

R1LP0408D Series

4Mb Advanced LPSRAM (512-kword × 8-bit)

R10DS0274EJ0100
Rev.1.00
2017.1.27

Description

The R1LP0408D Series is a family of 4-Mbit static RAMs organized 512-kword × 8-bit, fabricated by Renesas's high-performance CMOS and TFT technologies. The R1LP0408D Series has realized higher density, higher performance and low power consumption. The R1LP0408D Series offers low power standby power dissipation; therefore, it is suitable for battery backup systems. It is offered in 32-pin SOP and 32-pin TSOP.

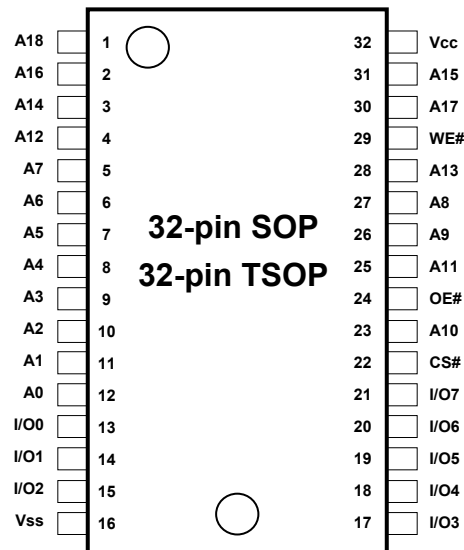
Features

- Single 5V supply: 4.5V to 5.5V
- Access time: 55ns (max.)
- Power dissipation:
 - Standby: 4μW (typ.)
- Equal access and cycle times
- Common data input and output
 - Three state output
- Directly TTL compatible
 - All inputs and outputs
- Battery backup operation

Ordering Information

Orderable part name	Access time	Temperature range	Package	Shipping container
R1LP0408DSP-5SI#B0	55 ns	-40 ~ +85°C	525-mil 32-pin plastic SOP	Tube (Magazine)
R1LP0408DSP-5SI#S0				Embossed tape
R1LP0408DSB-5SI#B1			400-mil 32-pin plastic TSOP (II)	Tray
R1LP0408DSB-5SI#S1				Embossed tape

