PCMCIA/JEIDA UNPROGRAMED ONE TIME PROGRAMABLE ROM

1. VARIATION

Part Number	Memory Size	Description
BWB065SD**	64K BYTE	32K × 16 bit UNPROGRAMED OTP ROM CARD
BWB129SD**	128K BYTE	64K × 16 bit UNPROGRAMED OTP ROM CARD
BWB257SD**	256K BYTE	128K × 16 bit UNPROGRAMED OTP ROM CARD
BWB513SD**	512K BYTE	256K × 16 bit UNPROGRAMED OTP ROM CARD
BWB101SD**	1M BYTE	512K × 16 bit UNPROGRAMED OTP ROM CARD
BWB201SD**	2M BYTE	1M × 16 bit UNPROGRAMED OTP ROM CARD

2. OUTLINE OF FUNCTIONS AND FEATURES

(1) This memory card conforms to PCMCIA/JEIDA.
(2) Operating temperature range: $T_{OPR} = 0 \sim 60°C$
Storage temperature range: $T_{STR} = -20 \sim 60°C$
(3) Size of the card: $85.6 \times 54.0 \times 3.3$ mm
(4) Includes exclusive IC's for the control of I/O.
(5) Supports 2 types of exclusive attribute memory.
(5-1) BWB***SDX*: With 2K Bytes EEPROM which can read/written
(5-2) BWB***SDY*: Without exclusive attribute memory (output "FFh", read only)
(6) BWB065, BWB267 and BWB513 permit writing words/bytes.
BWB129 and BWB101 permit writing words.
(7) This memory card is used for customer's development and data verification.
Data writing and write data cannot be guaranteed by manufacturer.

3. ELECTRICAL CHARACTERISTICS

3–1. Maximum Rating

Symbol	Description	Value	Unit
V_{CC}	SUPPLY VOLTAGE	–0.3 ~ 7.0	V
V_{IN}	INPUT SIGNAL VOLTAGE (*1)	–0.3 ~ V_{CC} +0.5	V
V_{OUT}	OUTPUT SIGNAL VOTLAGE	–0.3 ~ V_{CC}	V
V_{PP}	PROGRAM SUPPLY VOLTAGE	–0.3 ~ 14.0	V
T_{OPR}	OPERATING TEMPERATURE	0 ~ 60	°C
T_{STR}	STORAGE TEMPERATURE	–20 ~ 65	°C
HUM	HUMIDITY (*2)	10 ~ 95	%
PD	POWER DISSIPATION	2	W

*1: V_{IN}: Under 7.0 V

*2: No dew condition

3–2. Capacitance (Ta = 25°C, $V_{IN/OUT}$ = 0 V, f = 1 MHz)

Symbol	Description	Min	Typ	Max	Unit
C1	INPUT CAPACITANCE	—	14	20	pF
C2	I/O CAPACITANCE	—	14	20	pF

3–3. Recommended Operating Conditions (Ta = 0 ~ 60°C)

Symbol	Description	Min	Typ	Max	Unit
V_{CC}	V_{CC} SUPPLY VOLTAGE AT READ	4.50	5.0	5.50	V
V_{PP}	V_{PP} SUPPLY VOLTAGE AT READ	4.50	5.0	5.50	V
V_{CC}	V_{CC} SUPPLY VOLTAGE AT PROGRAM	6.0	6.25	6.50	V
V_{PP}	V_{PP} SUPPLY VOLTAGE AT PROGRAM *1	12.5	12.75	13.0	V
V_{PP}	V_{PP} SUPPLY VOLTAGE AT PROGRAM *2	12.2	12.50	12.8	V
V_{IH}	HIGH LEVEL INPUT VOLTAGE	V_{CC} × 0.8	—	V_{CC}+0.3	V
V_{IL}	LOW LEVEL INPUT VOLTAGE	–0.1	—	V_{CC} × 0.1	V

*1 : BWB129, BWB257, BWB513

*2 : BWB101

3–4. I/O DC Electrical Characteristics (Ta = 0 ~ 60°C, VCC = 5 V ±10%)

