

- ◇ STRUCTURE Silicon Monolithic Integrated Circuit
- ◇ PRODUCT I<sup>2</sup>C BUS Serial EEPROMs
- ◇ SERIES ADVANTAGE SERIES
- ◇ FAMILY BR24C□□ family
- ◇ TYPE Supply voltage 1.8V~5.5V/Operating temperature -40°C~+85°Ctype
- ◇ PART NUMBER BR24C□□-10□U-1.8

PART NUMBER	PACKAGE	DENSITY
BR24C01A -10SU-1.8	8-lead JEDECSOIC	1Kbit
BR24C02N -10SU-1.8		2Kbit
BR24C04N -10SU-1.8		4Kbit
BR24C08AN -10SU-1.8		8Kbit
BR24C16AN -10SU-1.8		16Kbit
BR24C32AN -10SU-1.8		32Kbit
BR24C01A -10TU-1.8	8-lead TSSOP	1Kbit
BR24C02 -10TU-1.8		2Kbit
BR24C04 -10TU-1.8		4Kbit
BR24C08A -10TU-1.8		8Kbit
BR24C16A -10TU-1.8		16Kbit
BR24C32A -10TU-1.8		32Kbit

- ◇ FEATURE Two wire serial interface  
Endurance : 1,000,000 erase/write cycles  
Data retention : 100years  
Initial Data FFh in all address

◇ ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Rating	Unit
Operating Temperature	Topr	-40~85	°C
Storage Temperature	Tstg	-65~125	°C
Voltage on Any Pin with Respect to Ground	-	-0.3~Vcc+0.3	V
Maximum Operating Voltage	Vcc	-0.3~6.5	V

◇ POWER DISSIPATION (Ta=25°C)

PACKAGE	Rating	Unit
8-lead JEDECSOIC	450 *1	mW
8-lead TSSOP	330 *2	mW

\* Degradation is done at 4.5mW/°C(\*1), 3.3mW/°C(\*2)for operation above 25°C

◇ DC OPERATING CHARACTERISTICS

BR24C01A/02/04/08A/16A.Unless otherwise specified,V<sub>CC</sub>=1.8V to 5.5V, T<sub>a</sub>=-40°C to 85°C

Parameter	Symbol	Min	Max	Unit	Test Conditions
Supply Current V <sub>CC</sub> =5.0V	I <sub>CC1</sub>	-	1.0	mA	READ at 100 kHz
Supply Current V <sub>CC</sub> =5.0V	I <sub>CC2</sub>	-	3.0	mA	WRITE at 100 kHz
Standby Current V <sub>CC</sub> =1.8V	I <sub>SB1</sub>	-	3.0	μA	V <sub>IN</sub> =V <sub>CC</sub> or GND
Standby Current V <sub>CC</sub> =2.5V	I <sub>SB2</sub>	-	4.0	μA	V <sub>IN</sub> =V <sub>CC</sub> or GND
Standby Current V <sub>CC</sub> =2.7V	I <sub>SB3</sub>	-	4.0	μA	V <sub>IN</sub> =V <sub>CC</sub> or GND
Standby Current V <sub>CC</sub> =5.0V	I <sub>SB4</sub>	-	18.0	μA	V <sub>IN</sub> =V <sub>CC</sub> or GND
Input Leakage Current	I <sub>I</sub>	-	3.0	μA	V <sub>IN</sub> =V <sub>CC</sub> or GND
Output Leakage Current	I <sub>LO</sub>	-	3.0	μA	V <sub>OUT</sub> =V <sub>CC</sub> or GND
Input Low Level	V <sub>IL</sub>	-	V <sub>CC</sub> ×0.3	V	2.5V ≤ V <sub>CC</sub> ≤ 5.5V
		-	V <sub>CC</sub> ×0.2		1.8V ≤ V <sub>CC</sub> < 2.5V
Input High Level	V <sub>IH</sub>	V <sub>CC</sub> ×0.7	-	V	2.5V ≤ V <sub>CC</sub> ≤ 5.5V
		V <sub>CC</sub> ×0.8	-		1.8V ≤ V <sub>CC</sub> < 2.5V
Output Low Level V <sub>CC</sub> =3.0V	V <sub>OL1</sub>	-	0.4	V	I <sub>OL</sub> =2.1mA
Output Low Level V <sub>CC</sub> =1.8V	V <sub>OL2</sub>	-	0.2	V	I <sub>OL</sub> =0.15mA