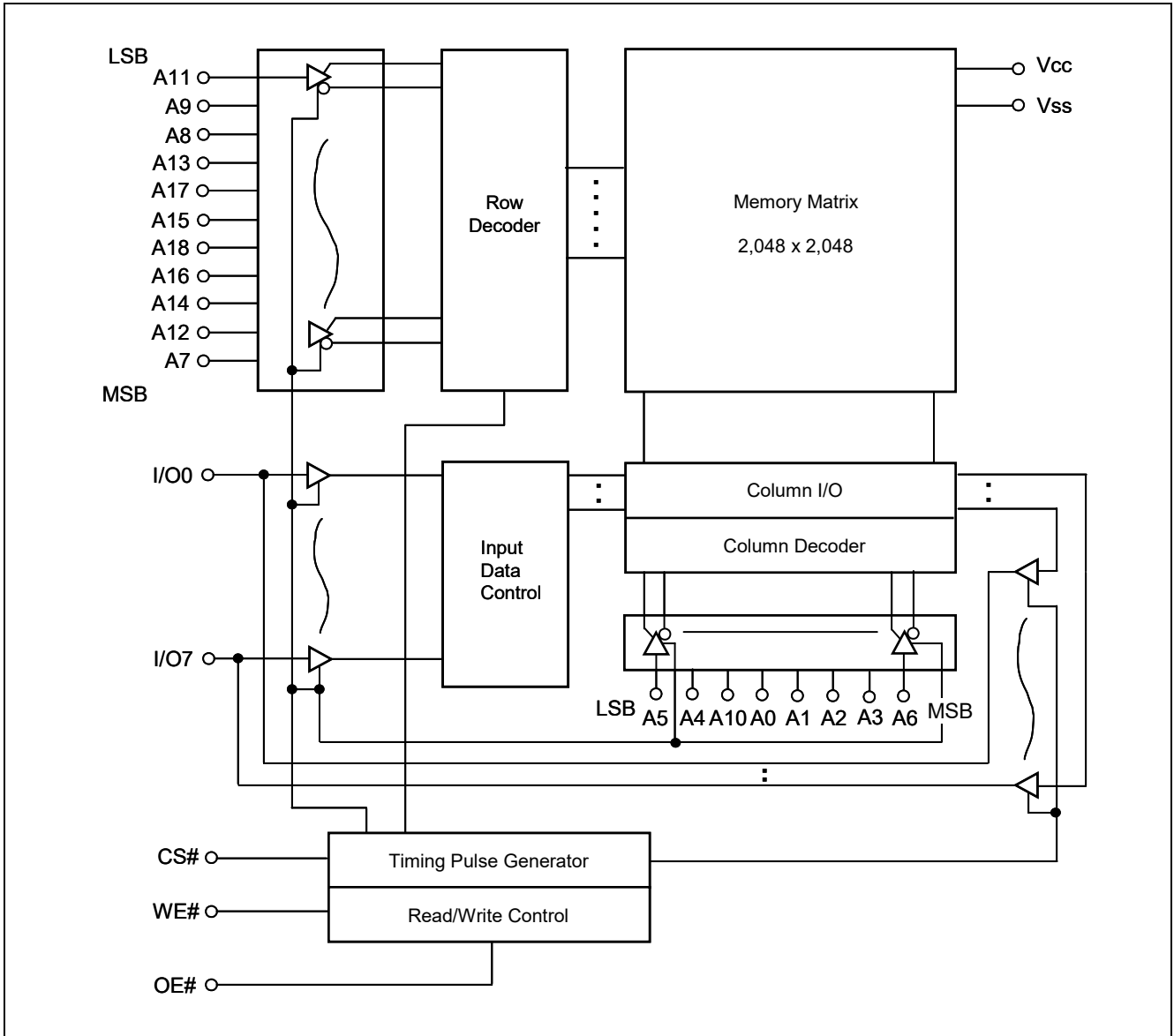
Pin Arrangement



Pin Description

Pin name	Function
Vcc	Power supply
Vss	Ground
A0 to A18	Address input
I/O0 to I/O7	Data input/output
CS#	Chip select
WE#	Write enable
OE#	Output enable

Block Diagram



Operation Table

WE#	CS#	OE#	Mode	Vcc current	I/O0 to I/O7	Ref. cycle
x	H	x	Not selected	I_{SB}, I_{SB1}	High-Z	—
H	L	H	Output disable	I_{CC}	High-Z	—
H	L	L	Read	I_{CC}	Dout	Read cycle
L	L	H	Write	I_{CC}	Din	Write cycle (1)
L	L	L	Write	I_{CC}	Din	Write cycle (2)

Note 1. H: V_{IH} L: V_{IL} x: V_{IH} or V_{IL}

Absolute Maximum Ratings

Parameter	Symbol	Value	unit
Power supply voltage relative to Vss	Vcc	-0.5 to +7.0	V
Terminal voltage on any pin relative to Vss	V_T	-0.5^{*1} to $V_{CC}+0.3^{*2}$	V
Power dissipation	P_T	0.7	W
Operation temperature	T_{opr}	-40 to +85	°C
Storage temperature range	T_{stg}	-65 to 150	°C
Storage temperature range under bias	T_{bias}	-40 to +85	°C

Note 1. -3.0V for pulse \leq 30ns (full width at half maximum)
 2. Maximum voltage is +7.0V.

DC Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage	V _{CC}	4.5	5.0	5.5	V	
	V _{SS}	0	0	0	V	
Input high voltage	V _{IH}	2.2	—	V _{CC} +0.3	V	
Input low voltage	V _{IL}	-0.3	—	0.8	V	1
Ambient temperature range	T _a	-40	—	+85	°C	

Note 1. -3.0V for pulse ≤ 30ns (full width at half maximum)

