JEIDA Ver. 4 STATIC RAM

VARIATION

Part Number	Memory Size	Description
AWB065SD*0	64K Bytes	32K × 16 bits MIX CMOS SRAM CARD
AWB129SD*0	128K Bytes	64K × 16 bits MIX CMOS SRAM CARD
AWB257SD*0	256K Bytes	128K × 16 bits MIX CMOS SRAM CARD
AWB513SD*0	512K Bytes	256K × 16 bits MIX CMOS SRAM CARD
AWB101SD*0	1M Bytes	512K × 16 bits MIX CMOS SRAM CARD
AWB201SD*0	2M Bytes	1M × 16 bits MIX CMOS SRAM CARD (Under development)

Note: * : Attribute memory type
2 : 2K Bytes EEPROM (Can be read/written)
3 : 16 Bytes battery back-up memory (Can be read/written)
4 : No attribute memory (Output "FF") (Read only)

OUTLINE OF FUNCTIONS AND FEATURES

(1) This memory card conforms to JEIDA Ver. 4.

(2) Size of the card

Width : 54.0 mm
Length : 85.6 mm
Thickness : 3.3 mm

(3) Includes exclusive IC's for the control of I/O and power functions.

(4) Two digital outputs (BVD_1, BVD_2) for the condition of the batter.

(5) A write protect switch for protection from accidental overwriting.

(6) Locking mechanism for battery holder.

(7) Replaceable battery. (Replace only when power is supplied.)

(8) Support 3 type attribute memory.

8–1) With 2K Bytes EEPROM which can be read/written.
8–2) With 16 Bytes battery back-up memory which can be read/writte.
8–3) No attribute memory which can be read only. (Output "FF")

(9) Card Type : 68 pin Two-piece Type.

ABSOLUTE MAXIMUM RATING

Symbol	Description	Note	Min	Max	Unit
V_{CC}	Supply voltage		–0.5	7.0	V
V_{IN}	Input signal voltage	1	–0.5	V_{CC} +0.5	V
V_{OUT}	Output signal voltage	1	–0.5	V_{CC} +0.5	V
T_{OPR}	Operating temperature		0	60	°C
T_{STR}	Storage temperature	2	–20	60	°C
HUM	Humidity	3	10	90	%
P_D	Power dissipation			1	W
V_{BTRY}	Battery voltage	4	–0.5	7.0	V

Notes : 1. Uuder 7.0 V
2. Without data back-up
3. No dew condition
4. The recommended battery is lithium battery CR2025 or equivalent.

CAPACITANCE
(Ta = 25°C, V_{IN}/V_{OUT} = 0 V, f = 1 MHz)

Symbol	Description	Min	Typ	Max	Unit
C_1	Input capacitance	—	10	14	pF
C_2	Input/output capacitance	—	10	14	pF

Note: The above figures are for reference only.

RECOMMENDED DC OPERATING CONDITIONS

Symbol	Description	Min	Typ	Max	Unit
V_{CC}	Supply voltage	4.75	5.0	5.25	V
V_{BAT}	Battery voltage	2.5	—	—	V
V_{IH}	High level input voltage	3.5	—	V_{CC} +0.3	V
V_{IL}	Low level input voltage	–0.3	—	1.0	V

DC ELECTRICAL CHARACTERISTICS (V_{CC} = 5 V, Ta = 25°C)

Symbol	Description	Note	Condition	Min	Typ	Max	Unit
I_{LI}	Low level input current	1, 3	V_{IN} = 0 V	–10	—	10	µA
		2		–53	—	–48	µA
I_{HI}	High level input current	1, 2	V_{IN} = 5 V	–10	—	10	µA
		3		10	—	50	µA
V_{OH}	High level output Voltage	3, 4, 5	I_{OH} = –2.0 mA	V_{CC}-0.6	—	—	V
V_{OL}	Low level output voltage	3, 4, 5	I_{OL} = 6.0 mA	—	—	V_{SS} +0.4	V

Notes:
1. A0 to A20
   Pull-down in the G/A (V_{CC} < 4.2 V)
   Without pull-down (V_{CC} > 4.2 V)
2. $\overline{CE1}$, $\overline{CE2}$, $\overline{WE}$, $\overline{OE}$, $\overline{REG}$
   Pull-up to V_{CC} through 100 ohm
   Pull-down in the G/A (V_{CC} < 4.2 V)
   Without pull-down (V_{CC} > 4.2 V)
3. D0 to D15
   Pull-down to GND through 100K ohm
4. BVD_1, BVD_2
5. WP

CURRENT CONSUMPTION AND BATTERY VOLTAGE DETECTION (Ta = 25°C, V_{CC} = 5 V ±5%, V_{BTRY} = 3 V)

