

- ◇ STRUCTURE Silicon Monolithic Integrated Circuit
- ◇ PRODUCT SPI BUS 16Kbit (2,048 × 8bit) EEPROM
- ◇ PART NUMBER BR35H160-WC series

PART NUMBER	PACKAGE
BR35H160F-WC	SOP8
BR35H160FJ-WC	SOP-J8
BR35H160FVT-WC	TSSOP-B8
BR35H160FVM-WC	MSOP8

- ◇ FEATURES Serial Peripheral Interface
 Single power supply (2.5V~5.5V)
 1,000,000 erase/write cycles endurance (85°C)
 500,000 erase/write cycles endurance (105°C)
 300,000 erase/write cycles endurance (125°C)

- ◇ ABSOLUTE MAXIMUM RATING (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V _{cc}	-0.3~6.5	V
Power Dissipation	P _d	560 (BR35H160F-WC) *1	mW
		560 (BR35H160FJ-WC) *2	
		410 (BR35H160FVT-WC) *3	
		380 (BR35H160FVM-WC) *4	
Storage Temperature	T _{stg}	-65~150	°C
Operating Temperature	T _{opr}	-40~125	°C
Terminal Voltage	—	-0.3~V _{cc} +0.3	V

* Degradation is done at 4.5mW/°C(※1,2), 3.3mW/°C(※3), 3.1mW/°C(※4) for operation above 25°C

- ◇ RECOMMENDED OPERATING CONDITION

Parameter	Symbol	Rating	Unit
Supply Voltage	V _{cc}	2.5~5.5	V
Input Voltage	V _{IN}	0~V _{cc}	V

◇MEMORY CELL CHARACTERISTICS(V_{CC}=2.5~5.5V)

Parameter		Specification			Unit	Test Condition
		Min.	Typ.	Max.		
Write/Erase Cycle	*1	1,000,000	-	-	Cycle	T _a ≤ 85°C
		500,000	-	-	Cycle	T _a ≤ 105°C
		300,000	-	-	Cycle	T _a ≤ 125°C
Data Retention	*1	40	-	-	Year	T _a ≤ 25°C
		20	-	-	Year	T _a ≤ 125°C

○Initial Data : Memory array FFh

*1 Not 100% TESTED

◇DC OPERATING CHARACTERISTICS

(Unless otherwise specified Ta=-40~125°C, V_{CC}=2.5~5.5V)

Parameter	Symbol	Specification			Unit	test condition
		Min.	Typ.	Max.		
"H" Input Voltage	VIH1	0.7xV _{CC}	-	V _{CC} +0.3	V	2.5V ≤ V _{CC} ≤ 5.5V
"L" Input Voltage	VIL1	-0.3	-	0.3xV _{CC}	V	2.5V ≤ V _{CC} ≤ 5.5V
"L" Output Voltage	VOL	0	-	0.4	V	IOL=2.1mA (V _{CC} =2.5V~5.5V)
"H" Output Voltage	VOH	V _{CC} -0.5	-	V _{CC}	V	IOH=-0.4mA (V _{CC} =2.5V~5.5V)
Input Leakage Current	ILI	-10	-	10	μA	VIN=0V~V _{CC}
Output Leakage Current	ILO	-10	-	10	μA	VOUT=0V~V _{CC} , CSB=V _{CC}
Operating Current Write	ICC1	-	-	2	mA	V _{CC} =2.5V, fSCK=5MHz, tE/W=5ms Byte Write, Page Write
	ICC2	-	-	3	mA	V _{CC} =5.5V, fSCK=5MHz, tE/W=5ms Byte Write, Page Write
Operating Current Read	ICC3	-	-	1.5	mA	V _{CC} =2.5V, fSCK=5MHz Read, Read Status Register
	ICC4	-	-	2	mA	V _{CC} =5.5V, fSCK=5MHz Read, Read Status Register
Standby Current	ISB	-	-	10	μA	V _{CC} =5.5V CSB=V _{CC} SCK=SI=V _{CC} or GND, SO=OPEN

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

◇AC OPERATING CHARACTERISTICS

(Unless otherwise specified Ta=-40~125°C, C_L=100pF)