DC Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions	
Input leakage current	I _{LI}	—	—	1	μA	V _{in} = V _{SS} to V _{CC}	
Output leakage current	I _{LO}	—	—	1	μA	CS# = V _{IH} or OE# = V _{IH} , VI/O = V _{SS} to V _{CC}	
Operating current	I _{CC}	—	5 ^{*1}	10	mA	CS# = V _{IL} , Others = V _{IH} /V _{IL} , I _{I/O} = 0mA	
Average operating current	I _{CC1}	—	15 ^{*1}	25	mA	Min. cycle, duty = 100%, I _{I/O} = 0mA, CS# = V _{IL} , Others = V _{IH} /V _{IL}	
	I _{CC2}	—	3 ^{*1}	5	mA	Cycle = 1μs, duty = 100%, I _{I/O} = 0mA, CS# ≤ 0.2V, V _{IH} ≥ V _{CC} -0.2V, V _{IL} ≤ 0.2V	
Standby current	I _{SB}	—	0.1 ^{*1}	0.5	mA	CS# = V _{IH} , Others = V _{SS} to V _{CC}	
Standby current	I _{SB1}	—	0.8 ^{*1}	2.5	μA	~+25°C	V _{in} = V _{SS} to V _{CC} , CS# ≥ V _{CC} -0.2V
		—	1 ^{*2}	3	μA	~+40°C	
		—	—	8	μA	~+70°C	
		—	—	10	μA	~+85°C	
Output high voltage	V _{OH}	2.4	—	—	V	I _{OH} = -1mA	
	V _{OH2}	V _{CC} -0.5	—	—	V	I _{OH} = -0.1mA	
Output low voltage	V _{OL}	—	—	0.4	V	I _{OL} = 2.1mA	

Note 1. Typical parameter indicates the value for the center of distribution at 5.0V (T_a=25°C), and not 100% tested.
2. Typical parameter indicates the value for the center of distribution at 5.0V (T_a=40°C), and not 100% tested.

Capacitance

(V_{CC} = 4.5V ~ 5.5V, f = 1MHz, T_a = -40 ~ +85°C)

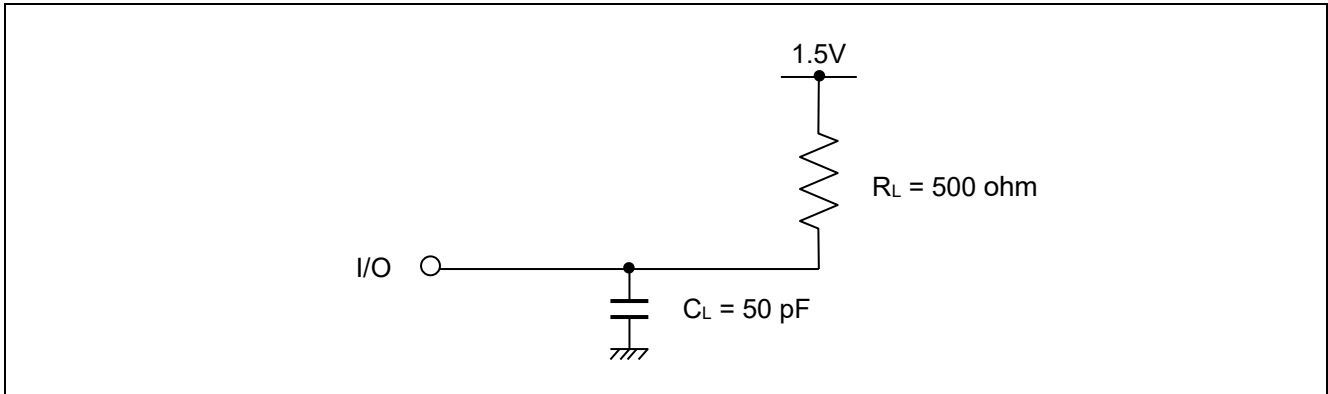
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions	Note
Input capacitance	C _{in}	—	—	8	pF	V _{in} = 0V	1
Input / output capacitance	C _{I/O}	—	—	10	pF	VI/O = 0V	1

Note 1. This parameter is sampled and not 100% tested.

AC Characteristics

Test Conditions ($V_{CC} = 4.5V \sim 5.5V$, $T_a = -40 \sim +85^{\circ}C$)

- Input pulse levels: $V_{IL} = 0.4V$, $V_{IH} = 2.4V$
- Input rise and fall time: 5ns
- Input and output timing reference level: 1.5V
- Output load: See figures (Including scope and jig)



Read Cycle

Parameter	Symbol	Min.	Max.	Unit	Note
Read cycle time	t _{RC}	55	—	ns	
Address access time	t _{AA}	—	55	ns	
Chip select access time	t _{ACS}	—	55	ns	
Output enable to output valid	t _{OE}	—	25	ns	
Chip select to output in low-Z	t _{CLZ}	10	—	ns	2
Output enable to output in low-Z	t _{OLZ}	5	—	ns	2
Chip deselect to output in high-Z	t _{CHZ}	0	20	ns	1,2
Output disable to output in high-Z	t _{OHZ}	0	20	ns	1,2
Output hold from address change	t _{OH}	10	—	ns	