Symbol	Description	Condition		Min	Typ	Max	Unit
I_{STBY}	Standby current	$\overline{CE}$ = $\overline{WE}$ = $\overline{OE}$ = $\overline{REG}$ = V_{CC} – 0.2 V Other = V_{IL}/V_{IH}		0.8	1.1	1.5	mA
I_{ACT}	Active current	$\overline{CE}$ = V_{IL}, I_{OUT} = 0 mA, Other = V_{IL}/V_{IH}	f = 1MHz	—	35	50	mA
			f = MAX	—	—	130	mA

CURRENT CONSUMPTION AND BATTERY VOLTAGE DETECTION ($Ta = 25°C$, $V_{CC} = 5\ V \pm 5\%$, $V_{BRTY} = 3\ V$) (Cont)

Symbol	Description	Condition		Min	Typ	Max	Unit
I_{BAT1}	Back-up current 1 Ta = 25°C	V_{CC} = 0 V, V_{BAT} = 3 V	AWB065 AWB129 AWB257 AWB513 AWB101 AWB201	— — —	1.0 1.5 2.3 4.5 9.0	4.0 5.0 7.0 14.0 27.0	µA µA µA µA
I_{BAT2}	Back-up current 2 Ta = 0 to 60°C	V_{CC} = 0 V, V_{BAT} = 3 V	AWB065 AWB128 AWB257 AWB513 AWB101 AWB201	— — — — —	— — — — —	20 40 15 30 60	µA µA µA µA µA µA
V_{INL}	Input detect voltage	V_{IN} V_{CC} – > 0 V		4.10	4.20	4.30	V
V_{INH}	Input detect voltage	V_{IN} 0 V – >V_{CC}		4.20	4.30	4.40	V
DV_{IN}	Hysteresis width	V_{INH} – V_{INL}		50	100	150	mV
BVD_2	Battery detect voltage 2	V_{BB} – > 0 V		2.55	2.65	2.75	V
$DBVD_2$	Hysteresis width			20	40	60	mV
BVD_1	Battery detect voltage 1	V_{BB} – > 0 V		2.27	2.37	2.47	V
$DBVD_1$	Hysteresis width			20	40	60	mV

OPERATING MODES OF COMMON MEMORY

Mode	$\overline{REG}$	A0	$\overline{CE1}$	$\overline{CE2}$	$\overline{OE}$	$\overline{WE}$	D0 to D7	D8 to D15
Standby	*	*	VIH	VIH	*	*	HZ	HZ
Even data read	VIH	VIL	VIL	VIH	VIL	VIH	OUTPUT	HZ
Odd data read 1	VIH	VIH	VIL	VIH	VIL	VIH	OUTPUT	HZ
Odd data read 2	VIH	*	VIH	VIL	VIL	VIH	HZ	OUTPUT
Even data write	VIH	VIL	VIL	VIH	VIH	VIL	INPUT	don't care
Odd data write 1	VIH	VIH	VIL	VIH	VIH	VIL	INPUT	don't care
Odd data write 2	VIH	*	VIH	VIL	VIH	VIL	don't care	INPUT
Word read	VIH	*	VIL	VIL	VIL	VIH	OUTPUT	OUTPUT
Word write	VIH	*	VIL	VIL	VIH	VIL	INPUT	INPUT

Notes: HZ = High impedance
(Pull-down to GND through 100 k ohm)
* = Input is VIH or VIL

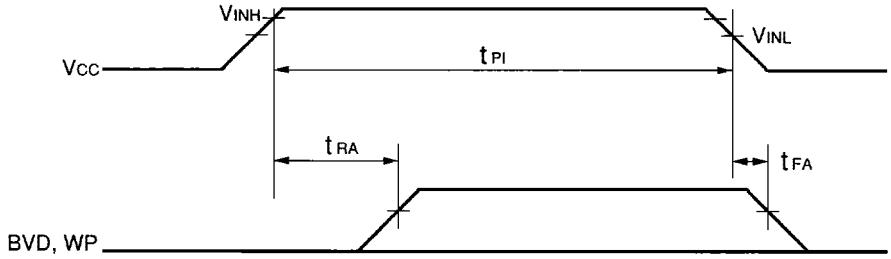
OPERATING MODES OF ATTRIBUTE MEMORY

Mode	$\overline{REG}$	A0	A1 to A11*	$\overline{CE1}$	$\overline{CE2}$	$\overline{OE}$	$\overline{WE}$	D0 to D7	D8 to D15
Data read	VIL	VIL	*	VIL	VIH	VIL	VIH	OUTPUT	HZ
	VIL	VIH	*	VIL	VIH	VIL	VIH	NON-VALID	HZ
Word data read	VIL	*	*	VIIL	VIL	VIL	VIH	OUTPUT	NON-VALID
Data write	VIL	VIL	*	VIL	VIH	VIH	VIL	INPUT	don't care
	VIL	VIH	*	VIL	VIH	VIH	VIL	don't care	don't care
Word data write	VIL	*	*	VIL	VIL	VIH	VIL	INPUT	don't care

