RENESAS

BIG IDEAS FOR EVERY SPACE

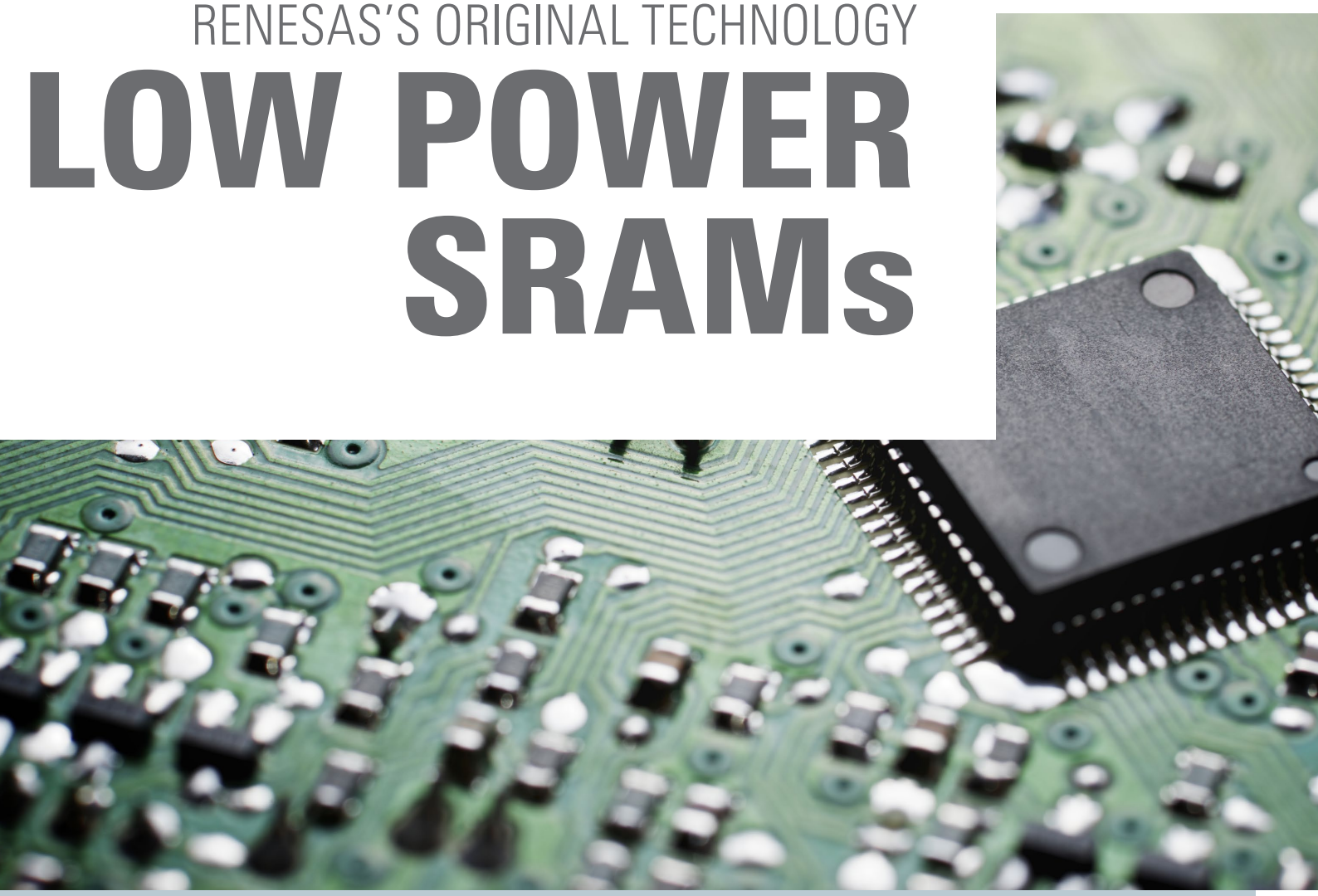
LOW POWER SRAMs

Advanced technology with superior performance and industry-leading support

2019.06

HIGH PERFORMANCE AND
HIGH RELIABILITY USING
RENESAS'S ORIGINAL TECHNOLOGY

LOW POWER SRAMs



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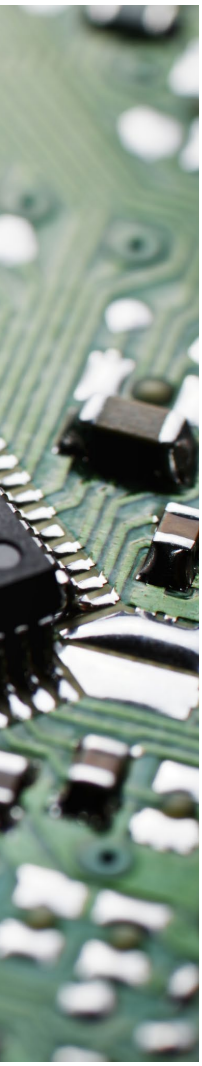