◇ AC OPERATING CHARACTERISTICS

BR24C01A/02/04/08A/16A.Unless otherwise specified,V<sub>CC</sub>=1.8V to 5.5V, T<sub>a</sub>=-40°C to 85°C

Parameter	Symbol	1.8V		2.5V,2.7V,5.0V		Unit
		Min	Max	Min	Max	
Clock Frequency, SCL	f <sub>SCL</sub>	-	100	-	400	kHz
Clock Pulse Width Low	t <sub>LOW</sub>	4.7	-	1.2	-	μs
Clock Pulse Width High	t <sub>HIGH</sub>	4.0	-	0.6	-	μs
Noise Suppression Time	t <sub>N</sub>	-	100	-	50	ns
Clock Low to Data Out Valid	t <sub>AA</sub>	0.1	4.5	0.1	0.9	μs
Time the bus must be free before a new transmission can start	t <sub>BUF</sub>	4.7	-	1.2	-	μs
Start Hold Time	t <sub>HD,STA</sub>	4.0	-	0.6	-	μs
Start Setup Time	t <sub>SU,STA</sub>	4.7	-	0.6	-	μs
Data In Hold Time	t <sub>HD,DAT</sub>	0	-	0	-	μs
Data In Setup Time	t <sub>SU,DAT</sub>	200	-	100	-	ns
Inputs Rise Time *1	t <sub>R</sub>	-	1.0	-	0.3	μs
Inputs Fall Time *1	t <sub>F</sub>	-	300	-	300	ns
Stop Setup Time	t <sub>SU,STO</sub>	4.7	-	0.6	-	μs
Data Out Hold Time	t <sub>OH</sub>	100	-	50	-	ns
Write Cycle Time	t <sub>WR</sub>	-	5	-	5	ms
Endurance *1 5.0V, 25°C	Endurance	1M	-	1M	-	Write Cycles

\*1 Not 100% TESTED

BR24C32A Unless otherwise specified,V<sub>CC</sub>=1.8V to 5.5V, T<sub>a</sub>=-40°C to 85°C

Parameter	Symbol	Min	Max	Unit	Test Conditions
Supply Current V <sub>CC</sub> =5.0V	I <sub>CC1</sub>	-	1.0	mA	READ at 400 kHz
Supply Current V <sub>CC</sub> =5.0V	I <sub>CC2</sub>	-	3.0	mA	WRITE at 400 kHz
Standby Current V <sub>CC</sub> =1.8V	I <sub>SB1</sub>	-	1.0	μA	V <sub>IN</sub> =V <sub>CC</sub> or GND
Standby Current V <sub>CC</sub> =2.5V	I <sub>SB2</sub>	-	2.0	μA	V <sub>IN</sub> =V <sub>CC</sub> or GND
Standby Current V <sub>CC</sub> =2.7V	I <sub>SB3</sub>	-	2.0	μA	V <sub>IN</sub> =V <sub>CC</sub> or GND
Standby Current V <sub>CC</sub> =5.0V	I <sub>SB4</sub>	-	6.0	μA	V <sub>IN</sub> =V <sub>CC</sub> or GND
Input Leakage Current	I <sub>I</sub>	-	3.0	μA	V <sub>IN</sub> =V <sub>CC</sub> or GND
Output Leakage Current	I <sub>LO</sub>	-	3.0	μA	V <sub>OUT</sub> =V <sub>CC</sub> or GND
Input Low Level	V <sub>IL</sub>	-	V <sub>CC</sub> ×0.3	V	2.5V ≤ V <sub>CC</sub> ≤ 5.5V
		-	V <sub>CC</sub> ×0.2		1.8V ≤ V <sub>CC</sub> < 2.5V
Input High Level	V <sub>IH</sub>	V <sub>CC</sub> ×0.7	-	V	2.5V ≤ V <sub>CC</sub> ≤ 5.5V
		V <sub>CC</sub> ×0.8	-		1.8V ≤ V <sub>CC</sub> < 2.5V
Output Low Level V <sub>CC</sub> =3.0V	V <sub>OL1</sub>	-	0.4	V	I <sub>OL</sub> =2.1mA
Output Low Level V <sub>CC</sub> =1.8V	V <sub>OL2</sub>	-	0.2	V	I <sub>OL</sub> =0.15mA