Notes: A1 to A11* = 2K Bytes attribute memory.
A1 to A4* = 16 Bytes attribyte memory.
* = Input is VIH or VIL

AC ELECTRICAL CHARACTERISTICS OF POWER CONTROL
(Ta = 25°C, VCC = 5 V ±5%)

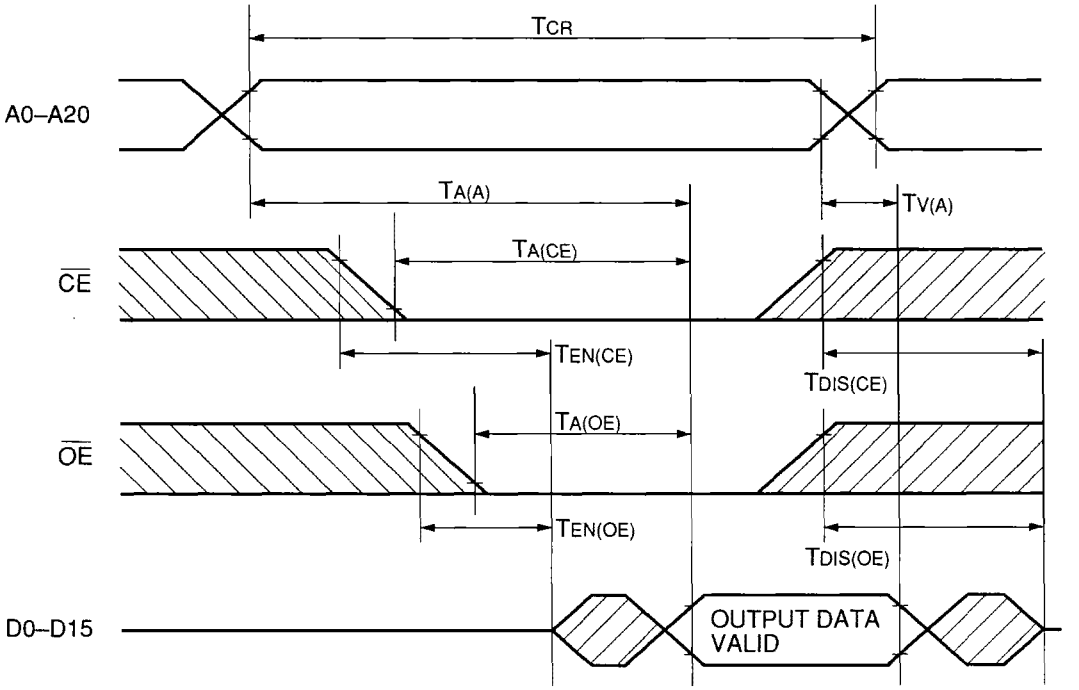
Symbol	Parameter	Condition	Min	Typ	Max	Unit
TPI	Input pulse width	—	1	—	—	ms
TRA	Rising time of VBAT output	—	0.5	1	1.5	ms
TFA	Falling time of VBAT output	—	—	2.0	—	µs



AC ELECTRICAL CHARACTERISTICS AT READ OF COMMON MEMORY

Symbol	Parameter	Min	Max	Unit
TCR	Read cycle time	250	—	ns
TA (A)	Address access time	—	250	ns
TA (CE)	Card enable access time	—	250	ns
TA (OE)	Output enable access time	—	125	ns
TDIS (CE)	Output disable time from card enable	—	100	ns
TDIS (OE)	Output disable time from output enable	—	100	ns
TEN (CE)	Output enable time from card enable	5	—	ns
TEN (OE)	Output enable time from output enable	5	—	ns
TV (A)	Valid data hold time from address invaled	0	—	ns

