1M WORD × 16 BIT LOW POWER PSEUDO SRAM

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1. GENERAL DESCRIPTION

W964B6BBN is a 16M bits CMOS pseudo static random access memory (Pseudo SRAM), organized as 1M words x 16 bits. Using advanced single transistor DRAM architecture and 0.175 μm process technology; W964B6BBN delivers fast access cycle time and low power consumption. It is suitable for mobile device application such as Cellular Phone and PDA, which high-density buffer is needed and power dissipation is most concerned

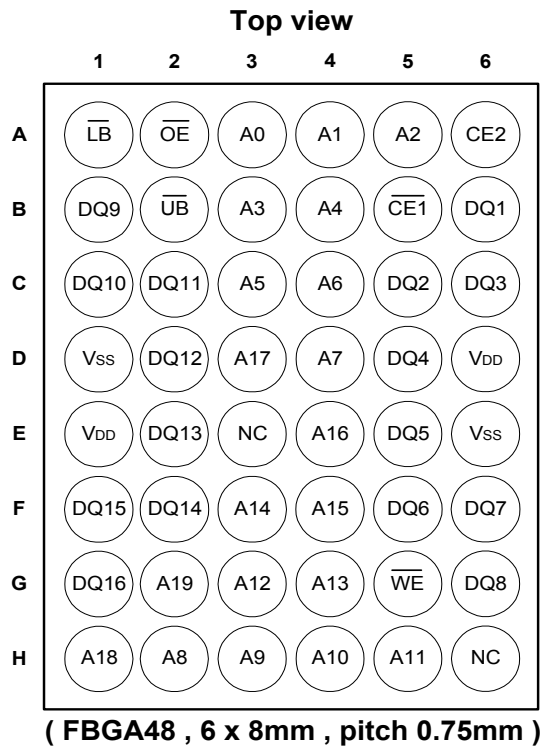
2. FEATURES

- Asynchronous SRAM interface
- Fast access cycle time:
  - t_{RC} = 70 nS (-70), 80 nS (-80)
- Low power consumption:
  - I_{DDA1} = 20 mA Max.
  - I_{DDS1} = 70 μA Max.
- Byte write control
- Wide operating conditions:
  - V_{DD} = +2.3V to +2.7V
- Temperature
  - T_A = 0°C to +70°C
  - T_A = -25°C to +85°C (Extended temperature)
  - T_A = -40°C to +85°C (Industrial temperature)

3. PRODUCT OPTIONS

PARAMETER	W964B6BBN70	W964B6BBN80
t_{RC}	70 nS Min.	80 nS Min.
I_{DDS1}	70 μA Max.	70 μA Max.
I_{DDA1}	20 mA	20 mA
V_{DD}	2.3V to 2.7V	2.3V to 2.7V