Write Cycle

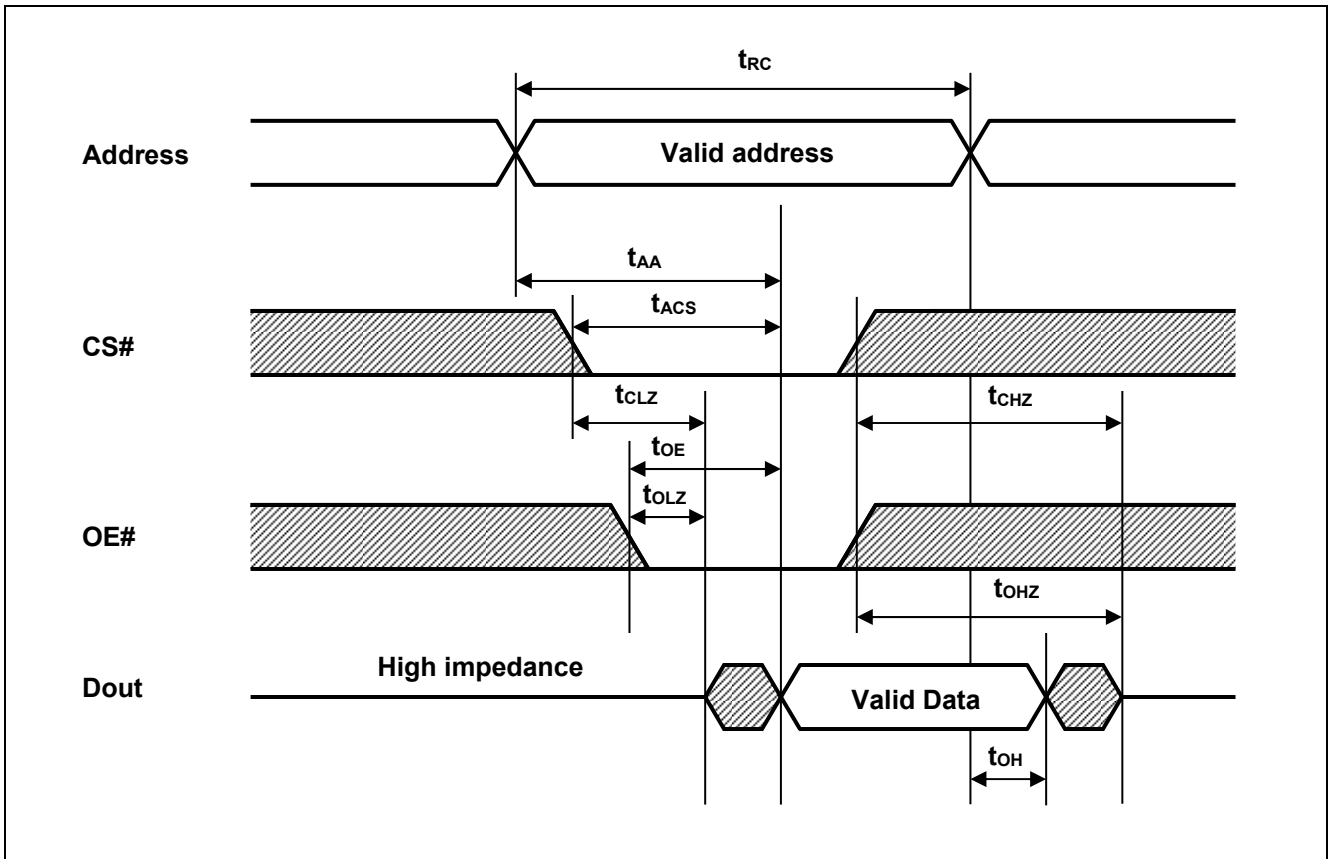
Parameter	Symbol	Min.	Max.	Unit	Note
Write cycle time	t _{WC}	55	—	ns	
Chip select to end of write	t _{CW}	50	—	ns	4
Address setup time	t _{AS}	0	—	ns	5
Address valid to end of write	t _{AW}	50	—	ns	
Write pulse width	t _{WP}	40	—	ns	3,12
Write recovery time	t _{WR}	0	—	ns	6
Write to output in high-Z	t _{WHZ}	0	20	ns	1,2,7
Data to write time overlap	t _{DW}	25	—	ns	
Data hold from write time	t _{DH}	0	—	ns	
Output enable from end of write	t _{OW}	5	—	ns	2
Output disable to output in high-Z	t _{OHZ}	0	20	ns	1,2,7