Symbol	Description	Object	Condition	Min	Typ	Max	Unit
I_{LI}	LOW LEVEL INPUT CURRENT	1, 3	V_{IN}=0 V	–10	—	10	μA
		2		–65	—	–40	μA
I_{HI}	HIGH LEVEL INPUT CURRENT	1, 2	V_{IN}=VCC	–10	—	10	μA
		3		10	—	65	μA
V_{OH}	HIGH LEVEL OUTPUT VOLTAGE	3	I_{OH}=–2.0mA	VCC–0.4	—	—	V
V_{OL}	LOW LEVEL OUTPUT VOLTAGE	3	I_{OL}=6.0mA	—	—	VSS+0.4	V

1: A0 ~ A19

2: /CE1, /CE2, /OE, /WE, /REG

3: D0 ~ D15

/CE1, /CE2, /OE, /WE, /REG

: Pull-up to VCC through 100 KΩ in the card

D0 ~ D15: Pull-down to GND through 100 KΩ in the card

3-5. Current Consumption (Ta = 0 ~ 60°C)

Symbol	Description	Condition		Min	Typ	Max	Unit
I_{STBY}	V_{CC} STANDBY CURRENT 1	/CE1=/CE2=/WE=/OE=/REG= V_{CC}–0.4V OTHERS=0.4V/V_{CC}–0.4V V_{CC}=5V ±0.5V, V_{PP}=V_{CC}		—	1.0	1.5	mA
I_{ACT1}	V_{CC} ACTIVE CURRENT (READ)	/CE1=/CE2=0.4V, I_{OUT}=0mA OTHERS=0.4V/V_{CC}–0.4V INPUT PULSE LEVEL (0.4V/V_{CC}–0.4V) V_{CC}=5V ±0.5V, V_{PP}=V_{CC}	f=1nS	—	20	40	mA
			f=200nS	—	—	70	mA
I_{ACT2}	V_{CC} ACTIVE CURRENT (PROGRAM)	PROGRAM MODE, V_{CC}=6.25V ±0.25V V_{PP}=12.75 ±0.25V (BWB129, 257, 513) V_{PP}=12.5 ±0.3V (BWB101)		—	—	60	mA
I_{PP1}	V_{PP} CURRENT (READ)	V_{CC}=5V ±0.5V, V_{PP}=V_{CC} ±0.25V		–20	—	20	μA
I_{PP2}	V_{PP} CURRENT (PROGRAM)	PROGRAMMING MODE, V_{CC}=6.25V ±0.25V V_{PP}=12.75 ±0.25V (BWB129, 257, 513) V_{PP}=12.5 ±0.3V (BWB101)		—	—	100	mA

3–6. AC Electrical Characteristics at Read of Common Memory (Ta = 0 ~ 60°C, VCC = 5 V ±10%)

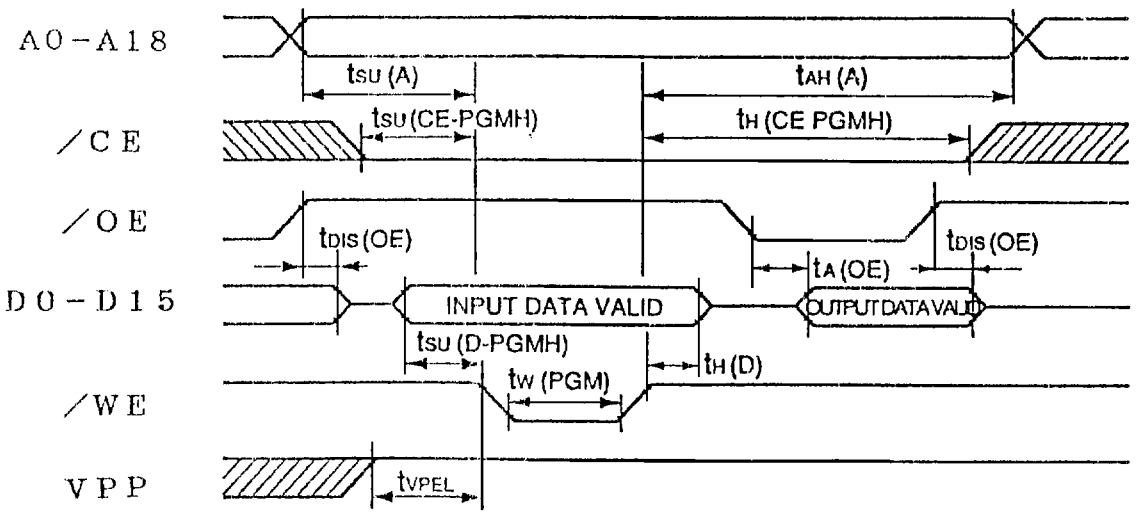
Symbol	Description	Min	Max	Unit
TCR	READ CYCLE TIME	200	—	nS
TA (A)	ADDRESS ACCESS TIME	—	200	nS
TA (CE)	/CE ACCESS TIME	—	200	nS
TA (OE)	/OE ACCESS TIME	—	100	nS
TDIS (CE)	OUTPUT DISABLE TIME FROM /CE	—	90	nS
TDIS (OE)	OUTPUT DISABLE TIME FROM /OE	—	90	nS
TEN (CE)	OUTPUT ENABLE TIME FROM /CE	5	—	nS
TEN (OE)	OUTPUT ENABLE TIME FROM /OE	5	—	nS
TV (A)	VALID DATA HOLD TIME FROM	0	—	nS