4. BALL CONFIGURATION

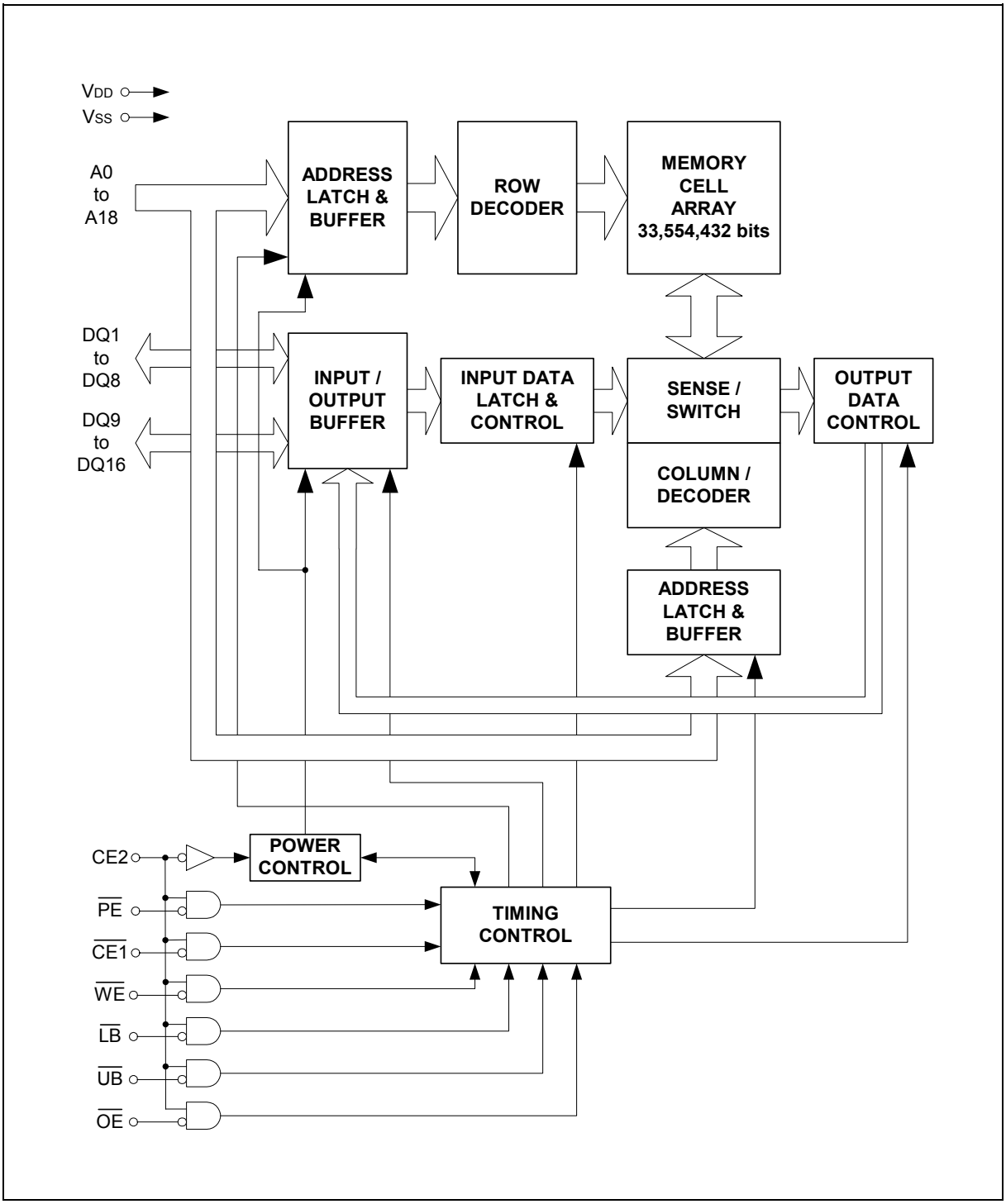


(FBGA48 , 6 x 8mm , pitch 0.75mm)

5. BALL DESCRIPTION

SYMBOL	DESCRIPTION
A0 – A19	Address input
$\overline{CE1}$	Chip Enable Input 1, Low: Enable
CE2	Chip Enable Input 2, High: Enable, Low: Enter Power Down mode
$\overline{WE}$	Write enable input
$\overline{OE}$	Output Enable input
$\overline{LB}$	Lower byte write control
$\overline{UB}$	Upper byte write control
I/O0 – I/O15	Data inputs/outputs
VDD	Power supply
VSS	Ground
NC	No Connection

6. BLOCK DIAGRAM



7. FUNCTION TRUTH TABLE

Mode	Note	CE2	$\overline{CE1}$	$\overline{WE}$	$\overline{OE}$	$\overline{LB}$	$\overline{UB}$	A0-18	DQ1-8	DQ9-16	IDD	Data Retention
Standby (Deselect)		H	H	X	X	X	X	X	High-Z	High-Z	IDDS	Yes
Output Disable	*1	H	L	H	H	X	X	*5	High-Z	High-Z	IDDA	Yes
No Read				H	L	H	H	Valid	High-Z	High-Z		
Read	*2					L	*4	Valid	Output Valid	Output Valid		
Write (Upper Byte)				L	H	H	L	Valid	Invalid	Input Valid		
Write (Lower Byte)						L	H	Valid	Input Valid	Invalid		
Write (Word)						L	L	Valid	Input Valid	Input Valid		
Power Down	*3	L	X	X	X	X	X	X	High-Z	High-Z	IDDP	No/Yes

Notes: L = VIL, H = VIH, X can be either VIL or VIH, High-Z = High impedance, KEY = Key Address.

*1: Output Disable mode should not be kept longer than 1 μS.

*2: Byte control at Read mode is not supported.

*3: Power Down mode can be entered from Standby state and all DQ pins are in High-Z state. IDDP current and data retention depend on the selection of Power Down Program.

*4: Either or both $\overline{LB}$ and $\overline{UB}$ must be Low for Read operation.

*5: Can be either VIL or VIH but must be valid before Read or Write.

8. ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

PARAMETER	SYMBOL	VALUE	UNIT
Voltage of V_{DD} Supply Relative to V_{SS}	V_{DD}	-0.5 to +3.6	V
Voltage at Any Pin Relative to V_{SS}	V_{IN}, V_{OUT}	-0.5 to +3.6	V
Short Circuit Output Current	I_{OUT}	±50	mA
Storage Temperature	T_{STG}	-55 to +125	°C

WARNING: *Semiconductor devices can be permanently damaged by application of stress (voltage, current, temperature, etc.) in excess of absolute maximum ratings. Do not exceed these ratings.*

Recommended Operation Conditions

(Reference to V_{SS})

PARAMETER	NOTES	SYMBOL	MIN.	MAX.	UNIT
Supply Voltage		V_{DD}	2.3	2.7	V
		V_{SS}	0	0	V
High Level Input Voltage	*1	V_{IH}	2.0	V_{DD} +0.3	V
Low Level Input Voltage	*2	V_{IL}	-0.3	0.4	V
Ambient Temperature		T_A	0	70	°C
Ambient Temperature		T_A	-25	85	°C
Ambient Temperature		T_A	-40	85	°C

Notes:

*1: Maximum DC voltage on input and I/O pins are V_{DD} +0.3V. During voltage transitions, inputs may positive overshoot to V_{DD} +1.0V for periods of up to 5 nS.

*2: Minimum DC voltage on input and I/O pins are -0.3V. During voltage transitions, inputs may negative overshoot to -1.0V for periods of up to 5 nS.

WARNING: *Recommended operating conditions are normal operating ranges for the semiconductor device. All the device's electrical characteristics are warranted when operated within these ranges.*

Always use semiconductor devices within the recommended operating conditions. Operation outside these ranges may adversely affect reliability and could result in device failure.

No warranty is made with respect to uses, operating conditions, or combinations not represented on the datasheet. Users considering application outside the listed conditions are advised to contact their Winbond representative beforehand.

Capacitance

Test conditions: T_A = 25°C, f = 1.0 MHz

SYMBOL	DESCRIPTION	TEST SETUP	TYP.	MAX.	UNIT
C_{IN1}	Address Input Capacitance	V_{IN} = 0V	-	5	pF
C_{IN2}	Control Input Capacitance	V_{IN} = 0V	-	5	pF
C_{IO}	Data Input/Output Capacitance	V_{IO} = 0V	-	8	pF

DC Characteristics

(Under Recommended Operating Conditions unless otherwise noted) notes*1, *2, *3

PARAMETER		SYM.	TEST CONDITIONS		MIN.	MAX.	UNIT
Input Leakage Current		I_{LI}	V_{IN} = V_{SS} to V_{DD}		-1.0	+1.0	μA
Output Leakage Current		I_{LO}	V_{OUT} = V_{SS} to V_{DD}, Output Disable		-1.0	+1.0	μA
Output High Voltage Level		V_{OH}	V_{DD} = V_{DD}, I_{OH} = -0.5 mA		1.8	-	V
Output Low Voltage Level		V_{OL}	I_{OL} = 1 mA		-	0.4	V
Standby Current	(TTL)	I_{DDS}	V_{DD} = V_{DD} Max., V_{IN} = V_{IH} or V_{IL}, $\overline{CE1}$ = CE2 = V_{IH}		-	3	mA
	(CMOS)	I_{DDS1}	V_{DD} = V_{DD} Max., $V_{IN} \leq$ 0.2V or $V_{IN} \geq V_{DD}$ -0.2V, $\overline{CE1}$ = CE2 $\geq V_{DD}$ -0.2V		-	70	μA
Active Current		I_{DDA1}	V_{DD} = V_{DD} Max., V_{IN} = V_{IH} or V_{IL},	t_{RC} / t_{WC} = Minimum	-	20	mA
		I_{DDA2}	$\overline{CE1}$ = V_{IL} and CE2 = V_{IH}, I_{OUT} = 0 mA	t_{RC} / t_{WC} = 1 μS	-	3	mA

Notes:

*1: All voltages are reference to V_{SS}.

*2: DC Characteristics are measured after following POWER-UP timing.

*3: I_{OUT} depends on the output load conditions.