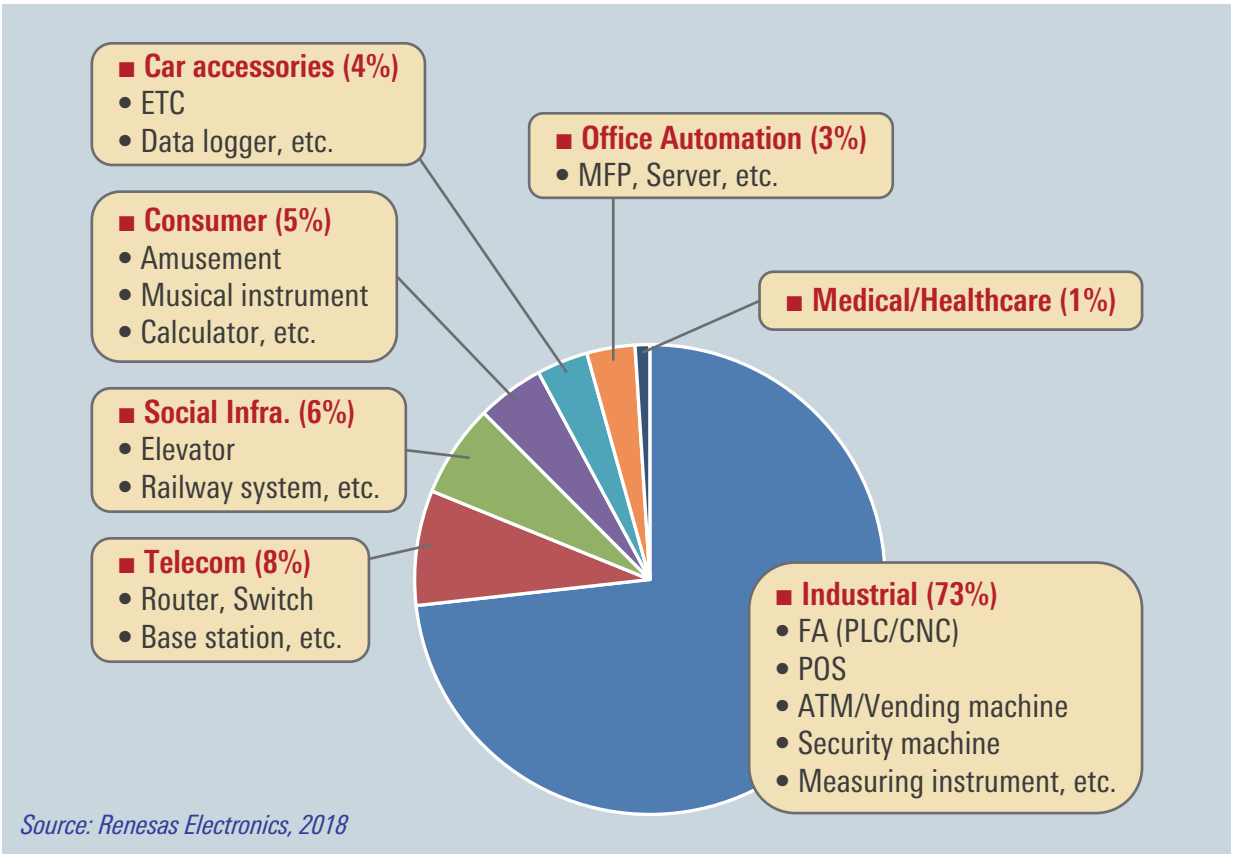
Low Power SRAM Roadmap

MP New

SRAM type	Density, Voltage	CY2018	2019	2020	2021	2122	2023
Low Power SRAM	256Kb 5V/3V, 1Mb 5V/3V, 2Mb 3V, 4Mb 5V	0.15µm Advanced LPSRAM					
	4Mb 3V, 8Mb 3V, 16Mb 3V, 32Mb 3V(16Mbx2)	0.11µm Advanced LPSRAM					
	16Mb 3V	0.13µm CMOS (ECC embedded)					
	32Mb 3V	0.15µm	0.11µm Advanced LPSRAM				
	64Mb 3V	0.15µm	0.11µm Advanced LPSRAM				

