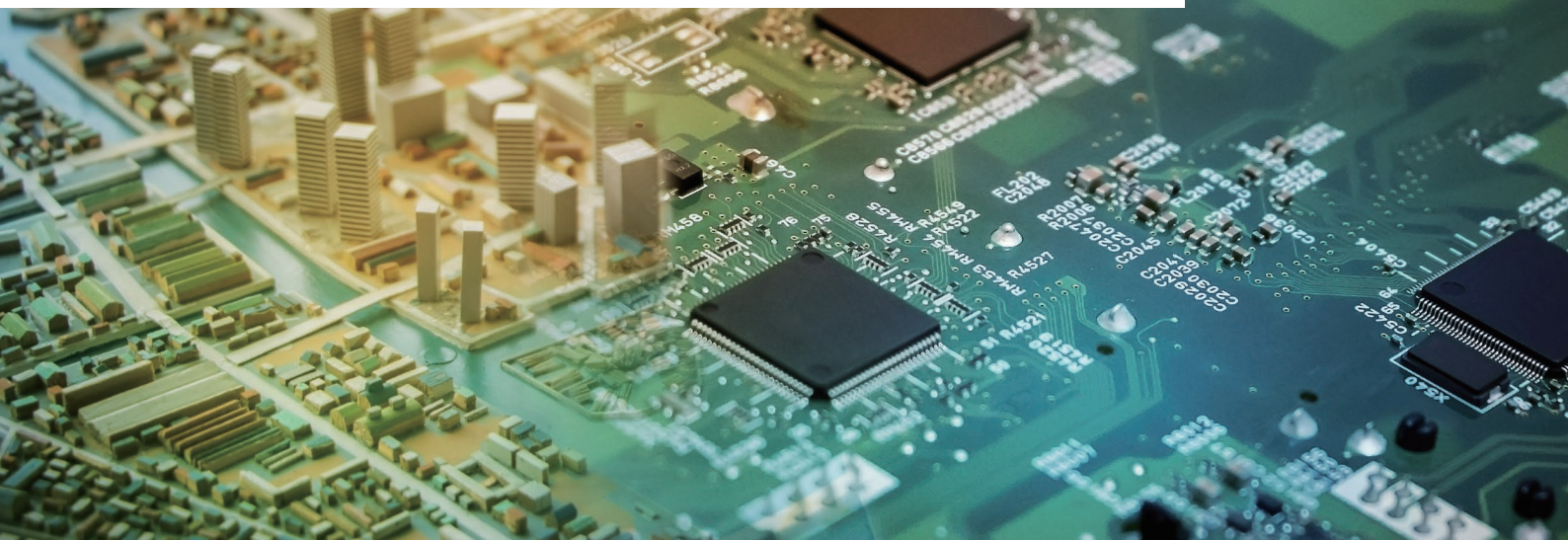
LOW POWER SRAMs

Advanced technology with superior performance and industry-leading support



HIGH PERFORMANCE AND
HIGH RELIABILITY USING
RENESAS'S ORIGINAL TECHNOLOGY

