

◇ STRUCTURE Silicon Monolithic Integrated Circuit

◇ PRODUCT SPI BUS 32Kbit (4,096 × 8bit) EEPROM

◇ PART NUMBER BR25L320-W Series

PART NUMBER	PACKAGE
BR25L320F-W	SOP8
BR25L320FJ-W	SOP-J8

◇ FEATURES Serial Peripheral Interface
Single power supply (1.8V~5.5V)
1,000,000 erase/write cycles endurance

◇ ABSOLUTE MAXIMUM RATING (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	Vcc	-0.3~6.5	V
Power Dissipation	Pd	450 (BR25L320F-W) *1	mW
		450 (BR25L320FJ-W) *2	
Storage Temperature	Tstg	-65~125	°C
Operating Temperature	Topr	-40~85	°C
Terminal Voltage	—	-0.3~Vcc+0.3	V

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

◇ RECOMMENDED OPERATING CONDITION

Parameter	Symbol	Rating	Unit
Supply Voltage	Vcc	1.8~5.5	V
Input Voltage	VIN	0~Vcc	V

Status of this document

The Japanese version of this document is the formal specification.

A customer may use this translation version only for a reference to help reading the formal version.
If there are any differences in translation version of this document, formal version takes priority.

◇MEMORY CELL CHARACTERISTICS($T_a=25^\circ C$, $V_{cc}=1.8 \sim 5.5V$)

Parameter	Specification			Unit
	Min.	Typ.	Max.	
Write/Erase Cycle *1	1,000,000	—	—	Cycle
Data Retention *1	40	—	—	Year

○Initial Data:Memory array FFh, Status Register WPEN:0, BP1:0, BP0:0

*1 Not 100% TESTED

◇ DC OPERATING CHARACTERISTICS

(Unless otherwise specified $T_a=-40 \sim 85^\circ C$, $V_{cc}=1.8 \sim 5.5V$)

Parameter	Symbol	Specification			Unit	test condition
		Min.	Typ.	Max.		
"H" Input Voltage1	VIH1	0.7xV _{cc}	—	V _{cc} +0.3	V	1.8V \leq V _{cc} \leq 5.5V
"L" Input Voltage1	VIL1	-0.3	—	0.3xV _{cc}	V	1.8V \leq V _{cc} \leq 5.5V
"L" Output Voltage1	VOL1	0	—	0.4	V	I _{OL} =2.1mA (V _{cc} =2.5V~5.5V)
"L" Output Voltage2	VOL2	0	—	0.2	V	I _{OL} =150 μ A (V _{cc} =1.8V~5.5V)
"H" Output Voltage1	VOH1	V _{cc} -0.5	—	V _{cc}	V	I _{OH} =-0.4mA (V _{cc} =2.5V~5.5V)
"H" Output Voltage2	VOH2	V _{cc} -0.2	—	V _{cc}	V	I _{OH} =-100 μ A (V _{cc} =1.8V~5.5V)
Input Leakage Current	I _{LI}	-1	—	1	μ A	VIN=0V~V _{cc}
Output Leakage Current	I _{LO}	-1	—	1	μ A	VOUT=0V~V _{cc} , CSB=V _{cc}
Operating Current Write	ICC1	—	—	1	mA	V _{cc} =1.8V, f _{SCK} =2MHz, tE/W=5ms Byte Write, Page Write, Write Status Register
	ICC2	—	—	2	mA	V _{cc} =2.5V, f _{SCK} =5MHz, tE/W=5ms Byte Write, Page Write, Write Status Register
	ICC3	—	—	3	mA	V _{cc} =5.5V, f _{SCK} =5MHz, tE/W=5ms Byte Write, Page Write, Write Status Register
Operating Current Read	ICC4	—	—	1.5	mA	V _{cc} =2.5V, f _{SCK} =5MHz Read, Read Status Register
	ICC5	—	—	2	mA	V _{cc} =5.5V, f _{SCK} =5MHz Read, Read Status Register
Standby Current	ISB	—	—	2	μ A	V _{cc} =5.5V CS=HOLD=WP=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 $T_a=-40 \sim 85^\circ C$, $C_L=100pF$)

Parameter	Symbol	1.8V \leq V _{cc} \leq 2.5V			2.5V \leq V _{cc} \leq 5.5V			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
SCK clock Frequency	f _{SCK}	—	—	2	—	—	5	MHz
SCK High Time	t _{SCKWH}	200	—	—	85	—	—	ns
SCK Low Time	t _{SCKWL}	200	—	—	85	—	—	ns
CS High Time	t _{CS}	200	—	—	85	—	—	ns
CS Setup Time	t _{CS}	200	—	—	90	—	—	ns
CS Hold Time	t _{CSH}	200	—	—	85	—	—	ns
SCK Setup Time	t _{SCKS}	200	—	—	90	—	—	ns
SCK Hold Time	t _{SCKH}	200	—	—	90	—	—	ns
SI Setup Time	t _{DIS}	40	—	—	20	—	—	ns
SI Hold Time	t _{DIH}	50	—	—	40	—	—	ns
Output Data Delay Time1	t _{PD1}	—	—	150	—	—	70	ns
Output Data Delay Time2 (C _L =30pF)	t _{PD2}	—	—	145	—	—	55	ns
Output Hold Time	t _{OH}	0	—	—	0	—	—	ns
Output Disable Time	t _{OZ}	—	—	250	—	—	100	ns
Clock High Setup Time before HOLD Active	t _{HFS}	120	—	—	60	—	—	ns
Clock Low Hold Time after HOLD Active	t _{HFH}	90	—	—	40	—	—	ns
Clock High Setup Time before HOLD not Active	t _{HRS}	120	—	—	60	—	—	ns
Clock Low Hold Time after HOLD not Active	t _{HRH}	140	—	—	70	—	—	ns
HOLD to Output High-Z	t _{HOZ}	—	—	250	—	—	100	ns
HOLD to Output Valid	t _{HPD}	—	—	150	—	—	70	ns
SCK Rise Time	*1 t _{RC}	—	—	1	—	—	1	μ s
SCK Fall Time	*1 t _{FC}	—	—	1	—	—	1	μ s
Output Rise Time	*1 t _{RO}	—	—	100	—	—	50	ns
Output Fall Time	*1 t _{FO}	—	—	100	—	—	50	ns
Write Cycle Time	t _{E/W}	—	—	5	—	—	5	ms

