SRAM Memory Card

38pin B series

- BS128G1-C-13
- BS256G1-C-13
- BS512G1-C-13
- BS1024G1-C-13

株式会社フジソク
FUJISOKU CORPORATION
1890, Kizuki Sumiyoshi-cho, Nakaharaku
Kawasaki, 211-0021 Japan

Contents

1. Characteristic

- ○ Supply Voltage 5V±0.5V
- ○ High speed access time 200ns (MAX)
- ○ Connector 38pin two pieces
- ○ Battery Lithium Battery (BR2325/CR2325)
- ○ Possible to replace the battery
- ○ Write protect switch
- ○ Highly resistant structure to static electricity
- ○ High reliability by used transfer mold IC
- ○ Latch – up prevention structure

2. Type

Type	Memory Device	Capacity
BS128G1-C-13	1Mbit SRAM × 1	128K Byte
BS256G1-C-13	1Mbit SRAM × 2	256K Byte
BS512G1-C-13	1Mbit SRAM × 4	512K Byte
BS1024G1-C-13	1Mbit SRAM × 8	1024K Byte

3. Pin Assignments

No.	Pin Name	I/O	No.	Pin Name	I/O
1	GND		20	A4	I
2	BATT DET	O	21	A5	I
3	Vcc		22	A6	I
4	#CE1	I	23	A7	I
5	CE2	I	24	A8	I
6	#WE	I	25	A9	I
7	#OE	I	26	A10	I
8	D0	I/O	27	A11	I
9	D1	I/O	28	A12	I
10	D2	I/O	29	A13	I
11	D3	I/O	30	A14	I
12	D4	I/O	31	A15	I
13	D5	I/O	32	A16	I
14	D6	I/O	33	A17 (Note)	I
15	D7	I/O	34	A18 (Note)	I
16	A0	I	35	A19 (Note)	I
17	A1	I	36	Vcc	
18	A2	I	37	#CARD DET	O
19	A3	I	38	GND	

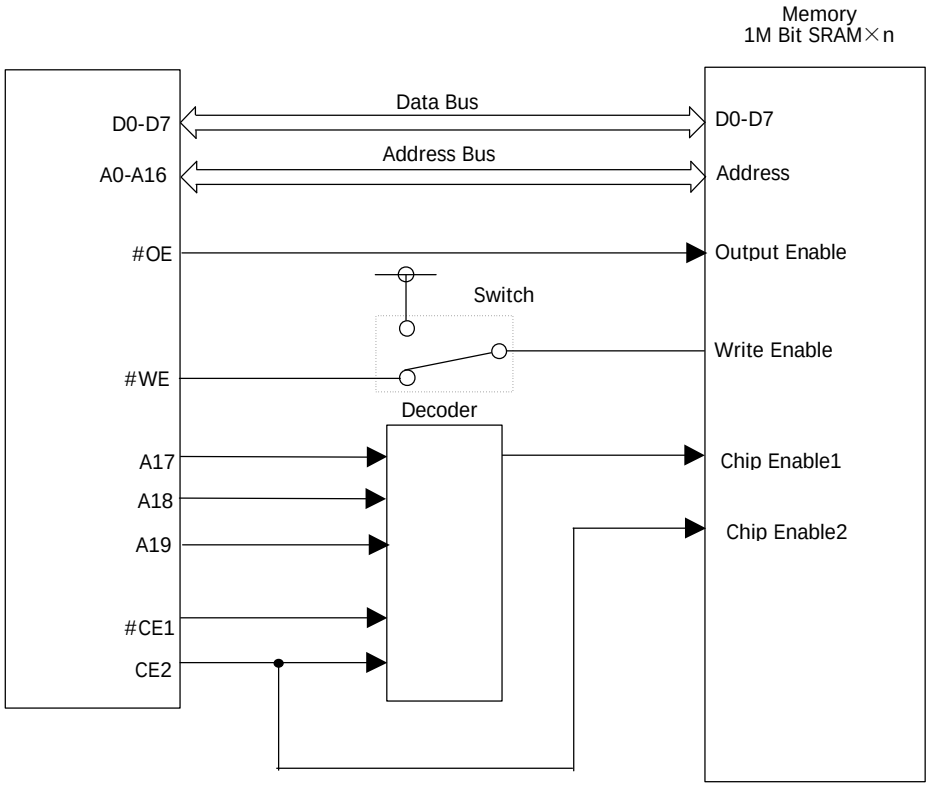
Note)