LOW POWER SRAMs



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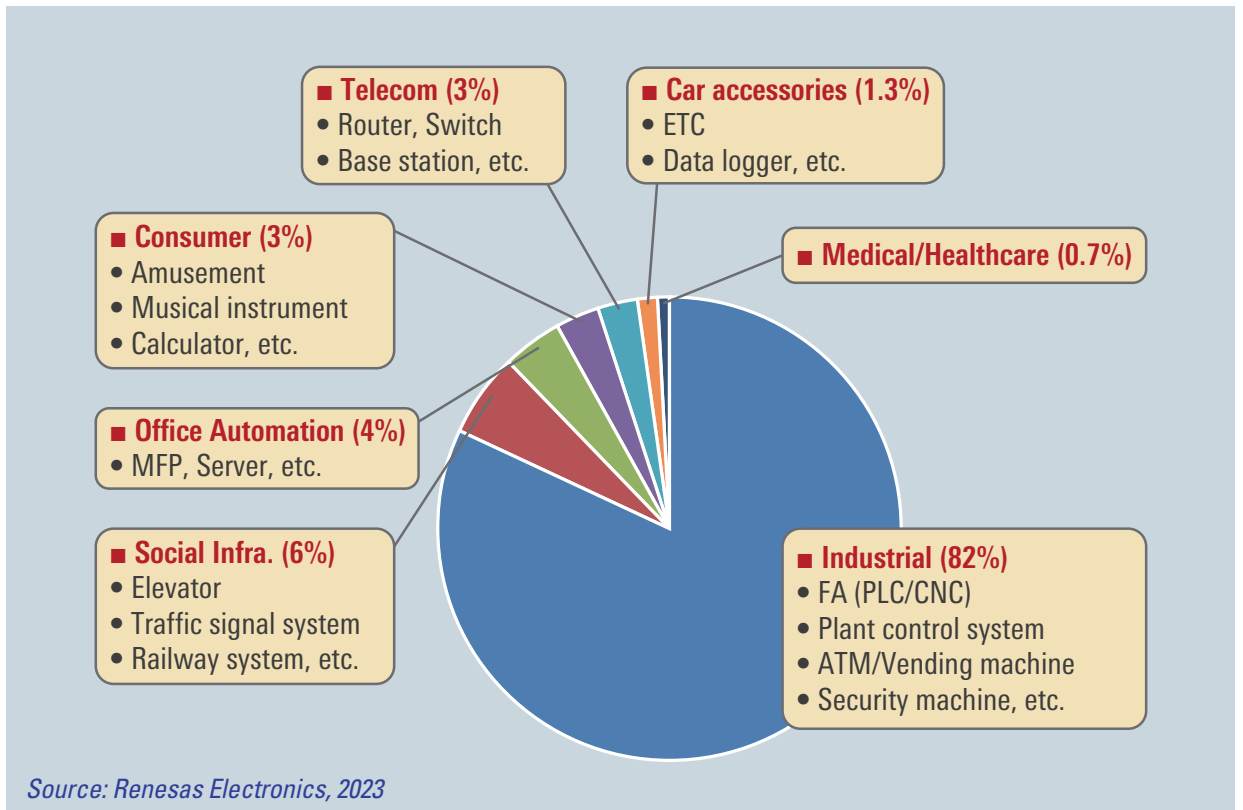
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Low Power SRAM Roadmap