AC Characteristics

(Under Recommended Operating Conditions unless otherwise noted)

Read Operation

PARAMETER	SYM.	-70		-80		UNIT	NOTES
		Min.	Max.	Min.	Max.		
Read Cycle Time	t_{RC}	70	-	80	-	nS	
Chip Enable Access Time	t_{CE}	-	65	-	75	nS	*1, *3
Output Enable Access Time	t_{OE}	-	40	-	45	nS	*1
Address Access Time	t_{AA}	-	65	-	75	nS	*1
Output Data Hold Time	t_{OH}	5	-	5	-	nS	*1
$\overline{CE1}$ Low to Output Low-Z	t_{CLZ}	5	-	5	-	nS	*2
$\overline{OE}$ Low to Output Low-Z	t_{OLZ}	0	-	0	-	nS	*2
$\overline{CE1}$ High to Output High-Z	t_{CHZ}	-	20	-	25	nS	*2
$\overline{OE}$ High to Output High-Z	t_{OHZ}	-	20	-	25	nS	*2
Address Setup Time to $\overline{CE1}$ Low	t_{ASC}	-5	-	-5	-	nS	*4
Address Setup Time to $\overline{OE}$ Low	t_{ASO}	30	-	35	-	nS	*3, *5
	$t_{ASO[ABS]}$	10	-	10	-	nS	*6
$\overline{LB}$ / $\overline{UB}$ Setup Time to $\overline{CE1}$ Low	t_{BSC}	-5	-	-5	-	nS	
$\overline{LB}$ / $\overline{UB}$ Setup Time to $\overline{OE}$ Low	t_{BSO}	10	-	10	-	nS	
Address Invalid Time	t_{AX}	-	5	-	5	nS	
Address Hold Time from $\overline{CE1}$ Low	t_{CLAH}	70	-	80	-	nS	
Address Hold Time from $\overline{OE}$ Low	t_{OLAH}	40	-	45	-	nS	*9
Address Hold Time from $\overline{CE1}$ High	t_{CHAH}	-5	-	-5	-	nS	
Address Hold Time from $\overline{OE}$ High	t_{OHAH}	-5	-	-5	-	nS	
$\overline{LB}$ / $\overline{UB}$ Hold Time from $\overline{CE1}$ High	t_{CHBH}	-5	-	-5	-	nS	
$\overline{LB}$ / $\overline{UB}$ Hold Time from $\overline{OE}$ High	t_{OHBH}	-5	-	-5	-	nS	
$\overline{CE1}$ Low to $\overline{OE}$ Low Delay Time	t_{CLOL}	25	1000	30	1000	nS	*3, *5, *7, *8
$\overline{OE}$ Low to $\overline{CE1}$ High Delay Time	t_{OLCH}	35	-	40	-	nS	*7
$\overline{CE1}$ High Pulse Width	t_{CP}	12	-	15	-	nS	
$\overline{OE}$ High Pulse Width	t_{OP}	25	1000	30	1000	nS	*5, *7, *8
	$t_{OP[ABS]}$	12	-	15	-	ns	*6

Read Operation, Continued

Notes:

*1: The output load is 30 pF.

*2: The output load is 5 pF.

*3: The t_{CE} is applicable if $\overline{OE}$ is brought to Low before $\overline{CE1}$ goes Low and is also applicable if actual value of both or either t_{ASO} or t_{CLOL} is shorter than specified value.

*4: Applicable if $\overline{OE}$ is brought to Low before $\overline{CE1}$ goes Low.

*5: The t_{ASO}, t_{CLOL}(min.) and t_{OP}(min.) are reference values when the access time is determined by t_{OE}. If actual value of each parameter is shorter than specified minimum value, t_{OE} become longer by the amount of subtracting actual value from specified minimum value.

For example, if actual t_{ASO}, t_{ASO}(actual), is shorter than specified minimum value, t_{ASO}(min), during $\overline{OE}$ control access (ie., $\overline{CE1}$ stays Low), the t_{OE} become t_{OE}(max.) + t_{ASO}(min.) - t_{ASO}(actual).

*6: The $t_{ASO[ABS]}$ and $t_{OP[ABS]}$ is the absolute minimum value during $\overline{OE}$ control access.

*7: If actual value of either t_{CLOL} or t_{OP} is shorter than specified minimum value, both t_{OLAH} and t_{OLCH} become t_{RC}(min.) - t_{CLOL}(actual) or t_{RC}(min.) - t_{OP}(actual).

*8: Maximum value is applicable if $\overline{CE1}$ is kept at low.