- Note
- t_{CHZ}, t_{OHZ} and t_{WHZ} are defined as the time at which the outputs achieve the open circuit conditions and are not referred to output voltage levels.
 - This parameter is sampled and not 100% tested.
 - A write occurs during the overlap (t_{WP}) of a low CS# and a low WE#.
A write begins at the later transition of CS# going low or WE# going low.
A write ends at the earlier transition of CS# going high or WE# going high.
t_{WP} is measured from the beginning of write to the end of write.
 - t_{CW} is measured from CS# going low to end of write.
 - t_{AS} is measured the address valid to the beginning of write.
 - t_{WR} is measured from the earlier of WE# or CS# going high to the end of write cycle.
 - During this period, I/O pins are in the output state so that the input signals of the opposite phase to the outputs must not be applied.
 - If the CS# low transition occurs simultaneously with the WE# low transition or after the WE# transition, the output remain in a high impedance state.
 - Dout is the same phase of the write data of this write cycle.
 - Dout is the read data of next address.
 - If CS# is low during this period, I/O pins are in the output state. Therefore, the input signals of the opposite phase to the outputs must not be applied to them.
 - In the write cycle with OE# low fixed, t_{WP} must satisfy the following equation to avoid a problem of data bus contention.

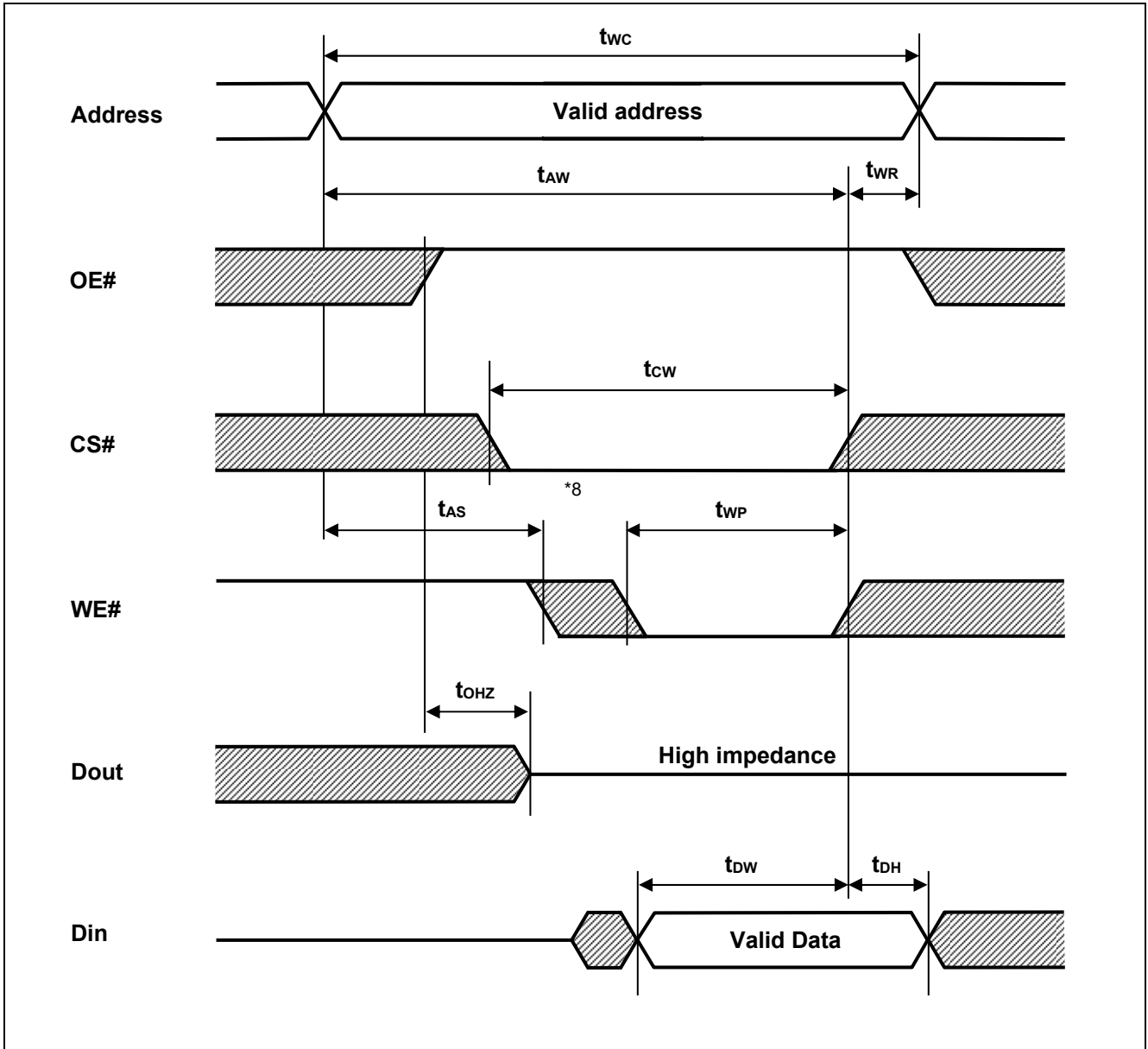
$$t_{WP} \geq t_{DW \text{ min}} + t_{WHZ \text{ max}}$$