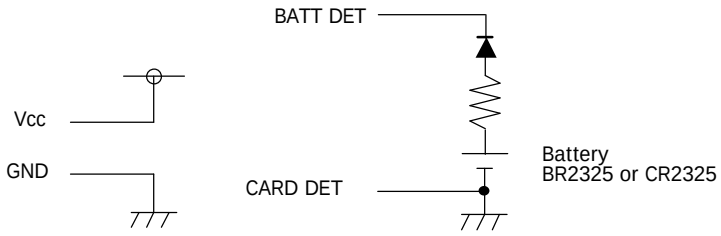
- BS128G1-C-13: A17~ A19 = NC
- BS256G1-C-13: A18 ~ A19 = NC
- BS512G1-C-13: A19 = NC

4. Pin Name･Function

Symbol	Pin Name	In/Out	Function
Vcc	Power Supply	Input	Supply voltage.
GND	Ground	Input	To give ground-level to the memory card.
D0-7	Data Bus	In/Out	Input/Output data.
A0-19	Address Bus	Input	To appoint address to the memory card.
#CE1 CE2	Card Enable 1,2	Input	Enable card to work by giving "L" level to #CE1 and "H" level to CE2.
#OE	Output Enable	Input	Enable the data to be out by giving "L" level.
#WE	Write Enable	Input	Enable the data to be written into the card by giving "L" level.
#CARD DET	Card Detect	Output	A terminal for detecting card insertion. (Internally connected with GND)
BATT DET	Battery Detect	Output	Battery power detect signal.
NC	Non-Connection	—	Not connected.

5. Block Figure





- BS128G1-C-13: A17~ A19 = NC
- BS256G1-C-13: A18 ~ A19 = NC
- BS512G1-C-13: A19 = NC

6. Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Supply voltage	Vcc	-0.3 ~ +7.0	V	
Input voltage	V_{IN}	-0.3 ~ Vcc	V	
Output voltage	V_{OUT}	0 ~ Vcc	V	
Operating Temperature Range	Topr	0 ~ +45	℃	
Operating Humidity Range	Hopr	Relative Humidity: 10~90	%	No Dew.
Storage Temperature Range	Tstg	-10 ~ +60	℃	

7. Recommend Operating Conditions

Item	Symbol	Condition	MIN	TYP	MAX	Unit
Supply voltage	Vcc		4.5	5.0	5.5	V
High Level Input voltage	V_{IH}	#CE1,CE2,A17,A18,A19	0.7 Vcc		Vcc+0.3	V
		Others	2.2		Vcc+0.3	V
Low Level Input voltage	V_{IL}		-0.3		0.8	V
Operating Ambient Temperature	T_a		0		45	℃

8. DC Characteristics

8.1 BS128G1-C-13

Item	Symbol	Condition	MIN	TYP	MAX	Unit
Output Leakage Current	I_{LO}	#CE1 = V_{IH} or CE2 = V_{IL} or #OE = V_{IH} or #WE = V_{IL}, V_{OUT} = 0~Vcc.	-1.0		1	μA
Input Leakage Current	I_{LI1}	#CE1,CE2. V_{IN} = 0~Vcc.	-1.0		51	μA
	I_{LI2}	Others. V_{IN} = 0~Vcc.	-1.0		1	μA
Supply Current	I_{CCA}	#CE1 = V_{IL}, CE2 = V_{IH}, MIN cycle, Iout=0mA.			100	mA
Stand-by Current	I_{CCS}	CE1 = V_{IH} or CE2 = V_{IL}.			3	mA
High Level Output voltage	V_{OH}	I_{OH} = -1mA.	2.4			V
Low Level Output voltage	V_{OL}	I_{OL} = 2.1mA.			0.4	V

Note) On recommended operating conditions.