BR24C32A.Unless otherwise specified,V<sub>CC</sub>=1.8V to 5.5V, T<sub>a</sub>=-40°C to 85°C

Parameter	Symbol	1.8V		2.5V,2.7V,5.0V		Unit
		Min	Max	Min	Max	
Clock Frequency, SCL	f <sub>SCL</sub>	-	100	-	400	kHz
Clock Pulse Width Low	t <sub>LOW</sub>	4.7	-	1.3	-	μs
Clock Pulse Width High	t <sub>HIGH</sub>	4.0	-	0.6	-	μs
Noise Suppression Time	t <sub>N</sub>	-	100	-	50	ns
Clock Low to Data Out Valid	t <sub>AA</sub>	0.1	4.5	0.1	0.9	μs
Time the bus must be free before a new transmission can start	t <sub>BUF</sub>	4.7	-	1.3	-	μs
Start Hold Time	t <sub>HD,STA</sub>	4.0	-	0.6	-	μs
Start Setup Time	t <sub>SU,STA</sub>	4.7	-	0.6	-	μs
Data In Hold Time	t <sub>HD,DAT</sub>	0	-	0	-	μs
Data In Setup Time	t <sub>SU,DAT</sub>	200	-	100	-	ns
Inputs Rise Time *1	t <sub>R</sub>	-	1.0	-	0.3	μs
Inputs Fall Time *1	t <sub>F</sub>	-	300	-	300	ns
Stop Setup Time	t <sub>SU,STO</sub>	4.7	-	0.6	-	μs
Data Out Hold Time	t <sub>OH</sub>	100	-	50	-	ns
Write Cycle Time	t <sub>WR</sub>	-	5	-	5	ms
Endurance *1 5.0V, 25°C	Endurance	1M	-	1M	-	Write Cycles

\*1 Not 100% TESTED

○This product is not designed for protection against radioactive rays.

◇ BLOCK DIAGRAM

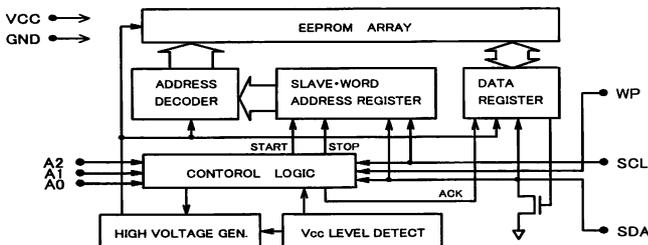


Fig.-1 BLOCK DIAGRAM

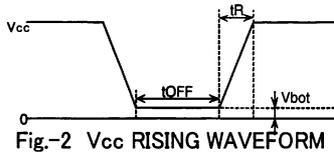
◇ PIN No., PIN NAME

PIN No.	PIN NAME
1	A0
2	A1
3	A2
4	GND
5	SDA
6	SCL
7	WP
8	Vcc

◇NOTES FOR POWER SUPPLY

Vcc rises through the low voltage region in which internal circuit of IC and the controller are unstable, so that device may not work properly due to an incomplete reset of internal circuit. To prevent this, the device has the feature of P.O.R. and LVCC. In the case of power up, keep the following conditions to ensure functions of P.O.R. and LVCC.

1. It is necessary to be "SDA='H'" and "SCL='L' or 'H'".
2. Follow the recommended conditions of tR, tOFF, Vbot for the function of P.O.R. during power up.