Timing Waveforms

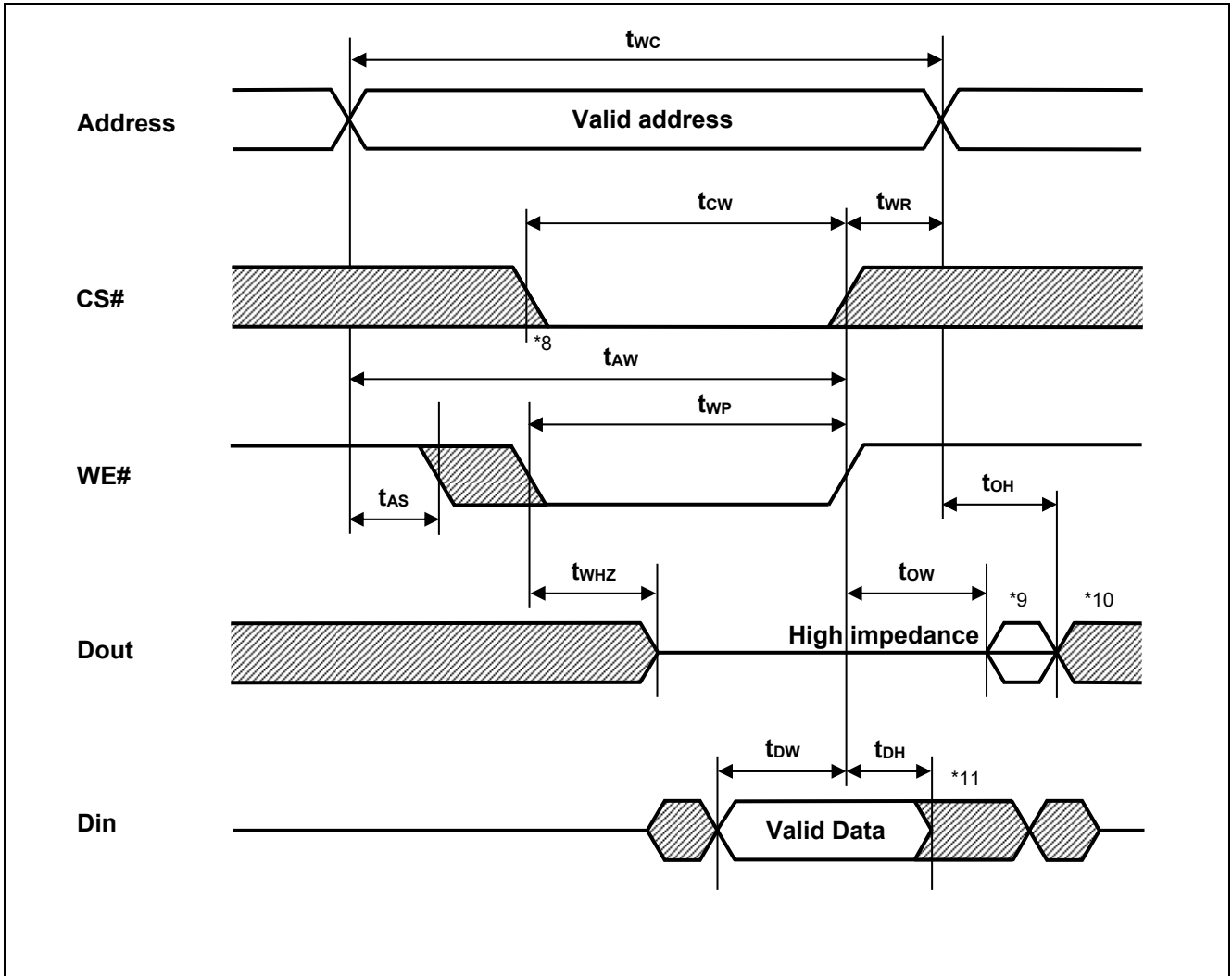
Read Cycle (WE# = V_{IH})