8.2 BS256G1-C-13

Item	Symbol	Condition	MIN	TYP	MAX	Unit
Output Leakage Current	I_{LO}	#CE1 = V_{IH} or CE2 = V_{IL} or #OE = V_{IH} or #WE = V_{IL}, V_{OUT} = 0~Vcc.	-1.0		1	μA
Input Leakage Current	I_{LI1}	#CE1,CE2. V_{IN} = 0~Vcc.	-1.0		51	μA
	I_{LI2}	Others. V_{IN} = 0~Vcc.	-1.0		1	μA
Supply Current	I_{CCA}	#CE1 = V_{IL}, CE2 = V_{IH}, MIN cycle, Iout=0mA.			100	mA
Stand-by Current	I_{CCS}	CE1 = V_{IH} or CE2 = V_{IL}.			6	mA
High Level Output voltage	V_{OH}	I_{OH} = -1mA.	2.4			V
Low Level Output voltage	V_{OL}	I_{OL} = 2.1mA.			0.4	V

Note) On recommended operating conditions.

8.3 BS512G1-C-13

Item	Symbol	Condition	MIN	TYP	MAX	Unit
Output Leakage Current	I_{LO}	#CE1 = V_{IH} or CE2 = V_{IL} or #OE = V_{IH} or #WE = V_{IL}, V_{OUT} = 0~Vcc.	-1.0		1	μA
Input Leakage Current	I_{LI1}	#CE1,CE2. V_{IN} = 0~Vcc.	-1.0		51	μA
	I_{LI2}	Others. V_{IN} = 0~Vcc.	-1.0		1	μA
Supply Current	I_{CCA}	#CE1 = V_{IL}, CE2 = V_{IH}, MIN cycle, Iout=0mA.			100	mA
Stand-by Current	I_{CCS}	CE1 = V_{IH} or CE2 = V_{IL}.			12	mA
High Level Output voltage	V_{OH}	I_{OH} = -1mA.	2.4			V
Low Level Output voltage	V_{OL}	I_{OL} = 2.1mA.			0.4	V

Note) On recommended operating conditions.

8.4 BS1024G1-C-13

Item	Symbol	Condition	MIN	TYP	MAX	Unit
Output Leakage Current	I_{LO}	#CE1 = V_{IH} or CE2 = V_{IL} or #OE = V_{IH} or #WE = V_{IL}, V_{OUT} = 0~Vcc.	-1.0		1	μA
Input Leakage Current	I_{LI1}	#CE1,CE2. V_{IN} = 0~Vcc.	-1.0		51	μA
	I_{LI2}	Others. V_{IN} = 0~Vcc.	-1.0		1	μA
Supply Current	I_{CCA}	#CE1 = V_{IL}, CE2 = V_{IH}, MIN cycle, Iout=0mA.			100	mA
Stand-by Current	I_{CCS}	CE1 = V_{IH} or CE2 = V_{IL}.			24	mA
High Level Output voltage	V_{OH}	I_{OH} = -1mA.	2.4			V
Low Level Output voltage	V_{OL}	I_{OL} = 2.1mA.			0.4	V

Note) On recommended operating conditions.

9. Function Table

Mode	＃CE1	CE2	＃OE	＃WE	Protect SW	D0~D7	Supply Current
Non-Selection (Power Down)	V_{IH}	＊	＊	＊	＊	High-Impedance	I_{CCS}
	＊	V_{IL}	＊	＊	＊		
Output Disable	V_{IL}	V_{IH}	V_{IH}	V_{IH}	＊		I_{CCA}
Read	V_{IL}	V_{IH}	V_{IL}	V_{IH}	＊	Data Output	
Write	V_{IL}	V_{IH}	V_{IH}	V_{IL}	OFF	Data Input	

＊：Don't Care

10. Input/Output Capacitance

10.1 BS128G1-C-13

Ta=25℃,f=1MHz

Item	Symbol	Condition	MAX	Unit
Input/Output Capacitance	$C_{I/O}$	$V_{IN}=V_{OUT}=0V$	10	pF
Input Capacitance	C_{IN}	$V_{IN}=0V$	10	pF

10.2 BS256G1-C-13

Ta=25℃,f=1MHz

Item	Symbol	Condition	MAX	Unit
Input/Output Capacitance	$C_{I/O}$	$V_{IN}=V_{OUT}=0V$	20	pF
Input Capacitance	C_{IN}	$V_{IN}=0V$	20	pF