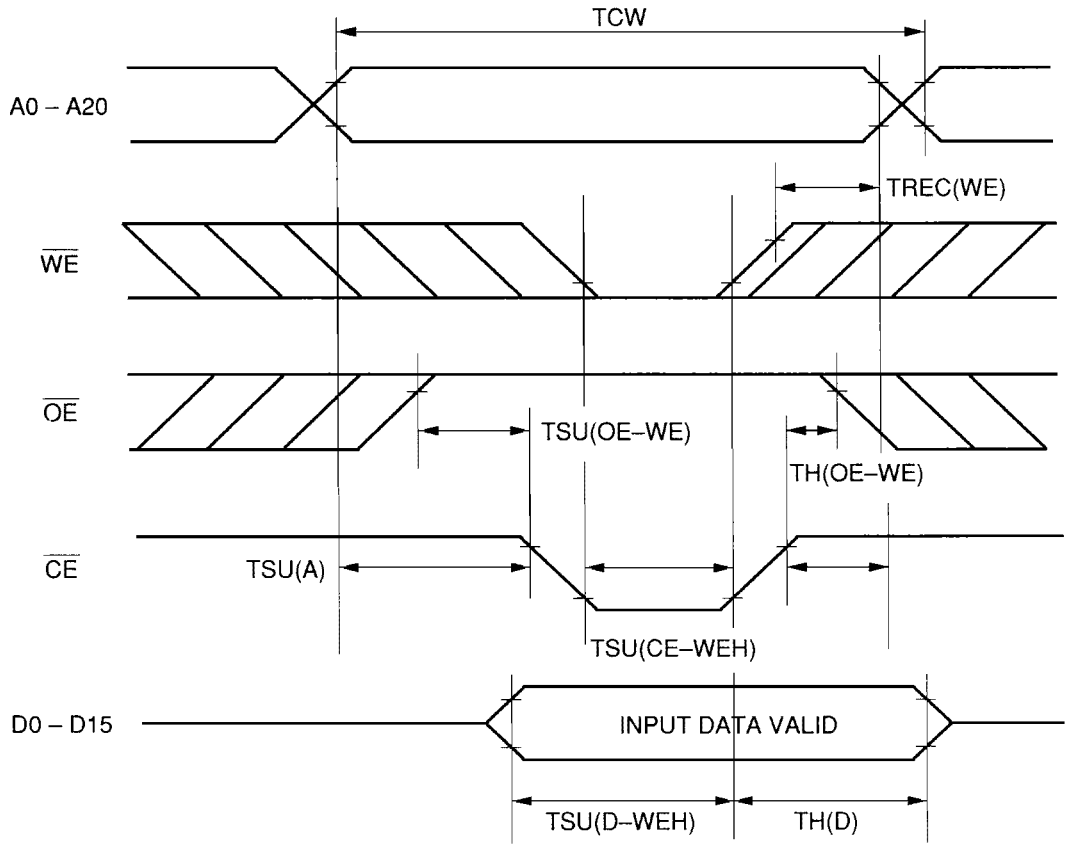
READ TIMING OF COMMON MEMORY



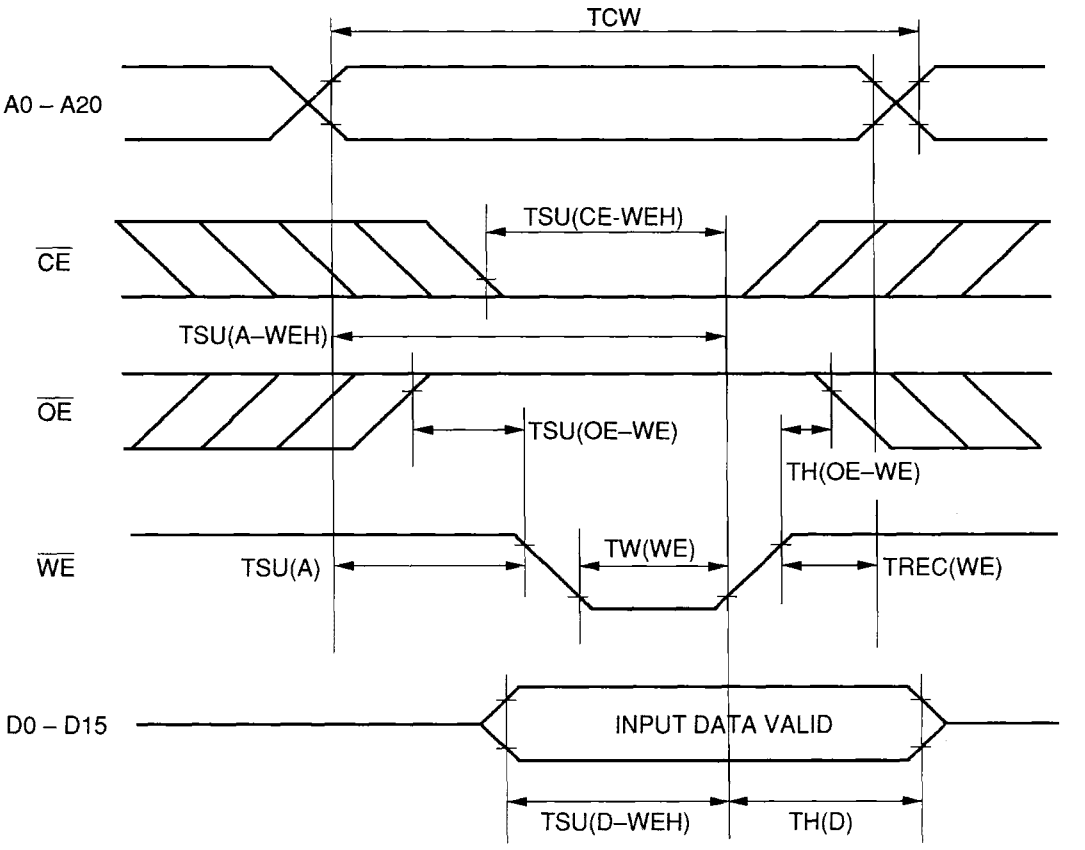
AC ELECTRICAL CHARACTERISTICS AT WRITE OF COMMON MEMORY

Symbol	Parameter	Min	Max	Unit
TCW	Write cycle time	250	—	ns
TW (WE)	Write pulse width	150	—	ns
TSU (A)	Address setup time	30	—	ns
TSU (A – WEH)	Address setup time to end write	180	—	ns
TSU (CE – WEH)	Card enable setup time	180	—	ns
TSU (D – WEH)	Data setup time	80	—	ns
TH (D)	Data hold time	30	—	ns
TREC (WE)	Write recovery time	30	—	ns
TSU (OE – WE)	Output enable setup time	10	—	ns
TH (OE)	Output enable hold time	10	—	ns