- 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

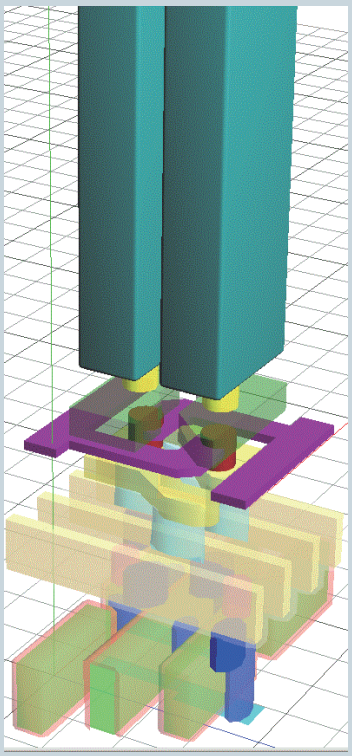
Industry-Leading Support, Application of Renesas Low Power SRAM



Source: Renesas Electronics, 2018

Advanced Low Power SRAM Technology with Superior Performance and Reliability

- Low standby current
- High reliability
  - –Soft error free
  - –Latch-up free



2nd stacked structure:
Separate physical capacitor
(not parasitic capacitance)

Soft error free:
Stores larger amount of charge

1st stacked structure:
p-type TFT
(thin film transistor)

Latch-up free:
No parasitic PNPN-structure
in the substrate

Infrastructure:
NMOS formed in Si substrate

Low standby current:
Optimized leakage current
of transistors

Renesas' Advanced LPSRAM Technology: 3D Image of Memory Cell

Product Differentiation

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

✓ Production Soft error countermeasure: Yes No

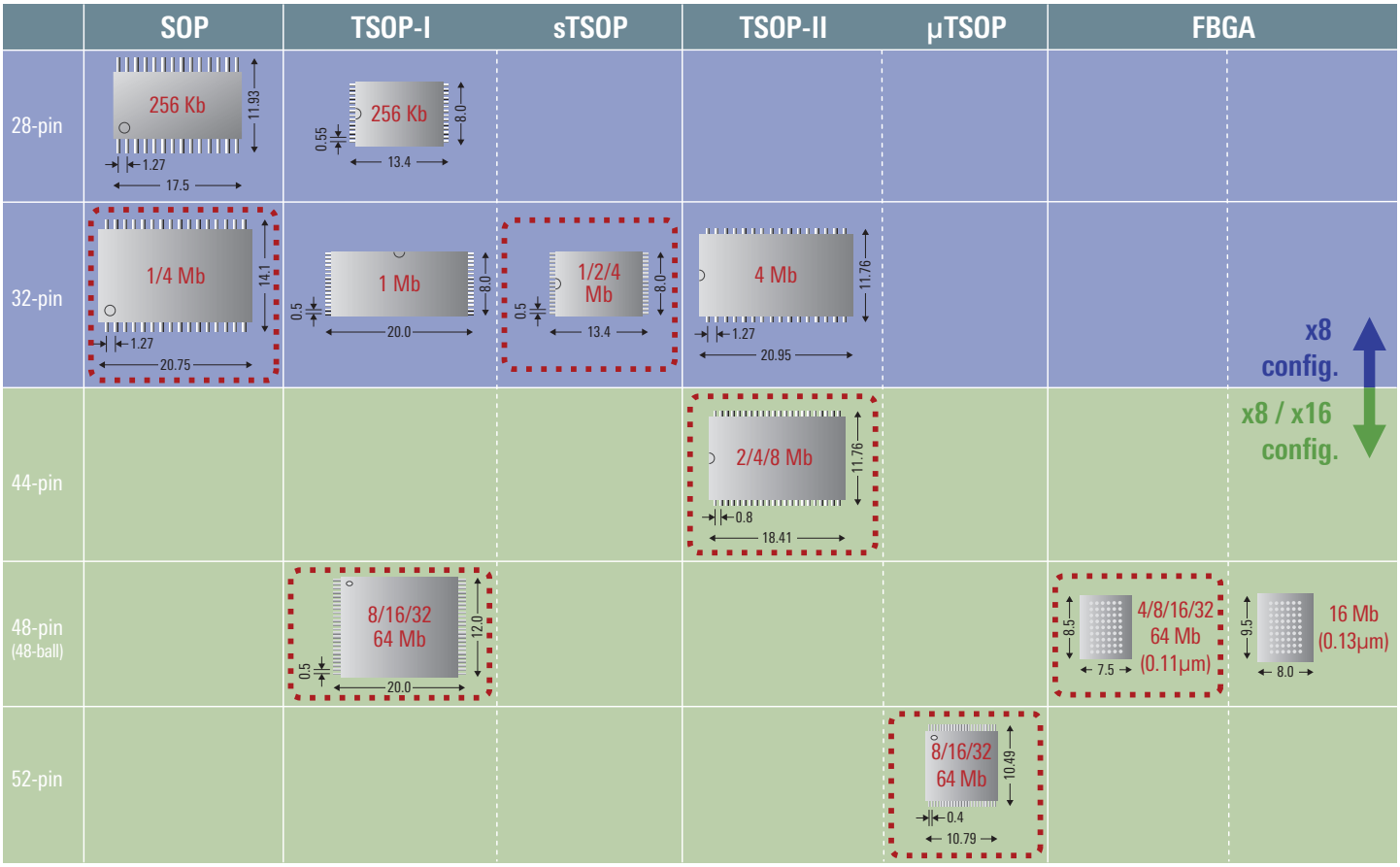
Vendor	Process	256Kb	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb
Renesas	0.13µm CMOS ECC embedded						✓		
	0.15µm Advanced	✓	✓	✓	✓ (5V)	Change to 0.11µm Advanced			✓
	0.11µm Advanced				✓ (3V)	✓	✓	✓	Development
Competitor	90nm CMOS no ECC	✓	✓	✓	✓	✓	✓	✓	✓
	65nm CMOS ECC embedded				✓	✓	✓	Development	Development