◇RECOMMENDED CONDITIONS OF tR, tOFF, Vbot

tR	tOFF	Vbot
Below 10ms	Above 10ms	Below 0.3V
Below 100ms	Above 10ms	Below 0.2V

3. Prevent SDA and SCL from being "High-Z".

In case that condition 1. and/or 2. cannot be met, take following actions.

- A) Unable to keep condition 1.  
( SDA is "LOW" during power up.)  
→ Control SDA ,SCL to be "HIGH" as Fig.-3(a), 3(b).
- B) Unable to keep condition 2.  
→ After power becomes stable, execute software reset.
- C) Unable to keep both conditions 1 and 2.  
→ Follow the instruction A first, then the instruction B.

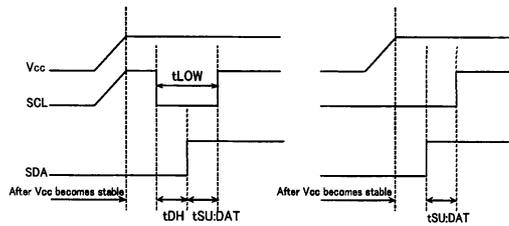
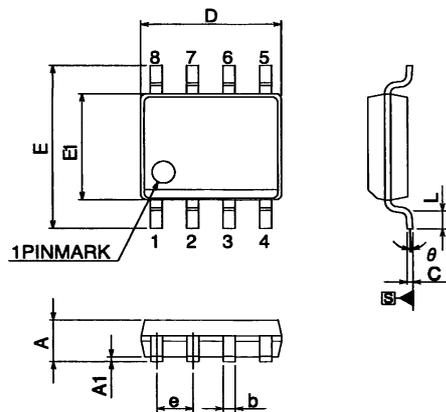


Fig.-3(a) SCL='H' and SDA='L' Fig.-3(b) SCL='L' and SDA='L'

◇CAUTIONS ON USE

- (1) Absolute maximum ratings  
If the absolute maximum ratings such as impressed voltage and action temperature range and so forth are exceeded, LSI may be destructed. Do not impress voltage and temperature exceeding the absolute maximum ratings. In the case of fear exceeding the absolute maximum ratings, take physical safety countermeasures such as fuses, and see to it that conditions exceeding the absolute maximum ratings should not be impressed to LSI.
- (2) GND electric potential  
Set the voltage of GND terminal lowest at any action condition. Make sure that each terminal voltage is lower than that of GND terminal.
- (3) Thermal design  
In consideration of permissible loss in actual use condition, carry out heat design with sufficient margin.
- (4) Terminal to terminal shortcircuit and wrong packaging  
When to package LSI onto a board, pay sufficient attention to LSI direction and displacement. Wrong packaging may destruct LSI. And in the case of shortcircuit between LSI terminals and terminals and power source, terminal and GND owing to foreign matter, LSI may be destructed.
- (5) Use in a strong electromagnetic field may cause malfunction, therefore, evaluated design sufficiently.

◇ PHYSICAL DIMENSION

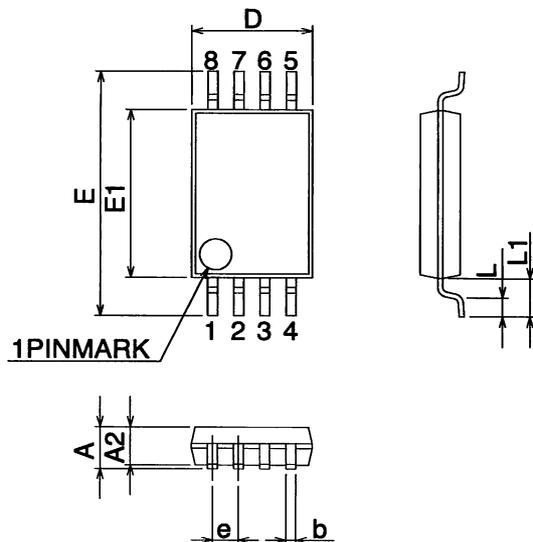


- Notes**
- 1.This drawing is subject to change without notice.
  - 2.Body dimensions do not include mold flash or protrusion, or gate burns.
  - 3.Reference JEDEC MS-012 variation AA.