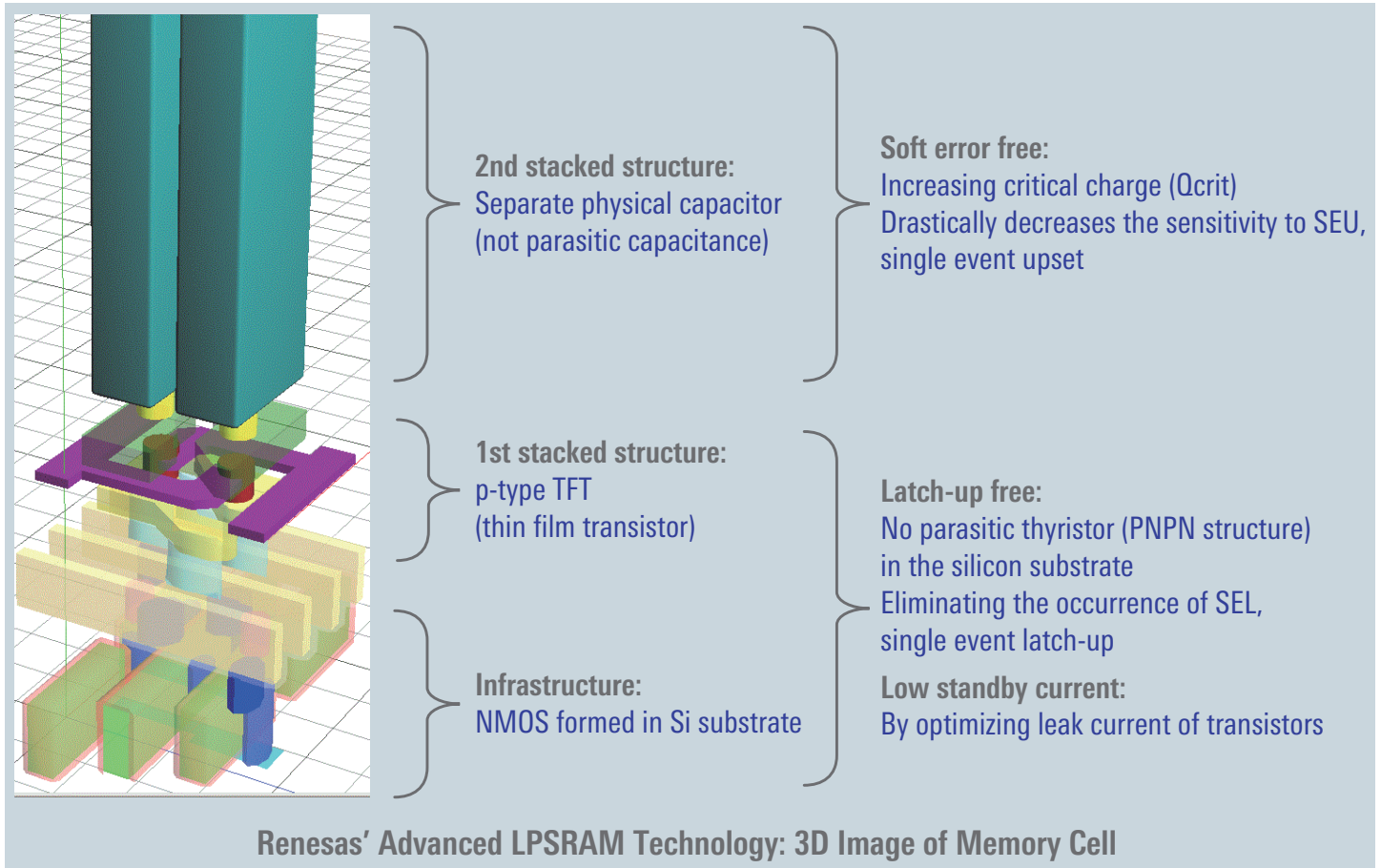
SRAM Type	Density (Voltage)	Roadmap					
		~2023	2024	2025	2026	2027	2028~
Low Power SRAM	256Kb, 1Mb (5V/3V) 2Mb (3V) 4Mb (5V)	0.15µm Advanced LPSRAM					
	4Mb (3V) 8Mb, 16Mb (3V) 32Mb, 64Mb (3V)	0.11µm Advanced LPSRAM					
	16Mb (3V) R1LV1616H series <EOL products>	0.13µm (ECC embedded)					
	16Mb (3V) RMLV1616A-U series Alternative to R1LV1616H series	0.11µm Advanced LPSRAM					
		MP: Now					

- Widest product lineup from 256Kbit to 64Mbit
- Long term and stable support
- Highest quality with Renesas core advanced technology
- Easy switch to higher density in the same package

Industry-Leading Support, Application of Renesas Low Power SRAM



Advanced Low Power SRAM Technology with Superior Performance and Reliability



Product Differentiation

Renesas supports soft error free products for entire lineup of 256Kbit to 64Mbit

✓ Production Soft error countermeasure: **Yes** **No**

Vendor	Process	256Kb	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb
Renesas	0.15μm Advanced	✓	✓	✓	✓ (5V)	Change to 0.11μm Advanced			
	0.11μm Advanced				✓ (3V)	✓	✓	✓	✓
Competitor	90nm CMOS no ECC	✓	✓	✓	✓	✓	✓	✓	✓
	65nm CMOS ECC embedded				✓	✓	✓	✓	✓