*1 Not 100% TESTED

◇ BLOCK DIAGRAM

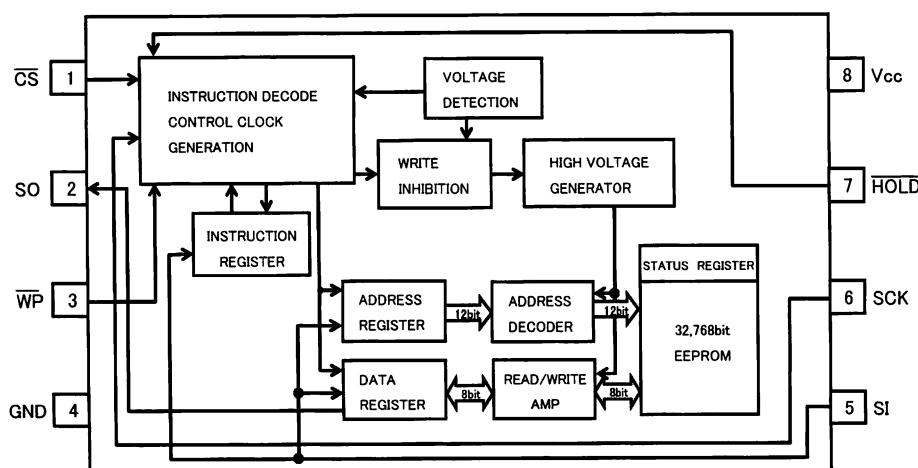


Fig.1 BLOCK DIAGRAM

◇ PIN No. / PIN NAME

PIN No.	PIN NAME
1	CS
2	SO
3	WP
4	GND
5	SI
6	SCK
7	HOLD
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.

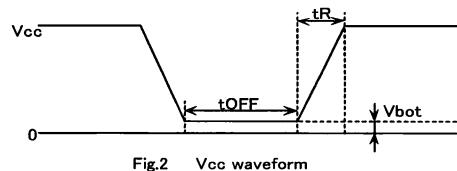


Fig.2 Vcc waveform

◇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.

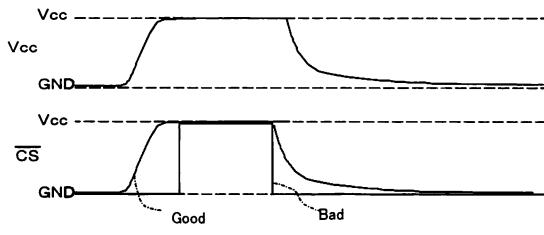


Fig.3 \overline{CS} TIMING DURING POWER ON/OFF

(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.

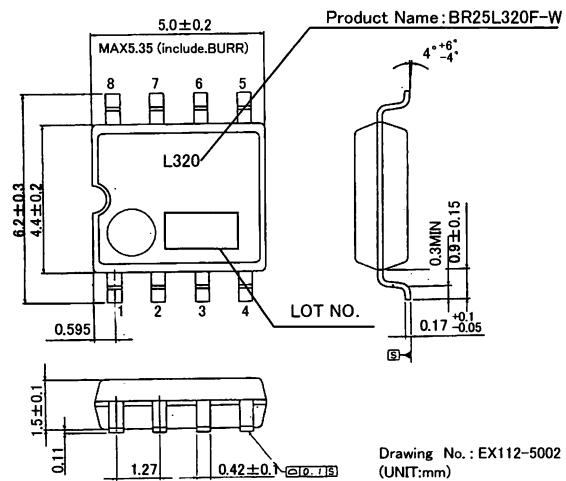
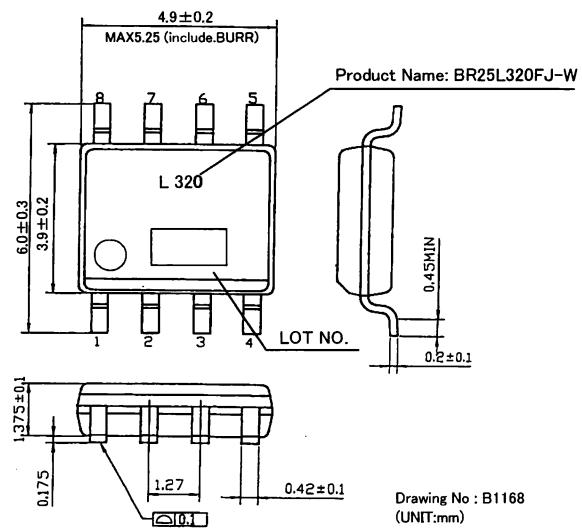
(4) Terminal to terminal shortcircuit and wrong packaging

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

Fig4-(a) PHYSICAL DIMENSION
SOP-8 (BR25L320F-W)Fig-4(b) PHYSICAL DIMENSION
SOP-J8 (BR25L320FJ-W)

Appendix

Notes

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