Fig-4 8-lead JEDEC SOIC Package Outline

◇ 8-lead JEDEC SOIC Package Size Data

Symbol	mm			inches		
	Typ.	Min.	Max.	Typ.	Min.	Max.
A	-	1.35	1.75	-	0.053	0.069
A1	-	0.10	0.25	-	0.004	0.010
b	-	0.31	0.51	-	0.012	0.020
c	-	0.17	0.25	-	0.007	0.010
D	-	4.80	5.00	-	0.189	0.197
e	1.27 BSC	-	-	0.050 BSC	-	-
E	-	5.79	6.20	-	0.228	0.244
E1	-	3.81	3.99	-	0.150	0.157
L	-	0.40	1.27	-	0.016	0.050
θ	-	0°	8°	-	0°	8°



- Notes**
- 1.This drawing is subject to change without notice.
  - 2.Body dimensions do not include mold flash or protrusion, or gate burns.
  - 3.Reference MO-153

Fig-5 8-lead TSSOP Package Outline

◇ 8-lead TSSOP Package Size Data

Symbol	mm			inches		
	Typ.	Min.	Max.	Typ.	Min.	Max.
A	-	-	1.20	-	-	0.047
A2	1.00	0.80	1.05	0.039	0.031	0.041
b	-	0.19	0.30	-	0.007	0.012
D	3.00	2.90	3.10	0.118	0.114	0.122
e	0.65 BSC	-	-	0.025	-	-
E	6.40 BSC	-	-	0.252	-	-
E1	4.40	4.30	4.50	0.173	0.169	0.177
L	0.60	0.45	0.75	0.023	0.017	0.030
L1	1.00 REF	-	-	0.039	-	-

## Notes

No copying or reproduction of this document, in part or in whole, is permitted without the consent of ROHM Co.,Ltd.

The content specified herein is subject to change for improvement without notice.

The content specified herein is for the purpose of introducing ROHM's products (hereinafter "Products"). If you wish to use any such Product, please be sure to refer to the specifications, which can be obtained from ROHM upon request.

Examples of application circuits, circuit constants and any other information contained herein illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

Great care was taken in ensuring the accuracy of the information specified in this document. However, should you incur any damage arising from any inaccuracy or misprint of such information, ROHM shall bear no responsibility for such damage.

The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM and other parties. ROHM shall bear no responsibility whatsoever for any dispute arising from the use of such technical information.

The Products specified in this document are intended to be used with general-use electronic equipment or devices (such as audio visual equipment, office-automation equipment, communication devices, electronic appliances and amusement devices).

The Products specified in this document are not designed to be radiation tolerant.

While ROHM always makes efforts to enhance the quality and reliability of its Products, a Product may fail or malfunction for a variety of reasons.

Please be sure to implement in your equipment using the Products safety measures to guard against the possibility of physical injury, fire or any other damage caused in the event of the failure of any Product, such as derating, redundancy, fire control and fail-safe designs. ROHM shall bear no responsibility whatsoever for your use of any Product outside of the prescribed scope or not in accordance with the instruction manual.

The Products are not designed or manufactured to be used with any equipment, device or system which requires an extremely high level of reliability the failure or malfunction of which may result in a direct threat to human life or create a risk of human injury (such as a medical instrument, transportation equipment, aerospace machinery, nuclear-reactor controller, fuel-controller or other safety device). ROHM shall bear no responsibility in any way for use of any of the Products for the above special purposes. If a Product is intended to be used for any such special purpose, please contact a ROHM sales representative before purchasing.

If you intend to export or ship overseas any Product or technology specified herein that may be controlled under the Foreign Exchange and the Foreign Trade Law, you will be required to obtain a license or permit under the Law.



Thank you for your accessing to ROHM product informations.  
More detail product informations and catalogs are available, please contact us.

### ROHM Customer Support System

<http://www.rohm.com/contact/>