10.3 BS512G1-C-13

Ta=25℃,f=1MHz

Item	Symbol	Condition	MAX	Unit
Input/Output Capacitance	$C_{I/O}$	$V_{IN}=V_{OUT}=0V$	40	pF
Input Capacitance	C_{IN}	$V_{IN}=0V$	40	pF

10.4 BS1024G1-C-13

Ta=25℃,f=1MHz

Item	Symbol	Condition	MAX	Unit
Input/Output Capacitance	$C_{I/O}$	$V_{IN}=V_{OUT}=0V$	80	pF
Input Capacitance	C_{IN}	$V_{IN}=0V$	80	pF

11. AC Characteristics

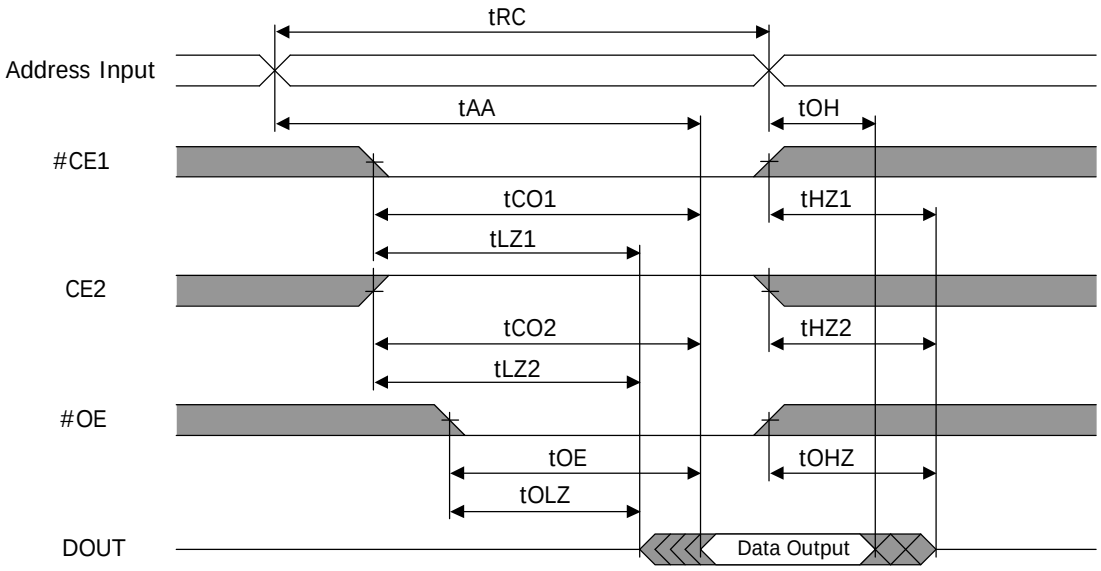
11.1 Test Conditions

- Input Pulse voltage Level ---------- 0.4 ~ 2.4V
- Input Rise And Fall Time ---------- 10ns
- In/Out timing Level ---------- 1.5V
- Output Load ---------- 1TTL + 100pF

11.2 Read Timing Specification

Item	Symbol	MIN	MAX	Unit
Read cycle Time	tRC	200		ns
Address Access Time	tAA		200	ns
#CE1 Access Time	tCO1		200	ns
CE2 Access Time	tCO2		200	ns
#OE Access Time	tOE		80	ns
Output Holding Time	tOH	10		ns
#CE1-Output Set Time	tLZ1	5		ns
CE2-Output Set Time	tLZ2	5		ns
#OE-Output Delay Time	tOLZ	5		ns
#CE1-Output Float Time	tHZ1		120	ns
CE2-Output Float Time	tHZ2		120	ns
#OE-Output Delay Time	tOHZ		65	ns

Note) On recommended operating conditions.