WRITE TIMING OF COMMON MEMORY ($\overline{CE}$ CONTROLLED WRITE)



WRITE TIMING OF COMMON MEMORY ($\overline{WE}$ CONTROLLED WRITE)



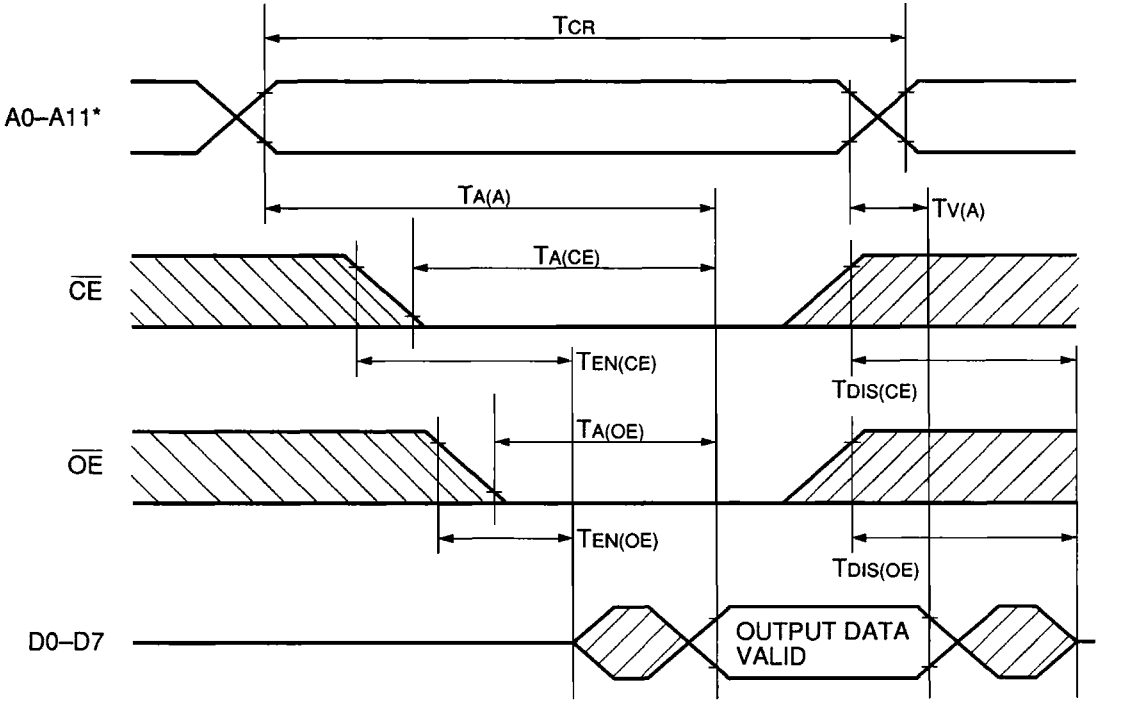
<< AC test conditions >>

Output load : 1 TTL gate + 100 pF (include jig)

AC ELECTRICAL CHARACTERISTICS AT READ OF ATTRIBUTE MEMORY

Symbol	Parameter	Min	Max	Unit
TCR	Read cycle time	300	—	ns
TA (A)	Address access time	—	300	ns
TA (CE)	Card enable access time	—	300	ns
TA (OE)	Output enable access time	—	150	ns
TDIS (CE)	Output disable time from card enable	—	100	ns
TDIS (OE)	Output disable time from output enable	—	100	ns
TEN (CE)	Output enable time from card enable	5	—	ns
TEN (OE)	Output enable time from output enable	5	—	ns
TV (A)	Valid data hold time from address invaled	0	—	ns