AC Characteristics, Continued

Write Operation

PARAMETER	SYM.	-70		-80		UNIT	NOTES
		Min.	Max.	Min.	Max.		
Write Cycle Time	t_{WC}	70	-	80	-	nS	*1
Address Setup Time	t_{AS}	0	-	0	-	nS	*2
Address Hold Time	t_{AH}	35	-	40	-	nS	*2
$\overline{CE1}$ Write Setup Time	t_{CS}	0	1000	0	1000	nS	
$\overline{CE1}$ Write Hold Time	t_{CH}	0	1000	0	1000	nS	
$\overline{WE}$ Setup Time	t_{WS}	0	-	0	-	nS	
$\overline{WE}$ Hold Time	t_{WH}	0	-	0	-	nS	
$\overline{LB}$ and $\overline{UB}$ Setup Time	t_{BS}	-5	-	-5	-	nS	
$\overline{LB}$ and $\overline{UB}$ Hold Time	t_{BH}	-5	-	-5	-	nS	
$\overline{OE}$ Setup Time	t_{OES}	0	1000	0	1000	nS	*3
$\overline{OE}$ Hold Time	t_{OEH}	30	1000	35	1000	nS	*3, *4
	$t_{OEH[ABS]}$	12	-	15	-	nS	*5
$\overline{OE}$ High to $\overline{CE1}$ Low Setup Time	t_{OHCL}	-5	-	-5	-	nS	*6
$\overline{OE}$ High to Address Hold Time	t_{OHAH}	-5	-	-5	-	nS	*7
$\overline{CE1}$ Write Pulse Width	t_{CW}	45	-	50	-	nS	*1, *8
$\overline{WE}$ Write Pulse Width	T_{WP}	45	-	50	-	nS	*1, *8
$\overline{CE1}$ Write Recovery Time	t_{WRC}	10	-	15	-	nS	*1, *9
$\overline{WE}$ Write Recovery Time	t_{WR}	10	1000	15	1000	nS	*1, *3, *9
Data Setup Time	t_{DS}	15	-	20	-	nS	
Data Hold Time	t_{DH}	0	-	0	-	nS	
$\overline{CE1}$ High Pulse Width	t_{CP}	12	-	15	-	nS	*9

Write Operation, Continued

Notes:

*1: Minimum value must be equal or greater than the sum of actual t_{CW} (or t_{WP}) and t_{WRC} (or t_{WR}).

*2: New write address is valid from either $\overline{CE1}$ or $\overline{WE}$ is brought to High.

*3: The t_{OEH} is specified from end of t_{WC}(min.). The t_{OEH}(min.) is a reference value when the access time is determined by t_{OE}.

If actual value, t_{OEH}(actual) is shorter than specified minimum value, t_{OE} become longer by the amount of subtracting actual value from specified minimum value.

*4: The t_{OEH}(max.) is applicable if $\overline{CE1}$ is kept at Low and both $\overline{WE}$ and $\overline{OE}$ are kept at High.

*5: The $t_{OEH[ABS]}$ is the absolute minimum value if write cycle is terminated by $\overline{WE}$ and $\overline{CE1}$ stays Low.

*6: t_{OHCL}(min.) must be satisfied if read operation is not performed prior to write operation.

In case $\overline{OE}$ is disabled after t_{OHCL}(min.), $\overline{WE}$ Low must be asserted after t_{RC}(min.) from $\overline{CE1}$ Low. In other words, read operation is initiated if t_{OHCL}(min.) is not satisfied.

*7: Applicable if $\overline{CE1}$ stays Low after read operation.

*8: t_{CW} and t_{WP} is applicable if write operation is initiated by $\overline{CE1}$ and $\overline{WE}$, respectively.

*9: t_{WRC} and t_{WR} is applicable if write operation is terminated by $\overline{CE1}$ and $\overline{WE}$, respectively.

The t_{WR}(min.) can be ignored if $\overline{CE1}$ is brought to High together or after $\overline{WE}$ is brought to High. In such case, the t_{CP}(min.) must be satisfied.

AC Characteristics, Continued

Power Down and Power Down Program Parameters

PARAMETER	SYM.	-70		-80		UNIT	NOTES
		Min.	Max.	Min.	Max.		
CE2 Low Setup Time for Power Down Entry	t_{CSP}	10	-	10	-	nS	
CE2 Low Hold Time after Power Down Entry	t_{C2LP}	70	-	80	-	nS	
$\overline{CE1}$ High Setup Time following CE2 High after Power Down Exit	t_{CHS}	10	-	10	-	nS	

Other Timing Parameters

PARAMETER	SYM.	-70		-80		UNIT	NOTES
		Min.	Max.	Min.	Max.		
$\overline{CE1}$ High to $\overline{OE}$ Invalid Time for Standby Entry	t_{CHOX}	10	-	10	-	nS	
$\overline{CE1}$ High to $\overline{WE}$ Invalid Time for Standby Entry	t_{CHWX}	10	-	10	-	nS	*1
CE2 Low Hold Time after Power-up	t_{C2LH}	50	-	50	-	µS	*2
CE2 High Hold Time after Power-up	t_{C2HL}	50	-	50	-	µS	*3
$\overline{CE1}$ High Hold Time following CE2 High after Power-up	t_{CHH}	350	-	350	-	µS	*2
Input Transition Time	t_T	1	25	1	25	nS	*4

Notes:

*1: Some data might be written into any address location if t_{CHWX}(min.) is not satisfied.