3–8. AC Electrical Characteristics at Write of Common Memory (BWB129, BWB257, BWB513)

(Ta = 0 ~ 60°C, V_{CC} = 6.25 V ±0.25 V, V_{PP} = 12.75 V ±0.25 V)

Symbol	Description	Min	Max	Unit
TSU (A)	ADDRESS SETUP TIME	2	—	μS
TAH (A)	ADDRESS HOLD TIME	2	—	μS
TSU (D-PGMH)	DATA SETUP TIME	2	—	μS
TH (D)	DATA HOLD TIME	2	—	μS
TSU (CE-PGMH)	/CE SETUP TIME	2	—	μS
TH (CE-PGMH)	/CE HOLD TIME	2	—	μS
TW (PGM)	WRITE PULSE WIDTH	95	105	μS
TA (OE)	/OE ACCESS TIME	—	150	nS
TDIS (OE)	OUTPUT DISABLE TIME FROM /OE	—	100	nS
TVPEL	V_{PP} SETUP TIME	2	—	μS

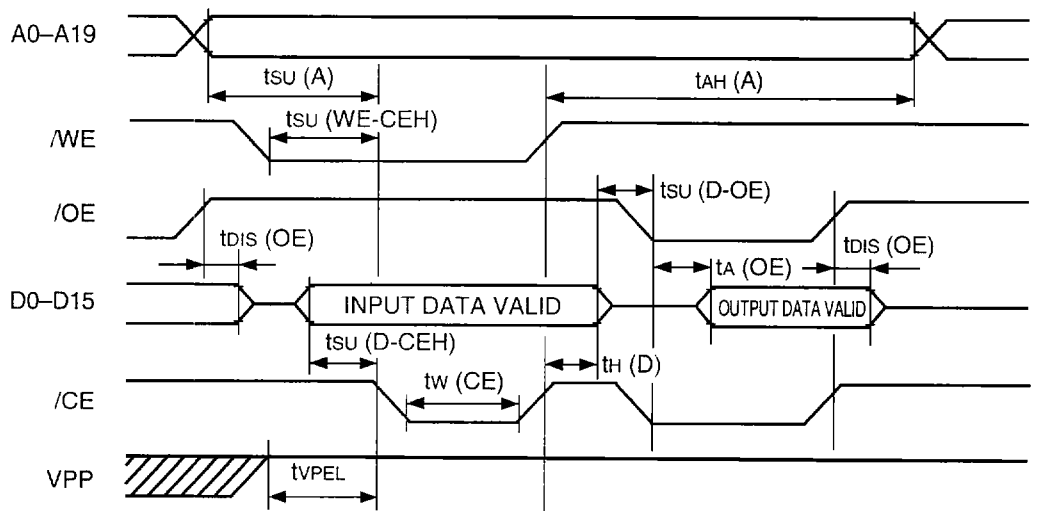
3–9. Write Timing of Common Memory (BWB129, BWB257, BWB513)