READ TIMING OF ATTRIBUTE MEMORY

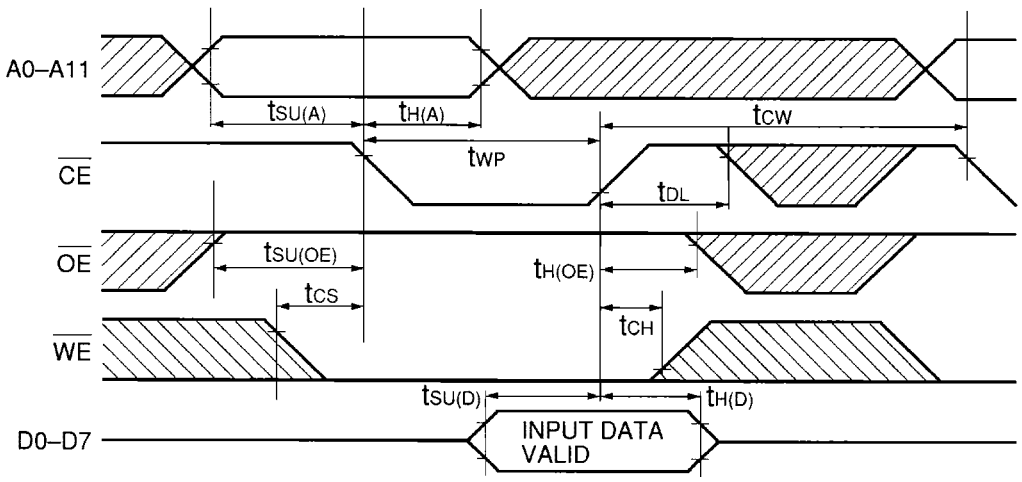


Note: A0 to A11 = 2 K Bytes attribute memory.
A0 to A4 = 16 Bytes attribute memory.

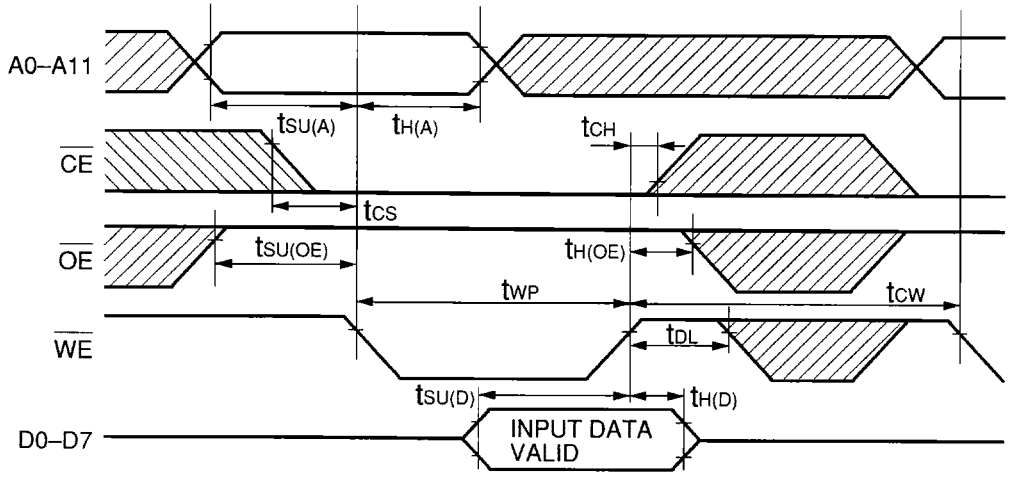
WRITE CYCLE OF ATTRIBUTE MEMORY (2K BYTES EEPROM ATTRIBUTE MEMORY)

Symbol	Parameter	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)	Output enable setup time	15	—	ns
TH (OE)	Output enable 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

WRITE TIMING OF ATTRIBUTE MEMORY ($\overline{CE}$ CONTROLLED WRITE) (2K BYTES EEPROM ATTRIBUTE MEMORY)



WRITE TIMING OF ATTRIBUTE MEMORY ($\overline{WE}$ CONTROLLED WRITE) (2K BYTES EEPROM ATTRIBUTE MEMORY)