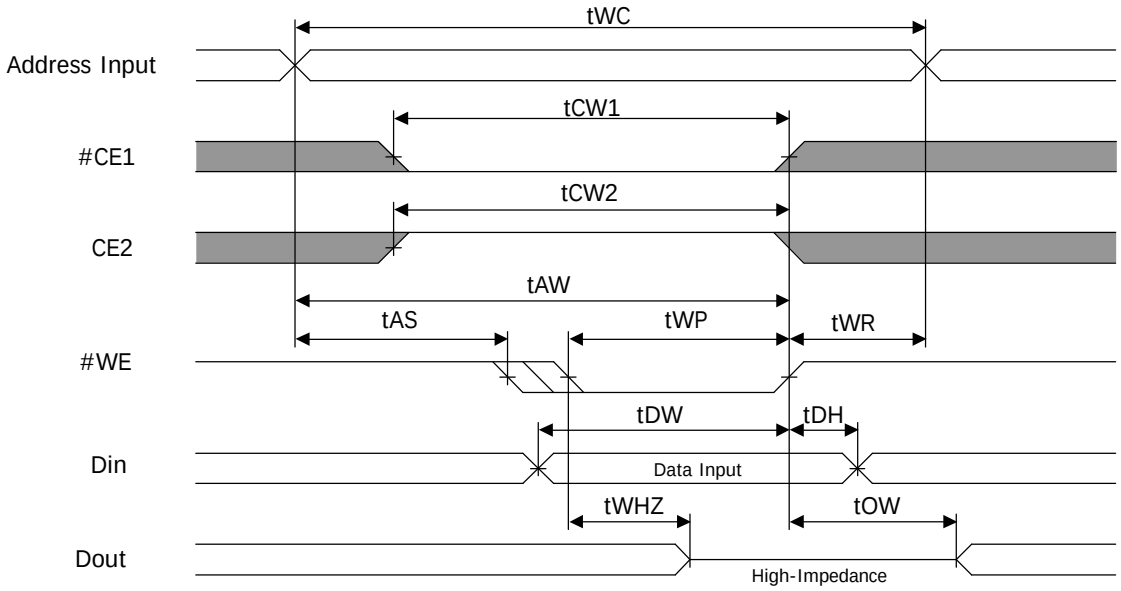
Note) #WE should be kept “H” level in read cycle.

図 11.1 Read Cycle timing

11.3 Write Timing Specification

Item	Symbol	MIN	MAX	Unit
Write cycle Time	tWC	200		ns
#CE1 - #WE Reset Time	tCW1	180		ns
CE2 - #WE Reset Time	tCW2	180		ns
Address - #WE Reset Time	tAW	180		ns
Address - #WE Set Up Time	tAS	0		ns
Write Pulse Width	tWP	85		ns
Address Holding Time	tWR	10		ns
Input Data Set Time	tDW	45		ns
Input Data Holding Time	tDH	0		ns
#WE - Output Float Time	tWHZ		80	ns
#WE - Output Activation Time	tOW	5		ns

Note) On recommended operating conditions.