*2: Must satisfy t_{CHH}(min.) after t_{C2LH}(min.).

*3: Requires Power Down mode entry and exit after t_{C2HL}.

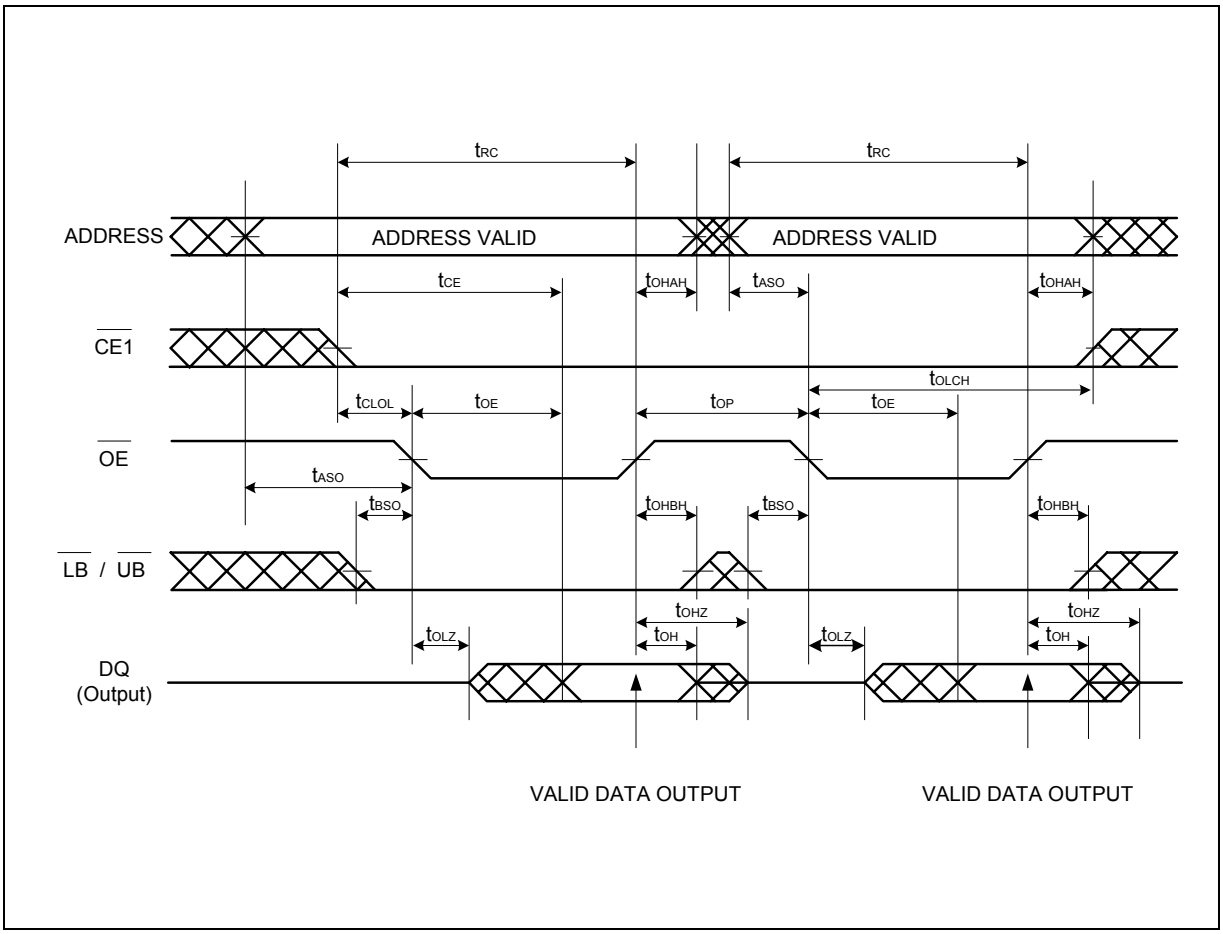
*4: The Input Transition Time (t_T) at AC testing is 5ns as shown in below. If actual t_T is longer than 5 nS, it may violate AC specified of some timing parameters.