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	**0.5µA (16Mb, typ.)**	5.5µA (16Mb, typ.)
vs.	**Renesas 0.11µm Advanced LPSRAM**	**Competitor's 90nm LPSRAM (no ECC)**
Soft error rate	**< 0.1 FIT / Mbit**	500 to 1,000 FIT / Mbit

Package Lineup for Low Power SRAM



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

Low Power SRAM Part Name Decoder

R1 L V 5256 E SA - 5 S I #B1
R1 L P 04 08 D SP - 5 S I #B0

RM L V 04 16 E G SB - 4 S 2 #A A 1

Packing, Environmental

	Packing	Environmental
#B0 / #B1	Tray or Tube	Pb free
#S0 / #S1	Embossed Tape	Pb free

Assembly Site Rev., etc.

0	Rev. Code
1	Rev. Code

Environment

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

Packing

A	Tray
C	Tube
H	Embossed Tape (TSOP, µTSOP, SOP)
K	Embossed Tape (FBGA, sTSOP)

Renesas Memory

Chip Configuration

L	LPSRAM, Single chip
W	LPSRAM, Two chips

Operating Voltage

V	3V
P	5V

Operating Temperature

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

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

Industrial Grade

Standby Current / Data Retention Current

L	Standard
S	Low power version

Access Time

5	55 ns
4	45 ns

Package Type

SA	TSOP-I (256Kb/8Mb/16Mb/32Mb/64Mb) sTSOP (1Mb/2Mb/4Mb)
SB	TSOP-II
SD	µTSOP
SF	TSOP-I (1Mb)
SP	SOP (256Kb, 4Mb)
SN	SOP (1Mb)
BG	FBGA