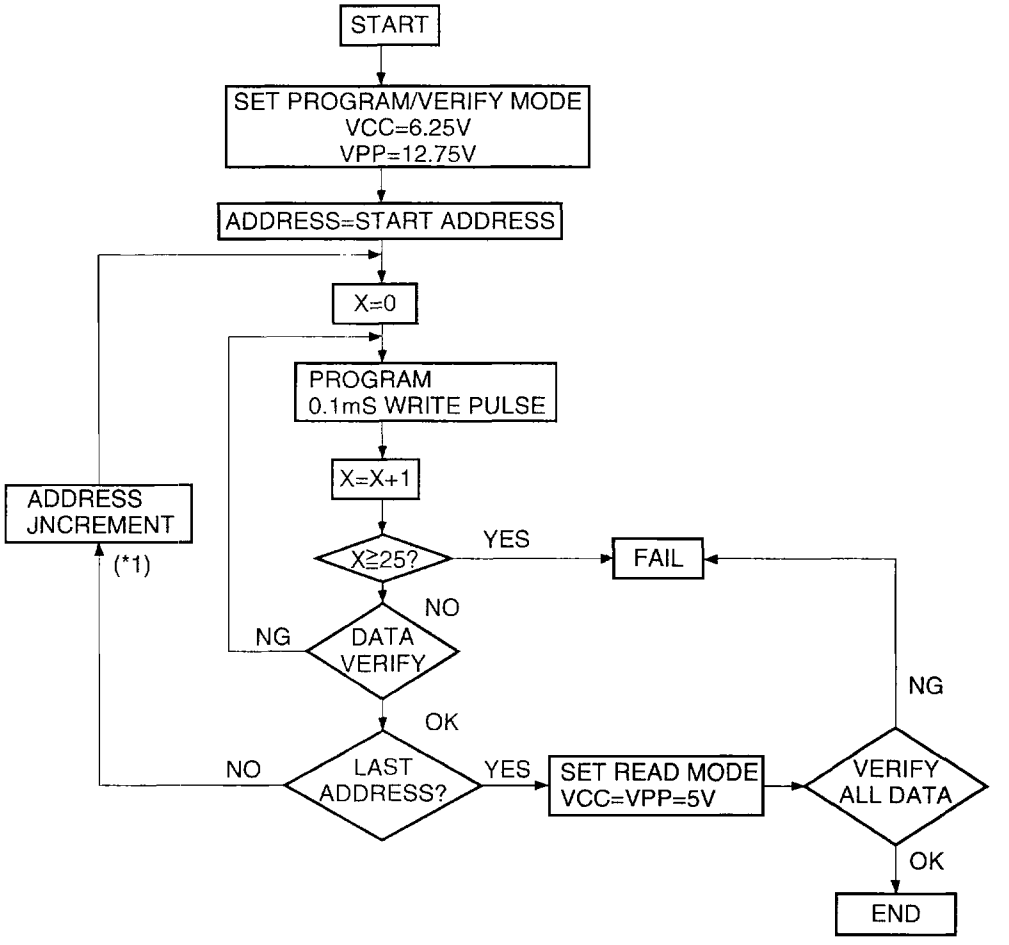
3–10. AC Electrical Characteristics at Write of Common Memory (BWB101) (Ta = 0 ~ 60°C, VCC = 6.25 V ±0.25 V, VPP = 12.5 V ±0.3 V)

記号	項　目	Min	Max	単位
TSU (A)	ADDRESS SETUP TIME	2	—	μS
TAH (A)	ADDRESS HOLD TIME	2	—	μS
TSU (D-CEH)	DATA SETUP TIME	2	—	μS
TH (D)	DATA HOLD TIME	2	—	μS
TSU (WE-CEH)	/CE SETUP TIME	0	—	μS
TW (CE)	WRITE PULSE WIDTH	45	55	μS
TSU (D-OE)	/OE SETUP TIME	2	—	μS
TA (OE)	/OE ACCESS TIME	—	150	nS
TDIS (OE)	OUTPUT DISABLE TIME FROM /OE	—	100	nS
TVPEL	VPP SETUP TIME	2	—	μS