Write Cycle (1) (OE# CLOCK)



Write Cycle (2) (OE# Low Fixed)

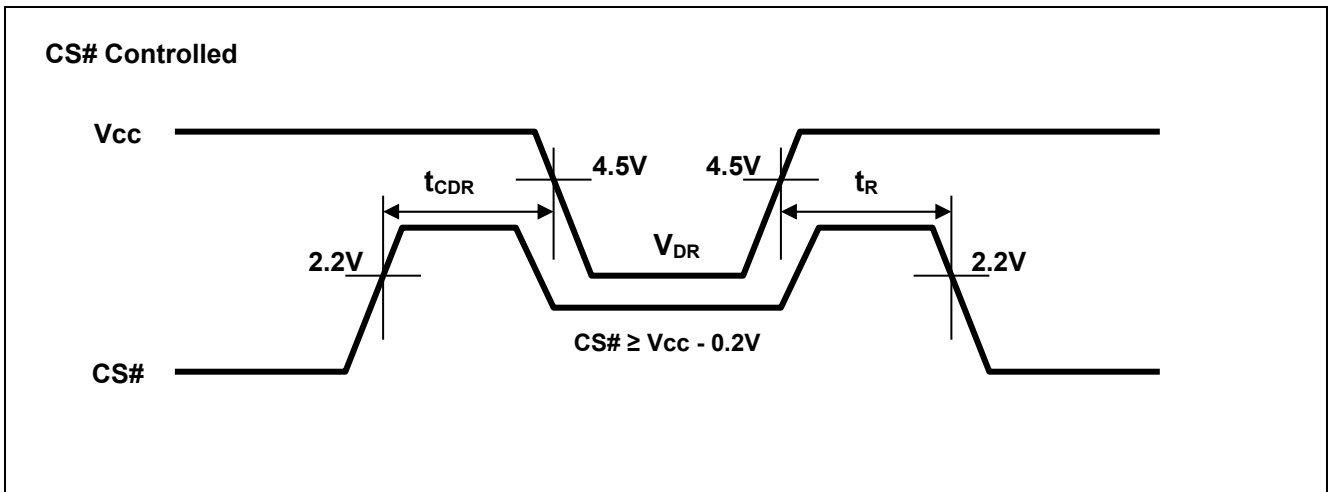


Low Vcc Data Retention Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions ^{*3}	
V _{CC} for data retention	V _{DR}	2.0	—	5.5	V	V _{in} ≥ 0V, CS# ≥ V _{CC} -0.2V	
Data retention current	I _{CCDR}	—	0.8 ^{*1}	2.5	μA	~+25°C	V _{CC} =3.0V, V _{in} ≥ 0V, CS# ≥ V _{CC} -0.2V
		—	1 ^{*2}	3	μA	~+40°C	
		—	—	8	μA	~+70°C	
		—	—	10	μA	~+85°C	
Chip deselect time to data retention	t _{CDR}	0	—	—	ns	See retention waveform.	
Operation recovery time	t _R	5	—	—	ms		

- Note
1. Typical parameter indicates the value for the center of distribution at 3.0V (T_a=25°C), and not 100% tested.
 2. Typical parameter indicates the value for the center of distribution at 3.0V (T_a=40°C), and not 100% tested.
 3. CS# controls address buffer, WE# buffer, OE# buffer and Din buffer. If data retention mode, V_{in} levels (address, WE#, OE#, I/O) can be in the high impedance state.