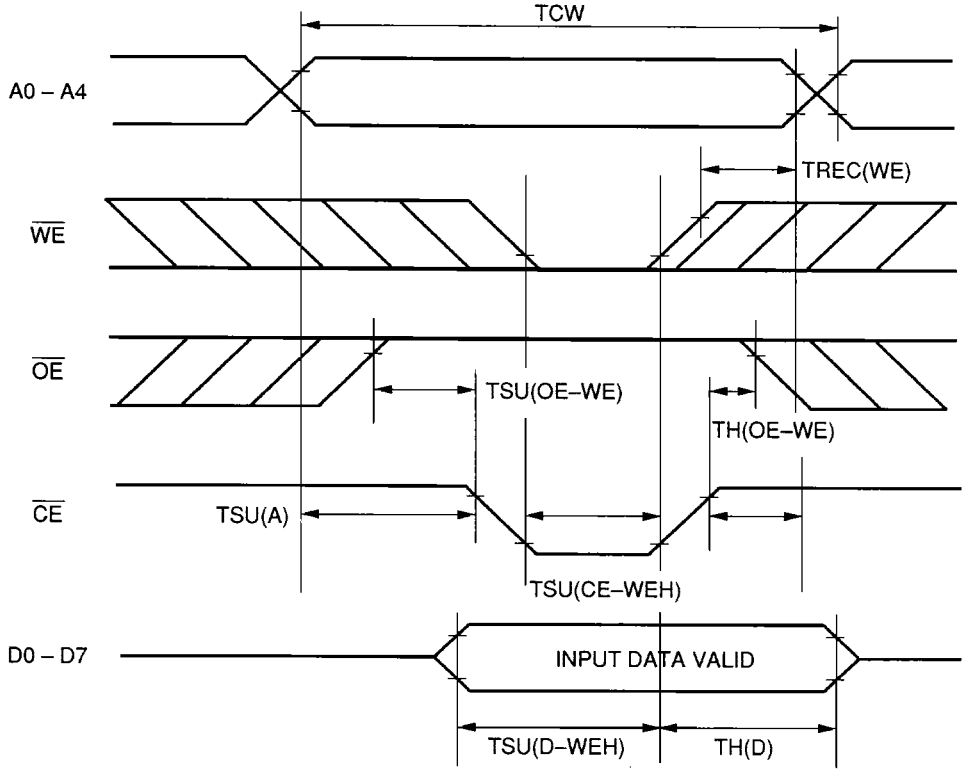
<< AC test conditions >>

Output load : 1 TTL gate + 100 pF (include jig)

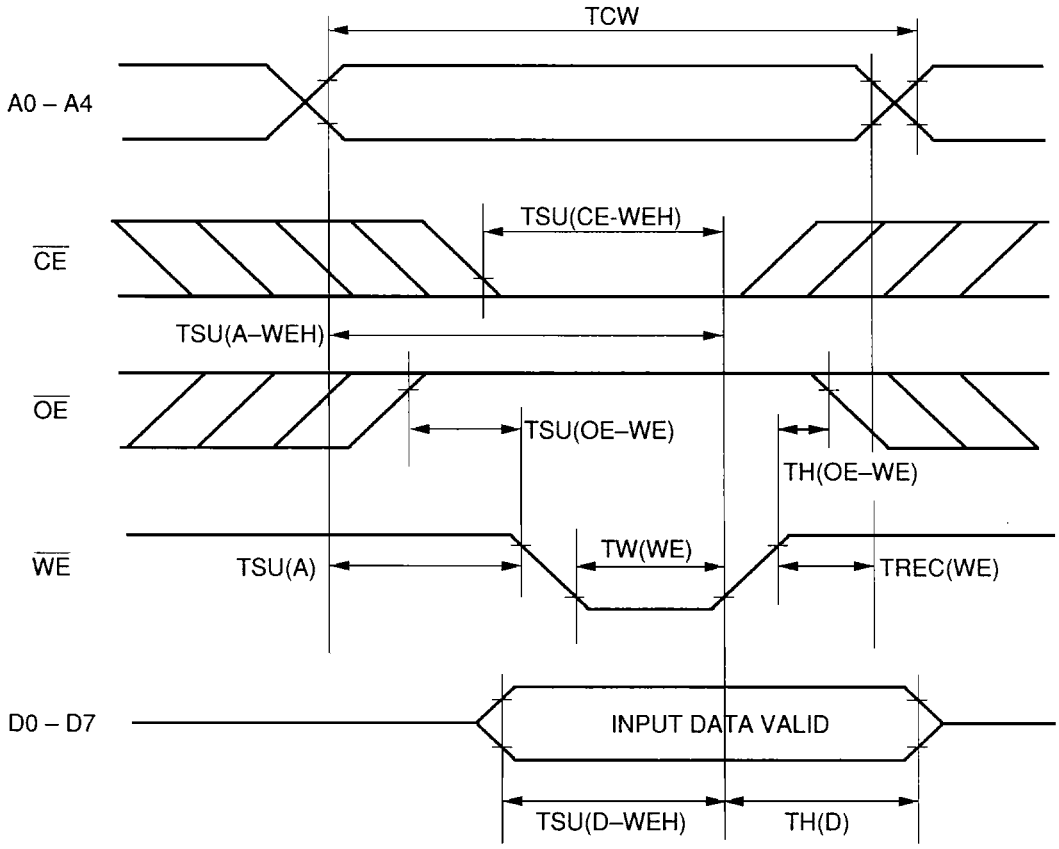
AC ELECTRICAL CHARACTERISTICS AT WRITE OF ATTRIBUTE MEMORY (16 BYTES ATTRIBUTE MEMORY)

Symbol	Parameter	Min	Max	Unit
TCW	Write cycle time	250	—	ns
TW (WE)	Write pulse width	150	—	ns
TSU (A)	Address setup time	30	—	ns
TSU (A-WEH)	Address setup time to end write	180	—	ns
TSU (CE-WEH)	Card enable setup time	180	—	ns
TSU (D-WEH)	Data setup time	80	—	ns
TH (D)	Data hold time	30	—	ns
TREC (WE)	Write recovery time	30	—	ns
TSU (OE-WE)	Output enable setup time	10	—	ns
TH (OE)	Output enable hold time	10	—	ns