Product Benchmark

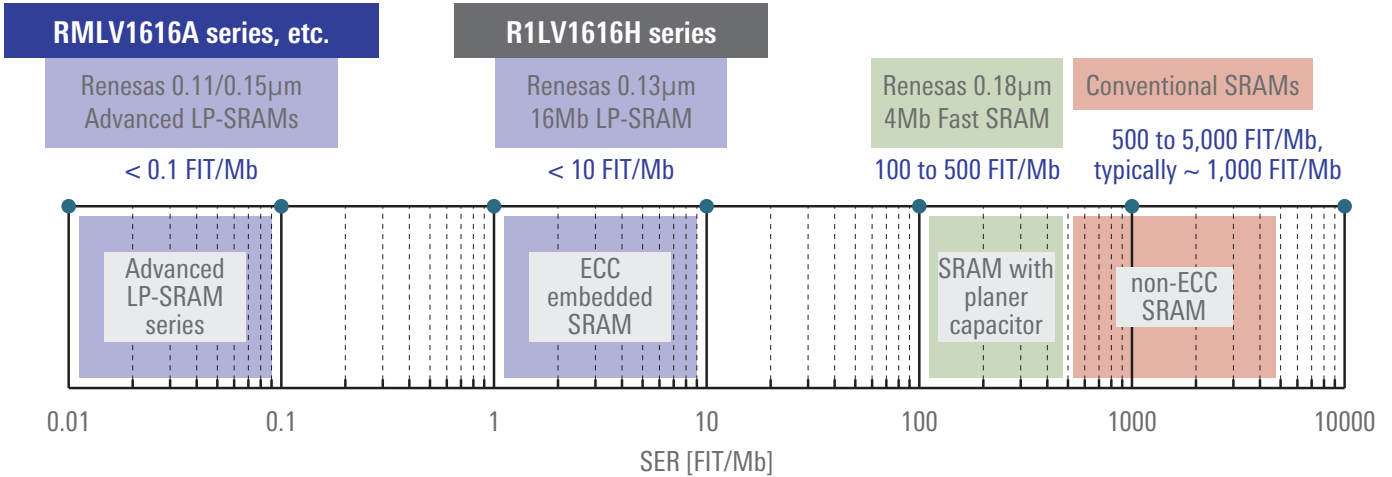
Only Renesas supports unique products that realize both lowest standby current and soft error free

vs.	Renesas 0.11μm Advanced LPSRAM	Competitor's 65nm LPSRAM (with ECC)
Standby current	0.3μA (4Mb, typ.)	3.5μA (4Mb, typ.)
vs.	Renesas 0.11μm Advanced LPSRAM	Competitor's 90nm LPSRAM (no ECC)
Soft error rate	< 0.04 FIT / Mbit	500 to 5,000 FIT / Mbit

Soft Error Rate Comparison

Advanced LPSRAM has superior Soft Error Immunity to ECC-embedded SRAMs

Product Family	Countermeasure against soft error?	By what?	Soft error rate (Measured)
Advanced LPSRAM series (0.11μm / 0.15μm)	YES	Increasing Critical Charge (Qcrit) by the proprietary technology	< 0.04 FIT/Mb [0.11μm] < 0.06 FIT/Mb [0.15μm]
R1LV1616H series <EOL> (0.13μm CMOS 16Mb)	YES	Embedded ECC	< 5.5 FIT/Mb



Logarithmic (order of $\times 10^n$) Comparison of SRAM Soft Error Rate

Package Lineup for Low Power SRAM

	SOP	TSOP-I	sTSOP	TSOP-II	μTSOP	FBGA
28-pin						
32-pin						
44-pin						x8 / x16 config.
48-pin (48-ball)						
52-pin						

■ Renesas provides 6 kinds of common packages, which are upward compatible, making it easy to expand density without changing the PCB.