3–11. Write Timing of Common Memory (BWB101)



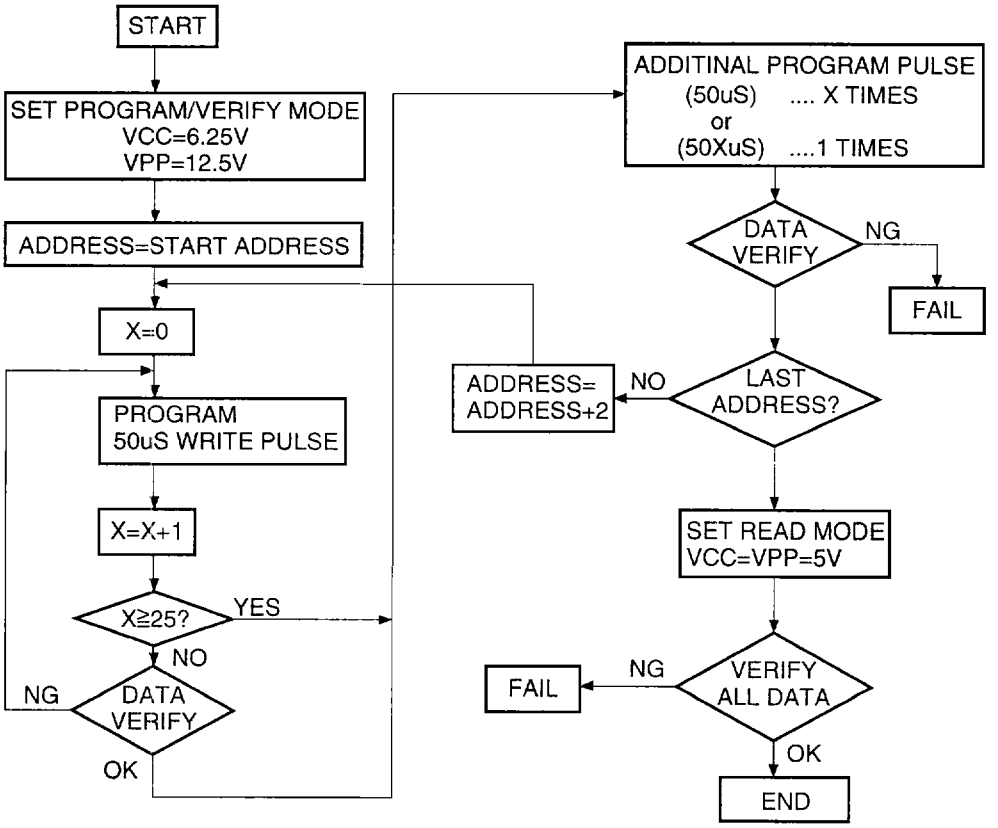
3–12. Programming Flow Chart of Common Memory (BWB129, BWB257, BWB513)



(*1) ADDRESS INCREMENT

ADDRESS INCREMENT	PROGRAM MODE
ADDRESS=ADDRESS+1	BYTE DATA PROGRAM for BWB257, BWB513 (BWB129 : WORD DATA PROGRAM ONLY)
ADDRESS=ADDRESS+2	WORD DATA PROGRAM