WRITE TIMING OF ATTRIBUTE MEMORY ($\overline{CE}$ CONTROLLED WRITE) (16 BYTES ATTRIBUTE MEMORY)



WRITE TIMING OF ATTRIBUTE MEMORY ($\overline{WE}$ CONTROLLED WRITE) (16 BYTES ATTRIBUTE MEMORY)



<< AC test conditions >>

Output load : 1 TTL gate + 100 pF (include jig)

BATTERY

(1) Recommended Battery

Type	: Lithium CR2025, Epson part No. YBA00020A
Voltage	: 3 V
Standard Capacitance	: 155 mAH
Size	: 20 mm diameter 2.5 mm thickness
Weight	: 2.7 g

(2) Battery Replacement

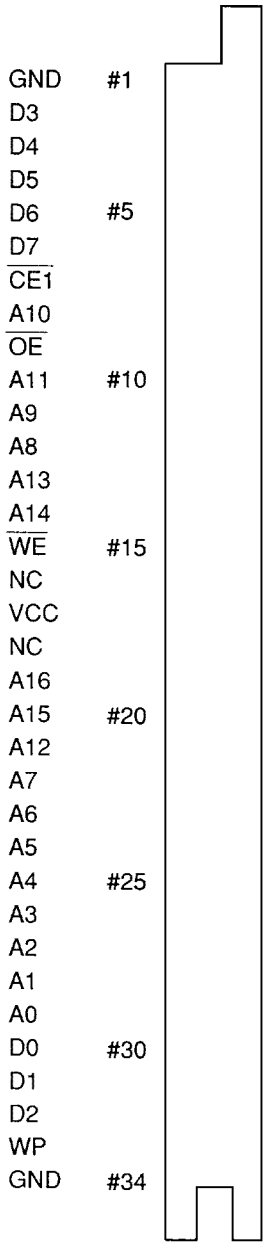
REPLACE THE BATTERY ONLY WHILE A SUPPLY VOLTAGE IS CONNECTED TO THE CARD TO PROTECT THE DATA.

(3) Approximate Battery Life (Ta = 25°C)

Card	Typ	Unit
AWB065SD*0	10	years
AWB129SD*0	10	years
AWB257SD*0	7.6	years
AWB513SD*0	3.9	years
AWB101SD*0	1.9	years
AWB201SD*0		years

Notes: Battery life figures are typical values and are based on manufacturers data. SEIKO EPSON does not guarantee BATTERY LIFE.
If the ambient storage temperature is greater than 25°C, the life span of the battery will be decreased.

PIN ASSIGNMENT



GND	#1		#35	GND
D3				$\overline{CD1}$
D4				D11
D5				D12
D6	#5			D13
D7			#40	D14
$\overline{CE1}$				D15
A10				$\overline{CE2}$
$\overline{OE}$				NC
A11	#10			NC
A9			#45	NC
A8				A17
A13				A18
A14				A19
$\overline{WE}$	#15			A20
NC			#50	NC
VCC				VCC
NC				NC
A16				NC
A15	#20			NC
A12			#55	NC
A7				NC
A6				NC
A5				NC
A4	#25			NC
A3			#60	NC
A2				$\overline{REG}$
A1				BVD2
A0				BVD1
D0	#30			D8
D1			#65	D9
D2				D10
WP				$\overline{CD2}$
GND	#34		#68	GND

PIN ASSIGNMENT

Pin No.	Symbol
1	GND
2	D3
3	D4
4	D5
5	D6
6	D7
7	$\overline{CE1}$
8	A10
9	$\overline{OE}$
10	A11
11	A9
12	A8
13	A13
14	A14
15	$\overline{WE}$
16	NC
17	Vcc
18	NC
19	A16*
20	A15*
21	A12
22	A7

Pin No.	Symbol
23	A6
24	A5
25	A4
26	A3
27	A2
28	A1
29	A0
30	D0
31	D1
32	D2
33	WP
34	GND
35	GND
36	$\overline{CD1}$
37	D11
38	D12
39	D13
40	D14
41	D15
42	$\overline{CE2}$
43	NC
44	NC
45	NC

Pin No.	Symbol
46	A17*
47	A18*
48	A19*
49	A20*
50	NC
51	Vcc
52	NC
53	NC
54	NC
55	NC
56	NC
57	NC
58	NC
59	NC
60	NC
61	$\overline{REG}$
62	BVD_2
63	BVD_1
64	D8
65	D9
66	D10
67	$\overline{CD2}$
68	GND

Notes: *A15 : AWB065, AWB129, AWB257, AWB513, AWB101, AWB201
*A16 : AWB129, AWB257, AWB513, AWB101, AWB201
*A17 : AWB257, AWB513, AWB101, AWB201
*A18 : AWB513, AWB101, AWB201
*A19 : AWB101, AWB201
*A20 : AWB201
Unused address lines should be no connect.
NC : No connect