11.2 Write cycle timing 1 (Note1, 2, 3) (#WE Control)

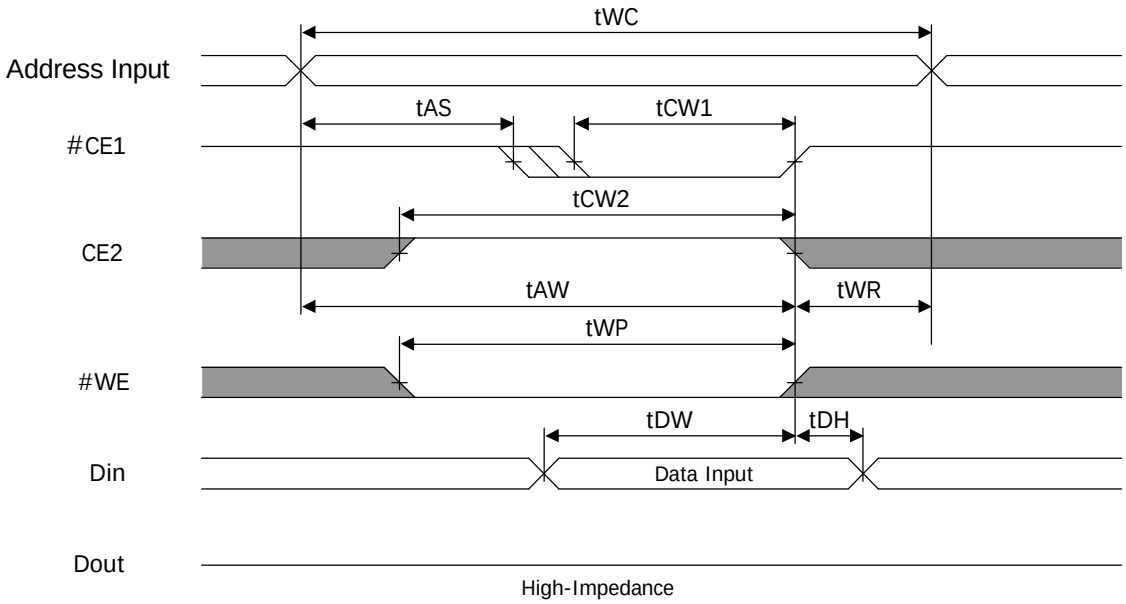


図 11.3 Write cycle timing 2(Note1, 3) (＃CE1 Control)

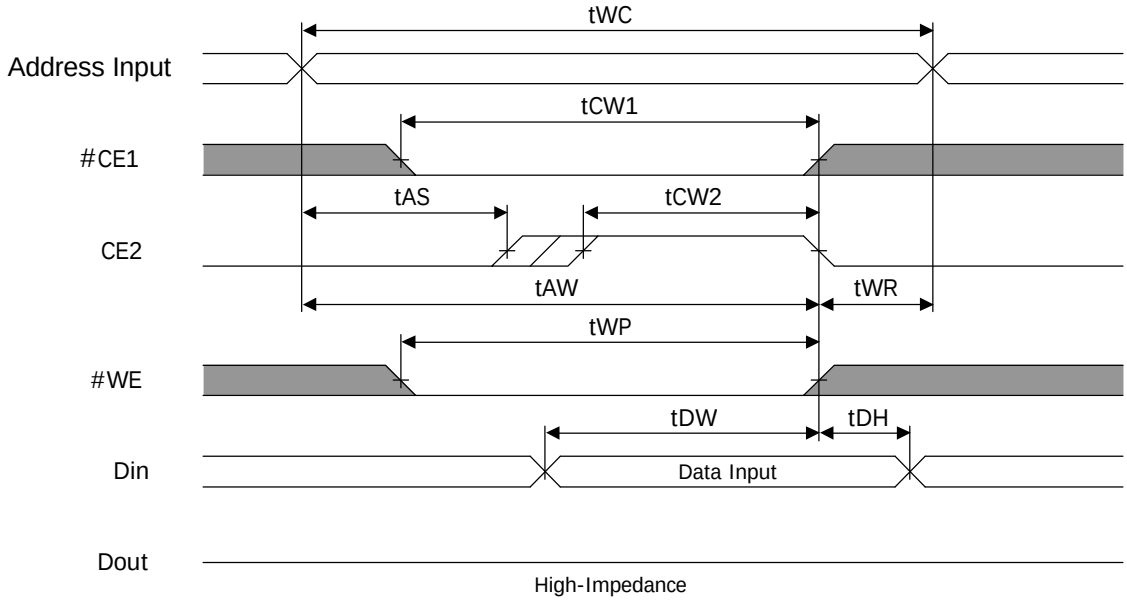
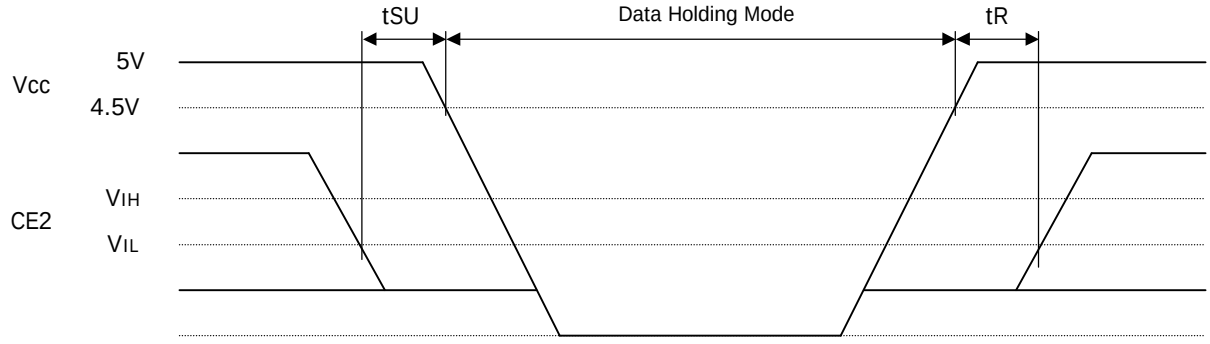