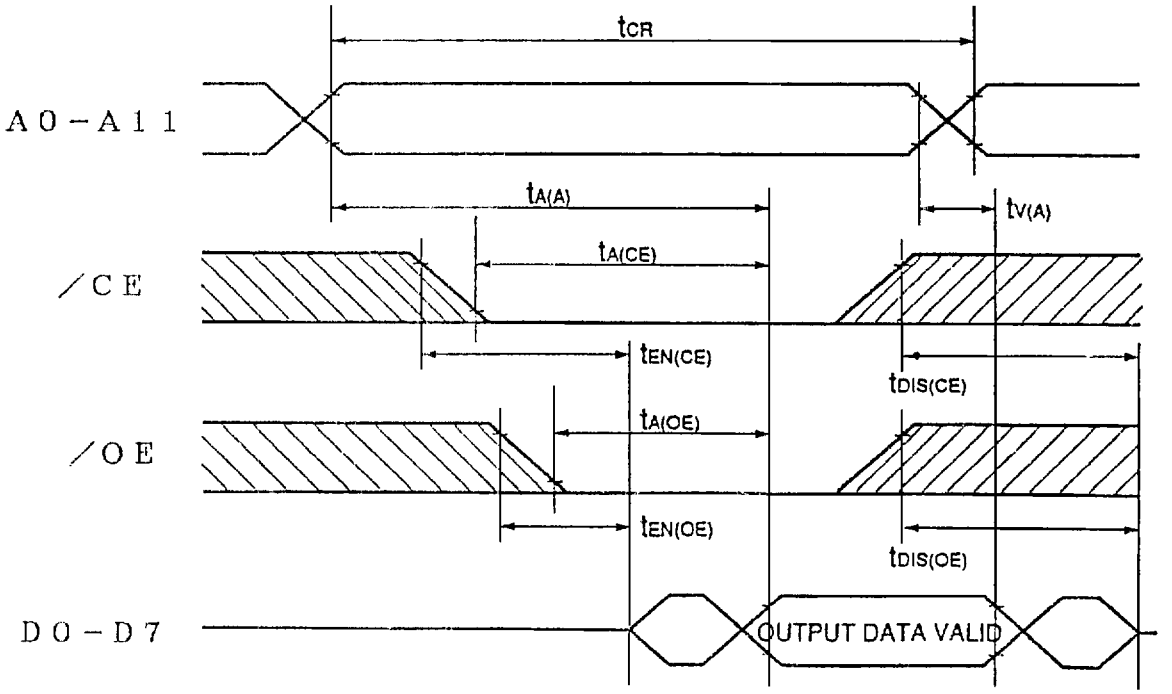
3–13. Programming Flow Chart of Common Memory (BWB101)



3–14. AC Electrical Characteristics at Read of Attribute Memory (2K Bytes EEPROM) (Ta = 0 ~ 60°C, Vcc = 5 V ±10%)

Symbol	Description	Min	Max	Unit
TCR	READ CYCLE TIME	300	—	nS
TA (A)	ADDRESS ACCESS TIME	—	300	nS
TA (CE)	/CE ACCESS TIME	—	300	nS
TA (OE)	/OE ACCESS TIME	—	150	nS
TDIS (CE)	OUTPUT DISABLE TIME FROM /CE	—	100	nS
TDIS (OE)	OUTPUT DISABLE TIME FROM /OE	—	100	nS
TEN (CE)	OUTPUT ENABLE TIME FROM /CE	5	—	nS
TEN (OE)	OUTPUT ENABLE TIME FROM /OE	5	—	nS
TV (A)	VALID DATA HOLD TIME FROM ADDRESS INVALID	0	—	nS

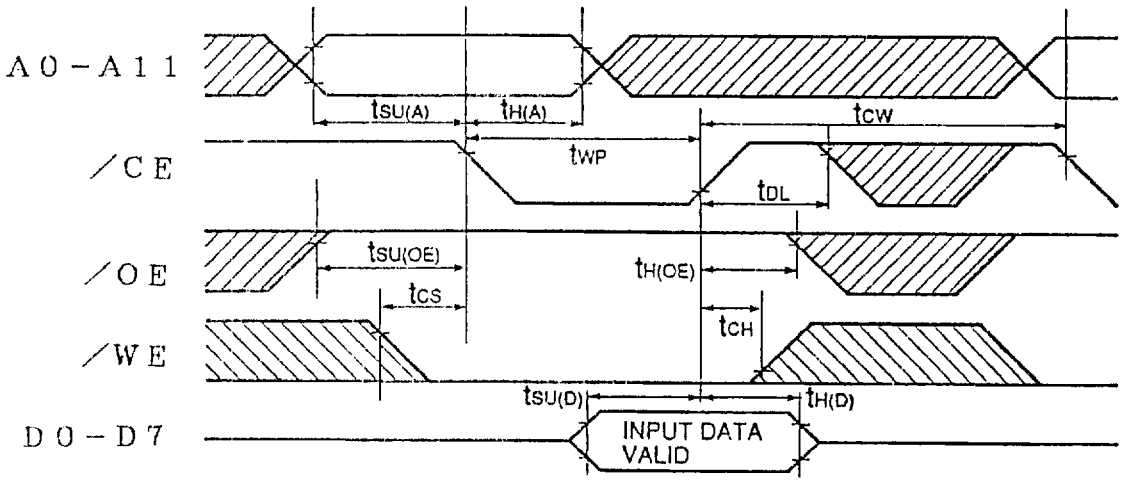
3–15. Read Timing of Attribute Memory (2K Bytes EEPROM)