Parameter	Symbol	2.5V ≤ V _{CC} ≤ 5.5V			Unit
		Min.	Typ.	Max.	
SCK clock Frequency	fSCK	-	-	5	MHz
SCK High Time	tSCKWH	85	-	-	ns
SCK Low Time	tSCKWL	85	-	-	ns
CS High Time	tCS	85	-	-	ns
CS Setup Time	tCSS	90	-	-	ns
CS Hold Time	tCSH	85	-	-	ns
SCK Setup Time	tSCKS	90	-	-	ns
SCK Hold Time	tSCKH	90	-	-	ns
SI Setup Time	tDIS	20	-	-	ns
SI Hold Time	tDIH	30	-	-	ns
Output Data Delay Time1	tPD1	-	-	70	ns
Output Data Delay Time2 (CL=30pF)	tPD2	-	-	55	ns
Output Hold Time	tOH	0	-	-	ns
Output Disable Time	tOZ	-	-	100	ns
SCK Rise Time	*1 tRC	-	-	1	μs
SCK Fall Time	*1 tFC	-	-	1	μs
Output Rise Time	*1 tRO	-	-	50	ns
Output Fall Time	*1 tFO	-	-	50	ns
Write Cycle Time	tE/W	-	-	5	ms

※1 Not 100% TESTED

◇BLOCK DIAGRAM

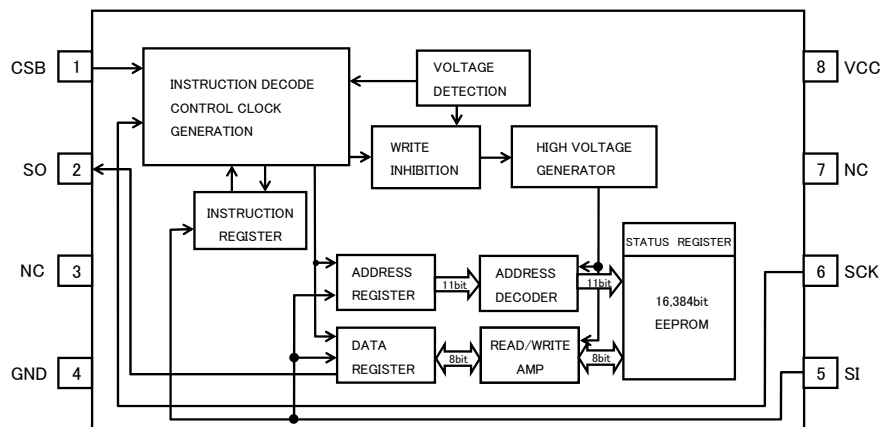


Fig.1 BLOCK DIAGRAM

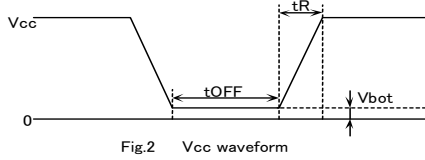
◇PIN No. / PIN NAME

PIN No.	PIN NAME
1	CSB
2	SO
3	NC
4	GND
5	SI
6	SCK
7	NC
8	VCC

◇NOTES FOR POWER SUPPLY

In order to prevent an inadvertent write, the device has the feature of P.O.R.

After the power is on, the device is in the write disable mode. P.O.R. works only during power up. The noise may force the device write enable mode with \overline{CS} ="H" during power ON/OFF. In the case of power up, keep the following conditions to ensure to make the function of P.O.R.



◇RECOMMENDED CONDITIONS OF tR, tOFF, Vbot

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

Please keep \overline{CS} "H" during power ON/OFF.

The device is an active state during \overline{CS} is low. The extraordinary function or data collaption may occur because of noise etc., if power-up is done with \overline{CS} "L". In order to prevent above errors from happening, keep \overline{CS} "H" (=Vcc) during power ON. (The device does not receive any command during \overline{CS} is high.)

It may continue at low Vcc by capacitance of Vcc line during power off.

Please keep \overline{CS} "H" during power off because of the device may make malfunction and inadvertent write.

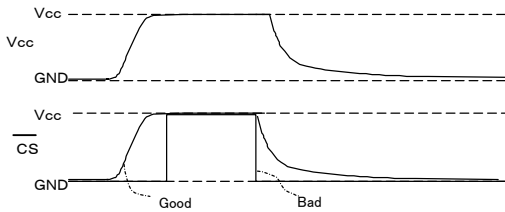


Fig.3 \overline{CS} TIMING DURING POWER ON/OFF

(Good example)

\overline{CS} follows Vcc. (\overline{CS} is pull up to Vcc)

(Bad example)

\overline{CS} is low during power ON/OFF.

Please take more than 10ms between power ON and power OFF, or the internal circuit is not always reset.

◇CAUTIONS ON USE

(1) Absolute maximum ratings

If the absolute maximum ratings such as impressed voltage and operating 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 voltages is lower than that of GND terminal.

(3) Heat design

In consideration of permissible dissipation in actual use condition, carry out heat design with sufficient margin.