図 11.4 Write cycle timing 3 (Note1, 3) (CE2 Control)

Note1. Writing is made while #CE1=#WE=V_{IL} and CE2=V_{IH} are over lapped.
Note2. Output stays in the state of High-impedance when “L” of #CE1 or “H” of CE2 is made simultaneously with “L” of #WE or later.
Note3. Output stays in the state of High-impedance when #OE=V_{IH}.

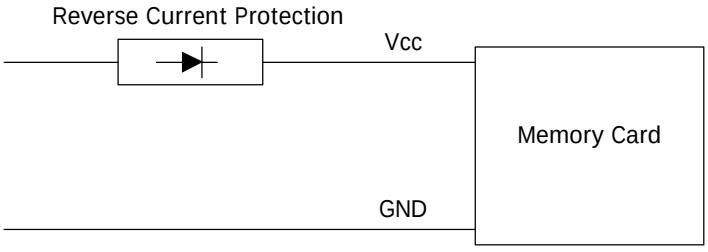
12. Data Holding Timing



CE2 Control (Power Supply at ON/OFF)

Item	Symbol	MIN	MAX	Unit
Chip Enable Setting Time	tSU	90		ns
Chip Enable Holding Time	tR	20		ms

A reverse current protection circuit should be provided to the system IN order to prevent the back up battery from draining away when installed in equipment.



13. Battery Life

Type	Battery Life	Unit
BS128G1-C-13	5.0	Year
BS256G1-C-13	5.0	
BS512G1-C-13	4.4	
BS1024G1-C-13	2.2	

The value of the battery life is applicable at an ambient temperature of 25℃.

14. Battery Back Up Characteristic

Item	Condition	MIN	MAX	Unit
Available battery voltage of back up	All pins open	2.5		V

15. Replacement of the Battery

○When the battery is replaced, insert the card into the unit and turn Power ON.

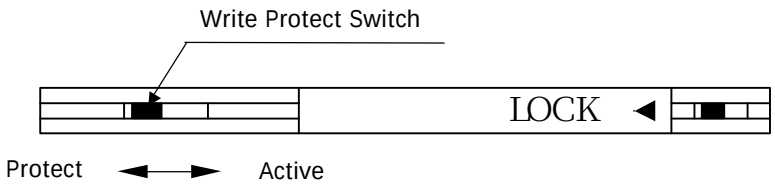
○Unlock the lock lever when pull out the battery holder.

○Look out the polarity of the battery.