Product List

Product Series	Density	Org.	Supply Voltage (V)	Access Time (ns)	Standby Current (typ.)	Temp. Range	TSOP	SOP	FBGA	μTSOP
R1LP5256E	256 Kb	x8	4.5 - 5.5	55	0.6 μA	-40°C to 85°C	✓	✓		
R1LP0108E	1 Mb	x8	4.5 - 5.5	55	0.6 μA	-40°C to 85°C	✓	✓		
R1LP0408D	4 Mb	x8	4.5 - 5.5	55	0.8 μA	-40°C to 85°C	✓	✓		
R1LV5256E	256 Kb	x8	2.7 - 3.6	55	0.6 μA	-40°C to 85°C	✓	✓		
R1LV0108E	1 Mb	x8	2.7 - 3.6	55	0.6 μA	-40°C to 85°C	✓	✓		
R1LV0208BSA	2 Mb	x8	2.7 - 3.6	55	1 μA	-40°C to 85°C	✓			
R1LV0216BSB	2 Mb	x16	2.7 - 3.6	55	1 μA	-40°C to 85°C	✓			
RMLV0408E	4 Mb	x8	2.7 - 3.6	45	0.3 μA	-40°C to 85°C	✓	✓		
RMLV0414E	4 Mb	x16	2.7 - 3.6	45	0.3 μA	-40°C to 85°C	✓			
RMLV0416E	4 Mb	x16	2.7 - 3.6	45	0.3 μA	-40°C to 85°C	✓		✓	
RMLV0808BGSB	8 Mb	x8	2.4 - 3.6	45	0.45 μA	-40°C to 85°C	✓			
RMLV0816BGBG	8 Mb	x16	2.4 - 3.6	45	0.45 μA	-40°C to 85°C			✓	
RMLV0816BGSA	8 Mb	x16	2.4 - 3.6	45	0.45 μA	-40°C to 85°C	✓			
RMLV0816BGSB	8 Mb	x16	2.4 - 3.6	45	0.45 μA	-40°C to 85°C	✓			
RMLV0816BGSD	8 Mb	x16	2.4 - 3.6	45	0.45 μA	-40°C to 85°C				✓
RMLV1616A-S	16 Mb	x16	2.7 - 3.6	55	0.5 μA	-40°C to 85°C	✓		✓	✓
RMLV1616A-U	16 Mb	x16	2.7 - 3.6	45, 55	0.4 μA	-40°C to 85°C	✓		✓	
RMLV3216A	32 Mb	x16	2.7 - 3.6	55	0.6 μA	-40°C to 85°C	✓		✓	✓
RMWV6416A	64 Mb	x16	2.7 - 3.6	55	1.2 μA	-40°C to 85°C	✓		✓	✓

Low Power SRAM Part Name Decoder

R1 LV 5256 E SA - 5 S I #B1
R1 LP 04 08 D SP - 5 S I #B1
RM LV 04 16 E G SB - 4 S 2 #A A 1

Renesas Memory
Chip Configuration
L LPSRAM, Single chip
W LPSRAM, Two chips

Operating Voltage
V 3V
P 5V

Memory Density
5256 256Kb (x8)
01 1Mb
02 2Mb
04 4Mb
08 8Mb
16 16Mb
32 32Mb
64 64Mb

Bus Width
08 x8
16 x16

Chip Generation
08 8Mb
16 16Mb
32 32Mb
64 64Mb

Industrial Grade

Package Type
SA TSOP-I (256Kb/8Mb/16Mb/32Mb/64Mb)
SB TSOP-II
SD μTSOP
SF TSOP-I (1Mb)
SP SOP (256Kb, 4Mb)
SN SOP (1Mb)

Access Time
5 55 ns
4 45 ns

Environment
A Pb free (pure-Tin plating)
C Pb free (non pure-Tin plating)

Operating Temperature
R 0 to 70°C
I -40 to 85°C
2 -40 to 85°C

Packing, Environmental

	Packing	Environmental
#B0 / #B1	Tray or Magazine	Pb free
#S0 / #S1	Tape & Reel	Pb free

Assembly Site Rev., etc.

0	Rev. Code
1	Rev. Code

Packing

A	Tray
C	Magazine
H	Tape & Reel (TSOP-II, μTSOP, SOP)
K	Tape & Reel (FBGA, TSOP-I, sTSOP)

Standby Current / Data Retention Current

S	Low power version
U	Ultra Low power version

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