AC Test Conditions

SYMBOL	DESCRIPTION	TEST SETUP	VALUE	UNIT	NOTE
V_{IH}	Input High Level	V_{DD} = 2.3V to 2.7V	2.0	V	
V_{IL}	Input Low Level	V_{DD} = 2.3V to 2.7V	0.4	V	
V_{REF}	Input Timing Measurement Level	V_{DD} = 2.3V to 2.7V	1.1	V	
T_T	Input Transition Time	Between V_{IL} and V_{IH}	5	nS	

9. TIMING WAVEFORMS

Read Timing #1 ($\overline{OE}$ Control Access)

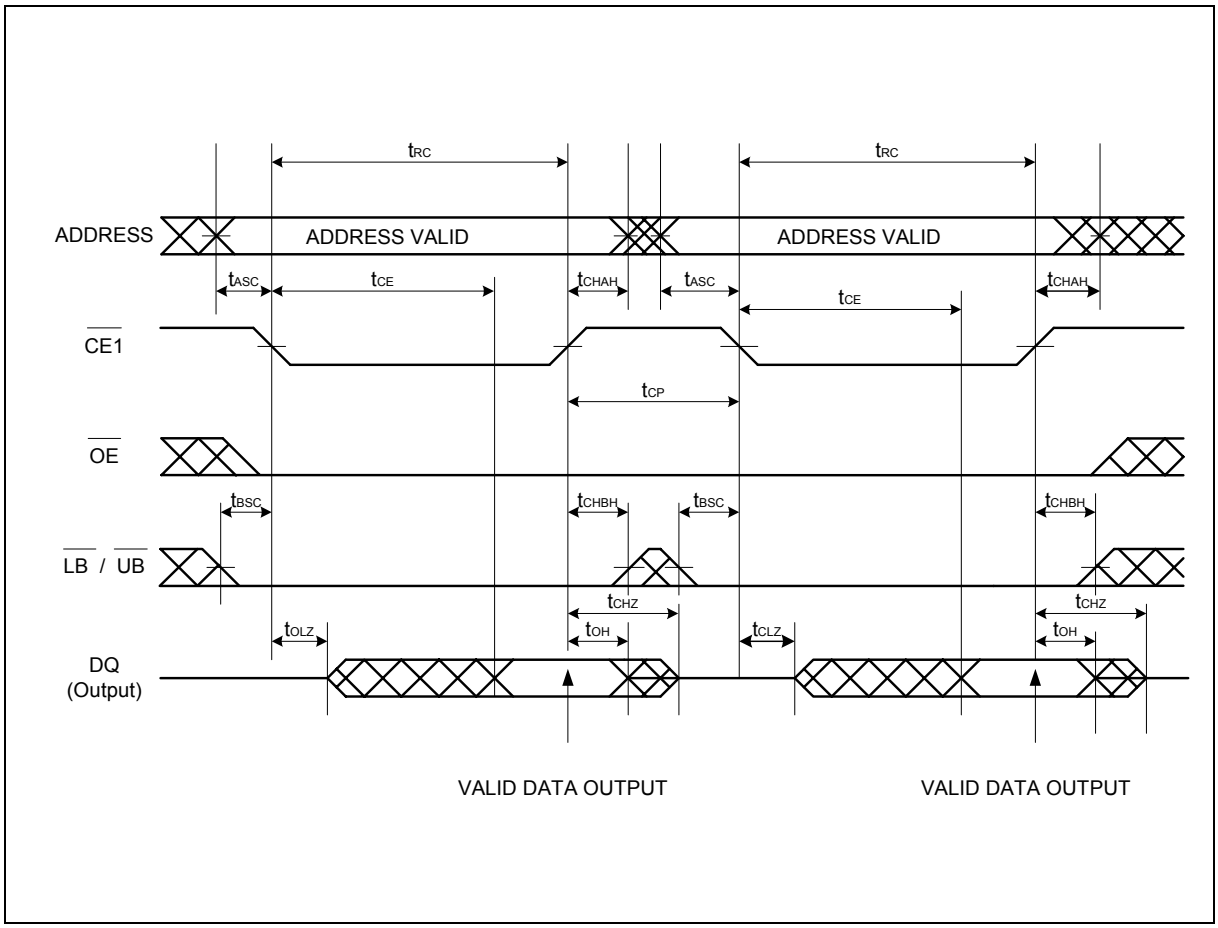


Note: CE2, $\overline{PE}$ and $\overline{WE}$ must be High for entire read cycle.