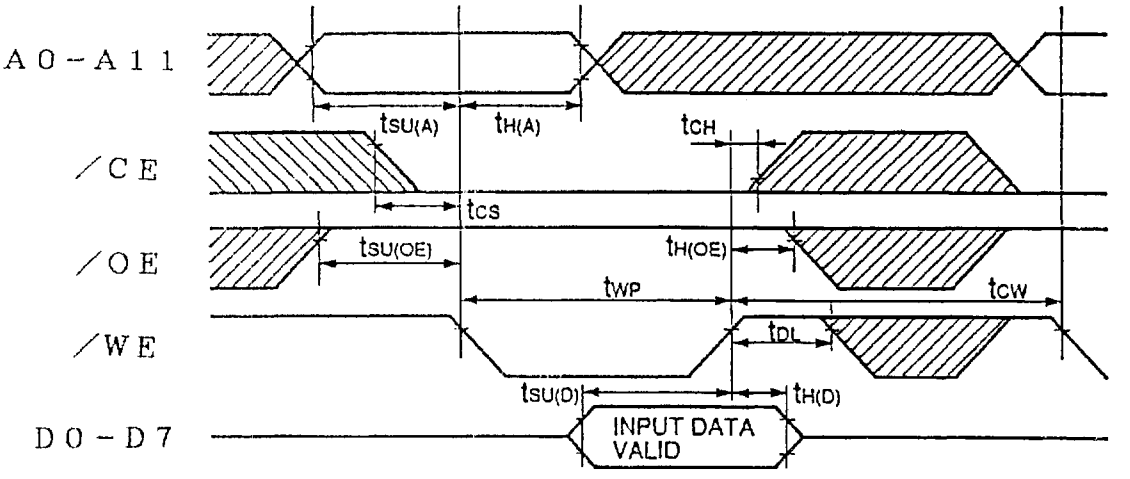
3–16. AC Electrical Characteristics of Attribute Memory (2K Bytes EEPROM) (Ta = 0 ~ 60°C, VCC = 5 V ±10%)

Symbol	Description	Min	Max	Unit
TCW	WRITE CYCLE TIME	15	—	mS
TWP	WRITE PULSE WIDTH	150	—	nS
TSU (A)	ADDRESS SETUP TIME	30	—	nS
TSU (D)	DATA SETUP TIME	80	—	nS
TH (D)	DATA HOLD TIME	30	—	nS
TSU (OE)	/OE SETUP TIME	15	—	nS
TH (OE)	/OE HOLD TIME	15	—	nS
TH (A)	ADDRESS HOLD TIME	100	—	nS
TCS	WRITE SETUP TIME	30	—	nS
TCH	WRITE HOLD TIME	0	—	nS
TDL	DATA LATCH TIME	50	—	nS

3–17. Write Timing of Attribute Memory (2K Bytes EEPROM) (/CE Controlled Write)



3–18. Write Timing of Attribute Memory (2K Bytes EEPROM) (/WE Controll)



3–19. AC Test Conditions

Vcc	:	5 V ±10%
Ta	:	0 ~ 60°C
Input pulse level	:	VIH = Vcc × 0.8 V VIL = Vcc × 0.1 V
I/O timing reference level	:	1.5 V
Output load	:	100 pF + 1 TTL gate (including oscilloscope and jig)