Product List

Process	Density	Configuration	Part Name	Package	Access Time	Voltage	Temperature
0.15µm Advanced	256Kbit	32K x 8	R1LP5256ESP	SOP (28)	55ns	4.5V to 5.5V	-40 to 85°C
			R1LP5256ESA	TSOP-I (28)	55ns	4.5V to 5.5V	-40 to 85°C
			R1LV5256ESP	SOP (28)	55ns	2.7V to 3.6V	-40 to 85°C
			R1LV5256ESA	TSOP-I (28)	55ns	2.7V to 3.6V	-40 to 85°C
0.15µm Advanced	1Mbit	128K x 8	R1LP0108ESN	SOP (32)	55ns	4.5V to 5.5V	-40 to 85°C
			R1LP0108ESF	TSOP-I (32)	55ns	4.5V to 5.5V	-40 to 85°C
			R1LP0108ESA	sTSOP (32)	55ns	4.5V to 5.5V	-40 to 85°C
			R1LV0108ESN	SOP (32)	55ns	2.7V to 3.6V	-40 to 85°C
			R1LV0108ESF	TSOP-I (32)	55ns	2.7V to 3.6V	-40 to 85°C
			R1LV0108ESA	sTSOP (32)	55ns	2.7V to 3.6V	-40 to 85°C
0.15µm Advanced	2Mbit	256K x 8	R1LV0208BSA	sTSOP (32)	55ns	2.7V to 3.6V	-40 to 85°C
		128K x 16	R1LV0216BSB	TSOP-II (44)	55ns	2.7V to 3.6V	-40 to 85°C
0.15µm Advanced	4Mbit	512K x 8	R1LP0408DSP	SOP (32)	55ns	4.5V to 5.5V	-40 to 85°C
			R1LP0408DSB	TSOP-II (32)	55ns	4.5V to 5.5V	-40 to 85°C
0.11µm Advanced	4Mbit	512K x 8	RMLV0408EGSP	SOP (32)	45ns	2.7V to 3.6V	-40 to 85°C
			RMLV0408EGSB	TSOP-II (32)	45ns	2.7V to 3.6V	-40 to 85°C
			RMLV0408EGSA	sTSOP (32)	45ns	2.7V to 3.6V	-40 to 85°C
		256K x 16	RMLV0414EGSB	TSOP-II (44)	45ns	2.7V to 3.6V	-40 to 85°C
			RMLV0416EGSB	TSOP-II (44)	45ns	2.7V to 3.6V	-40 to 85°C
			RMLV0416EGBG	FBGA (48)	45ns	2.7V to 3.6V	-40 to 85°C
0.11µm Advanced	8Mbit	1M x 8	RMLV0808BGSB	TSOP-II (44)	45ns	2.7V to 3.6V	-40 to 85°C
					55ns	2.4V to 3.6V	-40 to 85°C
		512K x 16	RMLV0816BGSB	TSOP-II (44)	45ns	2.7V to 3.6V	-40 to 85°C
					55ns	2.4V to 3.6V	-40 to 85°C
			RMLV0816BGBG	FBGA (48)	45ns	2.7V to 3.6V	-40 to 85°C
					55ns	2.4V to 3.6V	-40 to 85°C
		512K x 16 / 1M x 8	RMLV0816BGSA	TSOP-I (48)	45ns	2.7V to 3.6V	-40 to 85°C
					55ns	2.4V to 3.6V	-40 to 85°C
			RMLV0816BGSD	µTSOP (52)	45ns	2.7V to 3.6V	-40 to 85°C
					55ns	2.4V to 3.6V	-40 to 85°C
0.13µm CMOS	16Mbit (with ECC)	1M x 16 / 2M x 8	R1LV1616HSA	TSOP-I (48)	45ns	2.7V to 3.6V	-40 to 85°C
		1M x 16	R1LV1616HBG	FBGA (48)	45ns	2.7V to 3.6V	-40 to 85°C
0.11µm Advanced	16Mbit	1M x 16 / 2M x 8	RMLV1616AGSA	TSOP-I (48)	55ns	2.7V to 3.6V	-40 to 85°C
			RMLV1616AGSD	µTSOP (52)	55ns	2.7V to 3.6V	-40 to 85°C
		1M x 16	RMLV1616AGBG	FBGA (48)	55ns	2.7V to 3.6V	-40 to 85°C
0.11µm Advanced	32Mbit	2M x 16 / 4M x 8	RMLV3216AGSA	TSOP-I (48)	55ns	2.7V to 3.6V	-40 to 85°C
			RMLV3216AGSD	µTSOP (52)	55ns	2.7V to 3.6V	-40 to 85°C
		2M x 16	RMLV3216AGBG	FBGA (48)	55ns	2.7V to 3.6V	-40 to 85°C
0.11µm Advanced	32Mbit	2M x 16	RMWV3216AGBG	FBGA (48)	55ns	2.7V to 3.6V	-40 to 85°C
0.11µm Advanced	64Mbit	4M x 16 / 8M x 8	RMWV6416AGSA	TSOP-I (48)	55ns	2.7V to 3.6V	-40 to 85°C
			RMWV6416AGSD	µTSOP (52)	55ns	2.7V to 3.6V	-40 to 85°C
		4M x 16	RMWV6416AGBG	FBGA (48)	55ns	2.7V to 3.6V	-40 to 85°C

MEMO

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SALES OFFICES

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Renesas Electronics Corporation
TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan

Renesas Electronics America Inc.
1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.
Tel: +1-408-432-8888, Fax: +1-408-434-5351

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 101-T01, Floor 1, Building 7, Yard No. 7, 8th Street, Shangdi, Haidian District, Beijing 100085, China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai 200333, China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit No 3A-1 Level 3A Tower 8 UOA Business Park, No 1 Jalan Pengaturcara U1/51A, Seksyen U1, 40150 Shah Alam, Selangor, Malaysia
Tel: +60-3-5022-1288, Fax: +60-3-5022-1290

Renesas Electronics India Pvt. Ltd.
No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India
Tel: +91-80-67208700

Renesas Electronics Korea Co., Ltd.
17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5338

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