Low Vcc Data Retention Timing Waveforms



Revision History	R1LP0408D Series Data Sheet
------------------	-----------------------------

Rev.	Date	Description	
		Page	Summary
1.00	2017.1.27	—	First Edition issued

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other disputes involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawing, chart, program, algorithm, application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copy or otherwise misappropriation of Renesas Electronics products.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.
"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots etc.
"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.
Renesas Electronics products are neither intended nor authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems, surgical implantations etc.), or may cause serious property damages (space and undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for which the product is not intended by Renesas Electronics.
6. When using the Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat radiation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions or failure or accident arising out of the use of Renesas Electronics products beyond such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please ensure to implement safety measures to guard them against the possibility of bodily injury, injury or damage caused by fire, and social damage in the event of failure or malfunction of Renesas Electronics products, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures by your own responsibility as warranty for your products/system. Because the evaluation of microcomputer software alone is very difficult and not practical, please evaluate the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please investigate applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive carefully and sufficiently and use Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall not use Renesas Electronics products or technologies for (1) any purpose relating to the development, design, manufacture, use, stockpiling, etc., of weapons of mass destruction, such as nuclear weapons, chemical weapons, or biological weapons, or missiles (including unmanned aerial vehicles (UAVs)) for delivering such weapons, (2) any purpose relating to the development, design, manufacture, or use of conventional weapons, or (3) any other purpose of disturbing international peace and security, and you shall not sell, export, lease, transfer, or release Renesas Electronics products or technologies to any third party whether directly or indirectly with knowledge or reason to know that the third party or any other party will engage in the activities described above. When exporting, selling, transferring, etc., Renesas Electronics products or technologies, you shall comply with any applicable export control laws and regulations promulgated and administered by the governments of the countries asserting jurisdiction over the parties or transactions.
10. Please acknowledge and agree that you shall bear all the losses and damages which are incurred from the misuse or violation of the terms and conditions described in this document, including this notice, and hold Renesas Electronics harmless, if such misuse or violation results from your resale or making Renesas Electronics products available any third party.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.
(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.
(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.3.0-1 November 2016)



SALES OFFICES

Renesas Electronics Corporation

<http://www.renesas.com>

Refer to "<http://www.renesas.com/>" for the latest and detailed information.

Renesas Electronics America Inc.

2801 Scott Boulevard Santa Clara, CA 95050-2549, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited

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

Renesas Electronics Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-585-100, Fax: +44-1628-585-900

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 1709, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100191, P.R.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, P. R. China 200333
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 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics India Pvt. Ltd.

No.777C, 100 Feet Road, HAL II Stage, Indiranagar, Bangalore, India
Tel: +91-80-67208700, Fax: +91-80-67208777

Renesas Electronics Korea Co., Ltd.

12F., 234 Teheran-ro, Gangnam-Gu, Seoul, 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [SRAM](#) category:

Click to view products by [Renesas](#) manufacturer:

Other Similar products are found below :

[5962-8855206XA](#) [CY6116A-35DMB](#) [CY7C128A-45DMB](#) [CY7C1461KV33-133AXI](#) [CY7C199-45LMB](#) [GS8161Z36DD-200I](#) [GS88237CB-200I](#) [R1QDA7236ABB-20IB0](#) [RMLV0408EGSB-4S2#AA0](#) [IS64WV3216BLL-15CTLA3](#) [IS66WVE4M16ECLL-70BLI](#) [PCF8570P](#) [K6T4008C1B-GB70](#) [CY7C1353S-100AXC](#) [AS6C8016-55BIN](#) [AS7C164A-15PCN](#) [515712X](#) [IS62WV51216EBLL-45BLI](#) [IS63WV1288DBLL-10HLI](#) [IS66WVE2M16ECLL-70BLI](#) [47L16-E/SN](#) [IS66WVE4M16EALL-70BLI](#) [IS62WV6416DBLL-45BLI](#) [IS61WV102416DBLL-10TLI](#) [CY7C1381KV33-100AXC](#) [CY7C1381KV33-100BZXI](#) [CY7C1373KV33-100AXC](#) [CY7C1381KVE33-133AXI](#) [CY7C4042KV13-933FCXC](#) [8602501XA](#) [5962-3829425MUA](#) [5962-8855206YA](#) [5962-8866201XA](#) [5962-8866201YA](#) [5962-8866204TA](#) [5962-8866206MA](#) [5962-8866207NA](#) [5962-8866208UA](#) [5962-8872502XA](#) [5962-8959836MZA](#) [5962-8959841MZA](#) [5962-9062007MXA](#) [5962-9161705MXA](#) [N08L63W2AB7I](#) [7130LA100PDG](#) [GS81284Z36B-250I](#) [M38510/28902BVA](#) [5962-8971203XA](#) [5962-8971202ZA](#) [5962-8872501LA](#)