3–20. Programming Modes of Common Memory

CARD	PROGRAMMING MODE
BWB129 BWB101	WORD WRITE
BWB065 BWB257 BWB513	WORD WRITE EVEN DATA WRITE ODD DATA WRITE 1, 2

3–21. Operating Modes of Common Memory

Operating Mode	/REG	A0	/CE1	/CE2	/OE	/WE	D0 ~ D7	D8 ~ D15
STANDBY	*	*	VIH	VIH	*	*	Hi-Z	Hi-Z
EVEN DATA READ	VIH	VIL	VIL	VIH	VIL	VIH	OUTPUT	Hi-Z
ODD DATA READ 1	VIH	VIH	VIL	VIH	VIL	VIH	OUTPUT	Hi-Z
ODD DATA READ 2	VIH	*	VIH	VIL	VIL	VIH	Hi-Z	OUTPUT
EVEN DATA WRITE	VIH	VIL	VIL	VIH	VIH	VIL	INPUT	Hi-Z
ODD DATA WRITE 1	VIH	VIH	VIL	VIH	VIH	VIL	INPUT	Hi-z
ODD DATA WRITE 2	VIH	*	VIH	VIL	VIH	VIL	Hi-Z	INPUT
WORD READ	VIH	*	VIL	VIL	VIL	VIH	OUTPUT	OUTPUT
WORD WRITE	VIH	*	VIL	VIL	VIH	VIL	INPUT	INPUT

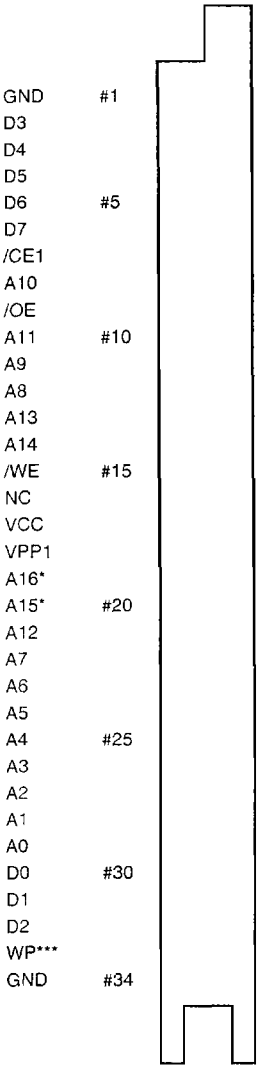
Hi-Z : High impedance
* : VIH or VIL

3–22. Operating Modes of Attribute Memory (2K Bytes EEPROM)

Operating Mode	/REG	A0	/CE1	/CE2	/OE	/WE	D0 ~ D7	D8 ~ D15
BYTE DATA READ	VIL	VIL	VIL	VIH	VIL	VIH	OUTPUT	Hi-Z
	VIL	VIH	VIL	VIH	VIL	VIH	Hi-Z	Hi-Z
WORD DATA READ	VIL	*	VIL	VIL	VIL	VIH	OUTPUT	Hi-Z
BYTE DATA WRITE	VIL	VIL	VIL	VIH	VIH	VIL	INPUT	Hi-Z
	VIL	VIH	VIL	VIH	VIH	VIL	INVALID	Hi-Z
WORD DATA WRITE	VIL	*	VIL	VIL	VIH	VIL	INPUT	INVALID

Hi-Z : High impedance
* : VIH or VIL

4. PIN ASSIGNMENT



GND	#1		#35	GND
D3				/CD1**
D4				D11
D5				D12
D6	#5			D13
D7			#40	D14
/CE1				D15
A10				/CE2
/OE				NC
A11	#10			NC
A9			#45	NC
A8				A17*
A13				A18*
A14				A19*
/WE	#15			NC
NC			#50	NC
VCC				VCC
VPP1				VPP2
A16*				NC
A15*	#20			NC
A12			#55	NC
A7				NC
A6				NC
A5				NC
A4	#25			NC
A3			#60	NC
A2				/REG
A1				BVD2***
A0				BVD1***
D0	#30			D8
D1			#65	D9
D2				D10
WP***				/CD2**
GND	#34		#68	GND

A15* : BWB065, BWB129, BWB257, BWB513, BWB101

A16* : BWB129, BWB257, BWB513, BWB101

A17* : BWB257, BWB513, BWB101

A18* : BWB513, BWB101

A19* : BWB101

/CD1**, /CD2** : Connect to GND in the card.

WP***, BVD1***, BVD2***

: Connect to VCC in the card.

NC : No connect