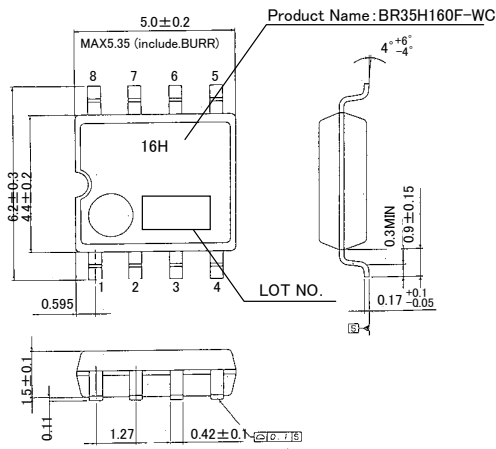
(4) Terminal to terminal shortcircuit and wrong packaging

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) Strong electromagnetic field

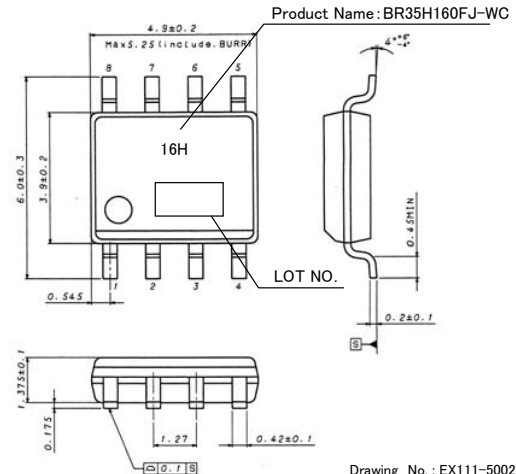
Use in a strong electromagnetic field may cause malfunction, therefore, evaluated design sufficiently.

◇PHYSICAL DIMENSION



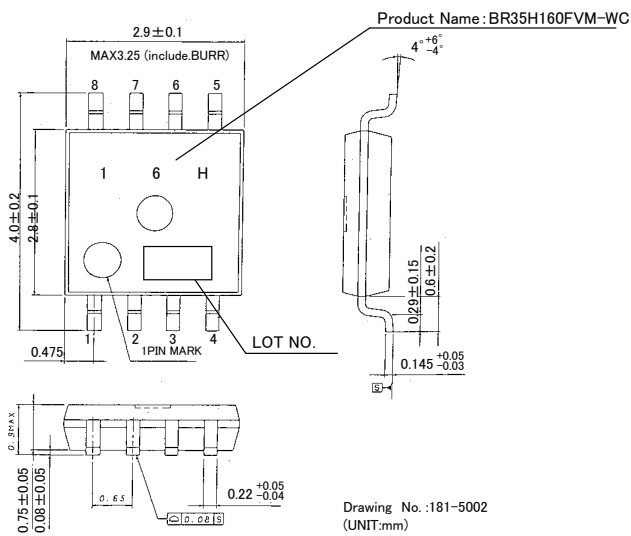
Drawing No. : EX112-5002
(UNIT:mm)

Fig.4-(a) PHYSICAL DIMENSION SOP-8 (BR35H160F-WC)



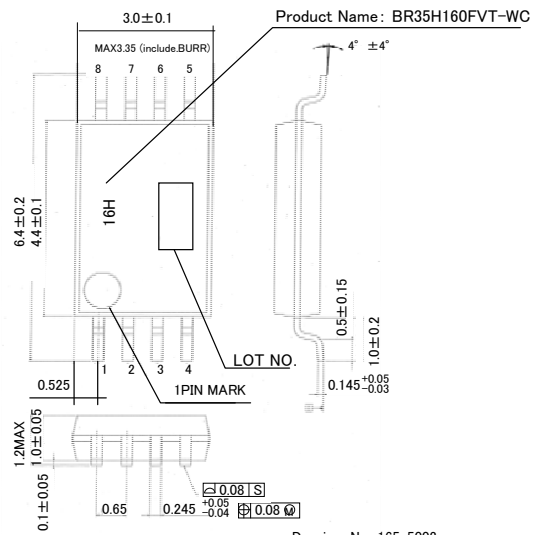
Drawing No. : EX111-5002
(UNIT:mm)

Fig.4-(b) PHYSICAL DIMENSION SOP-J8 (BR35H160FJ-WC)



Drawing No. :181-5002
(UNIT:mm)

Fig.4-(c) PHYSICAL DIMENSION MSOP8 (BR35H160FVM-WC)



Drawing No. :165-5002
(UNIT:mm)

Fig.4-(d) PHYSICAL DIMENSION TSSOP-B8 (BR35H160FVT-WC)

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/>