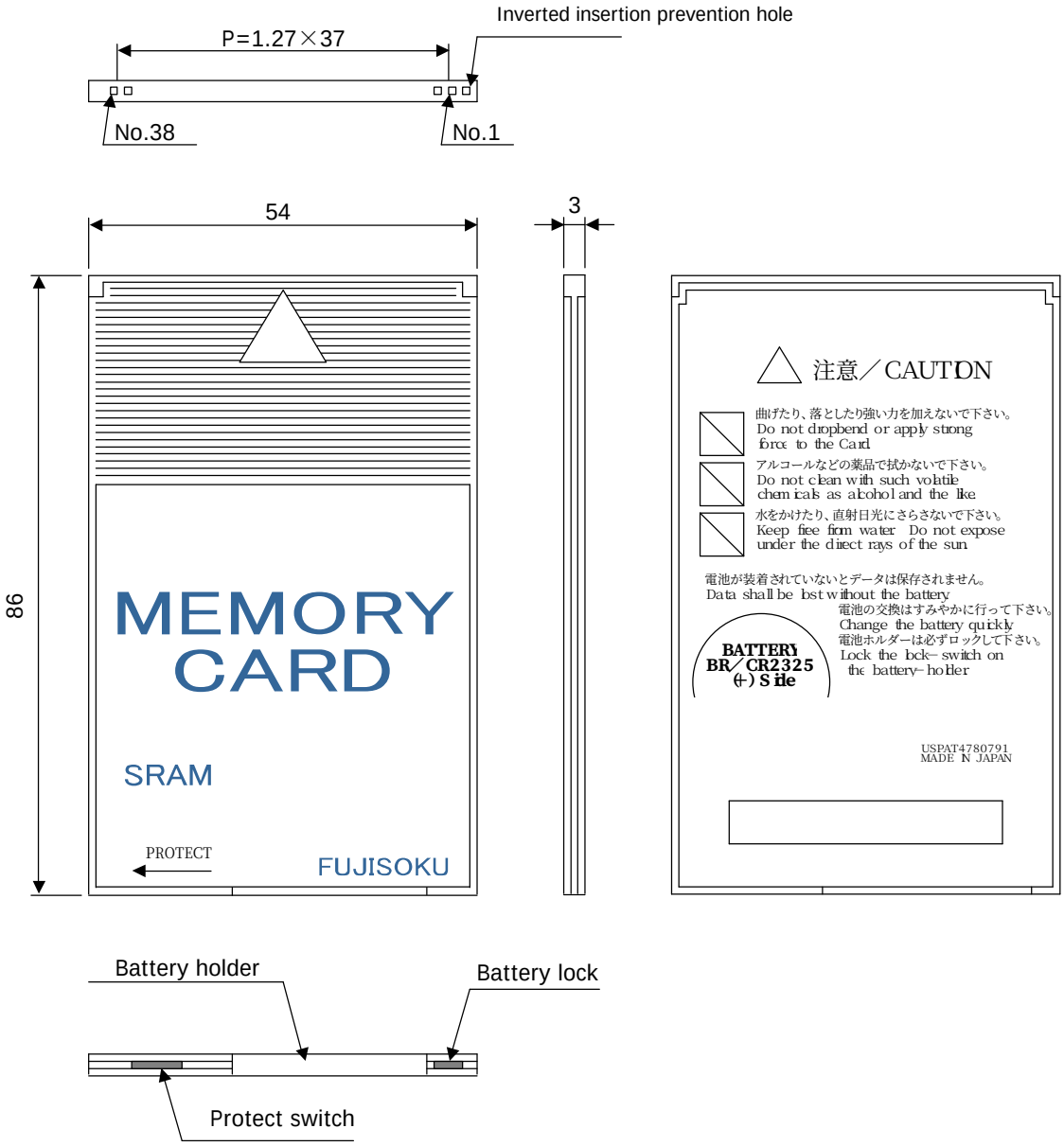
○Use the lithium battery type BR2325 or CR2325.

16. Write Protect

Switch	Condition
Protect	Write Impossible
Active	Write Possible



17. Diagrams of Exterior



18. Attention

This card is recommended for use for general system such as OA- system, Measuring-system, FA- system and the like.
You are requested to contact our sales people when you want to use the Card under such particular environments as exampled below.
This card is not for treating data of life maintenance or money exchange, etc.

[Examples] Fire prevention / Security system, Mobile / Traffic control system, Combustion control system, Aircraft / Spacecraft control system, Nuclear energy control system, etc.

When using the card, follow the below- mentioned instructions.
Otherwise, the card or the data damage may occur.

1. Do not clean the card with such volatile chemicals as alcohol and the like.
   Panels may come off from the card and may cause unexpected injury.
2. Do not drop, bend, or apply strong shock to the card.
3. Do not apply strong force to the card by putting it in a pocket of trousers, putting something heavy on the card, or by some other ways.
4. Keep the card free from the water. Do not expose the card under the rays of the sun.
5. Do not disassemble the panels or insert a metal tip such as a pin into the card.
6. Keep away the battery from infants.
   In case that they swallow the battery by accident, contact with a doctor as soon as possible.
7. Check the (+), (－)polarity, when replacing the battery.
8. Do not use the battery other than the attached or specified one.
9. Keep the card in the attached case when it is not used.

This card is guaranteed for 1 year after shipment.
If the card is found defective, during the warranty period, due to some cause in manufacturing, it shall be repaired or replaced.
But the stored data is out of warranty.

These products contain Strategic Products subject to COCOM regulations.
They should not be exported without authorization from the Japanese governmental authorities.