Either or both $\overline{LB}$ and $\overline{UB}$ must be Low when both $\overline{CE1}$ and $\overline{OE}$ are Low.

Timing Waveforms, Continued

Read Timing #2 ($\overline{CE1}$ Control Access)

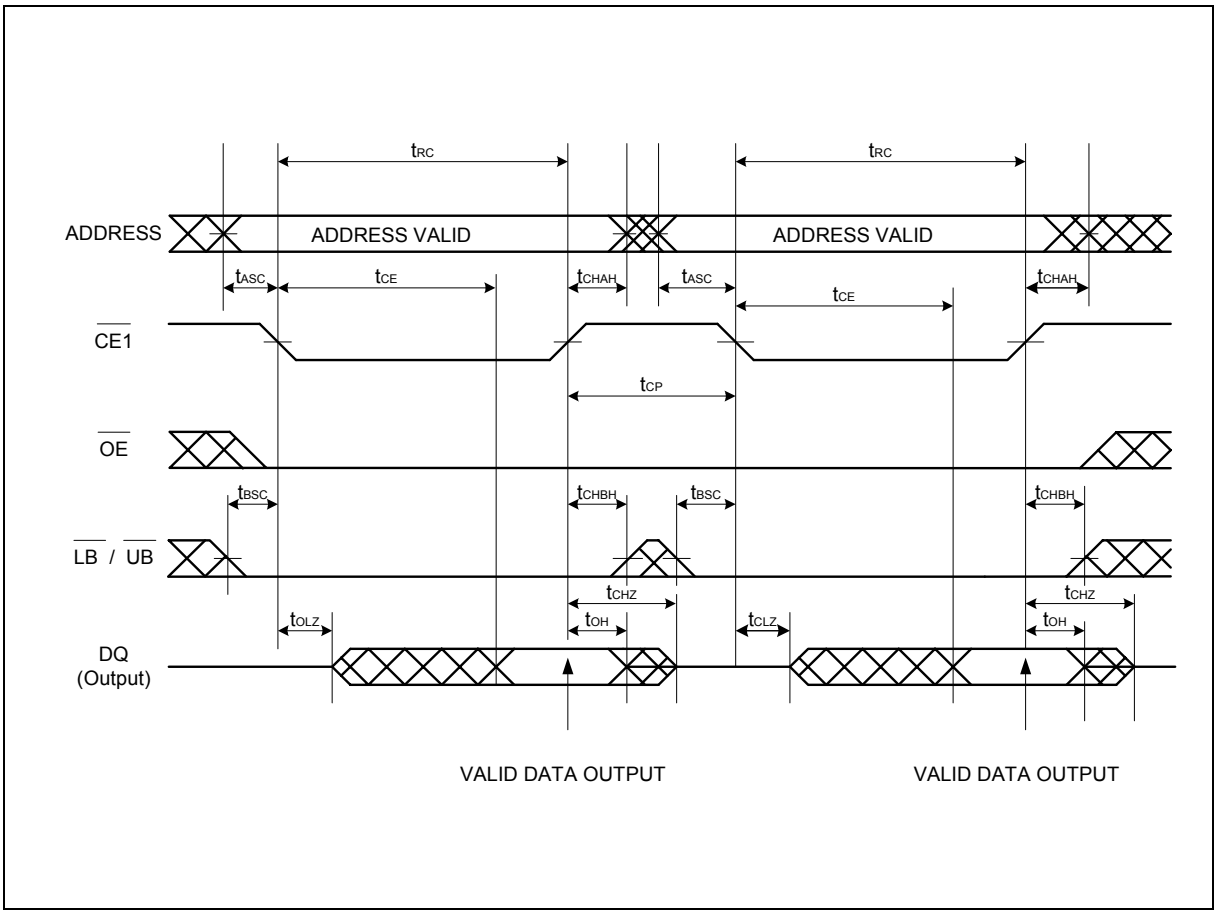


Note: CE2, $\overline{PE}$ and $\overline{WE}$ must be High for entire read cycle.

Either or both $\overline{LB}$ and $\overline{UB}$ must be Low when both $\overline{CE1}$ and $\overline{OE}$ are Low.

Timing Waveforms, Continued

Read Timing #2 ($\overline{CE1}$ Control Access)

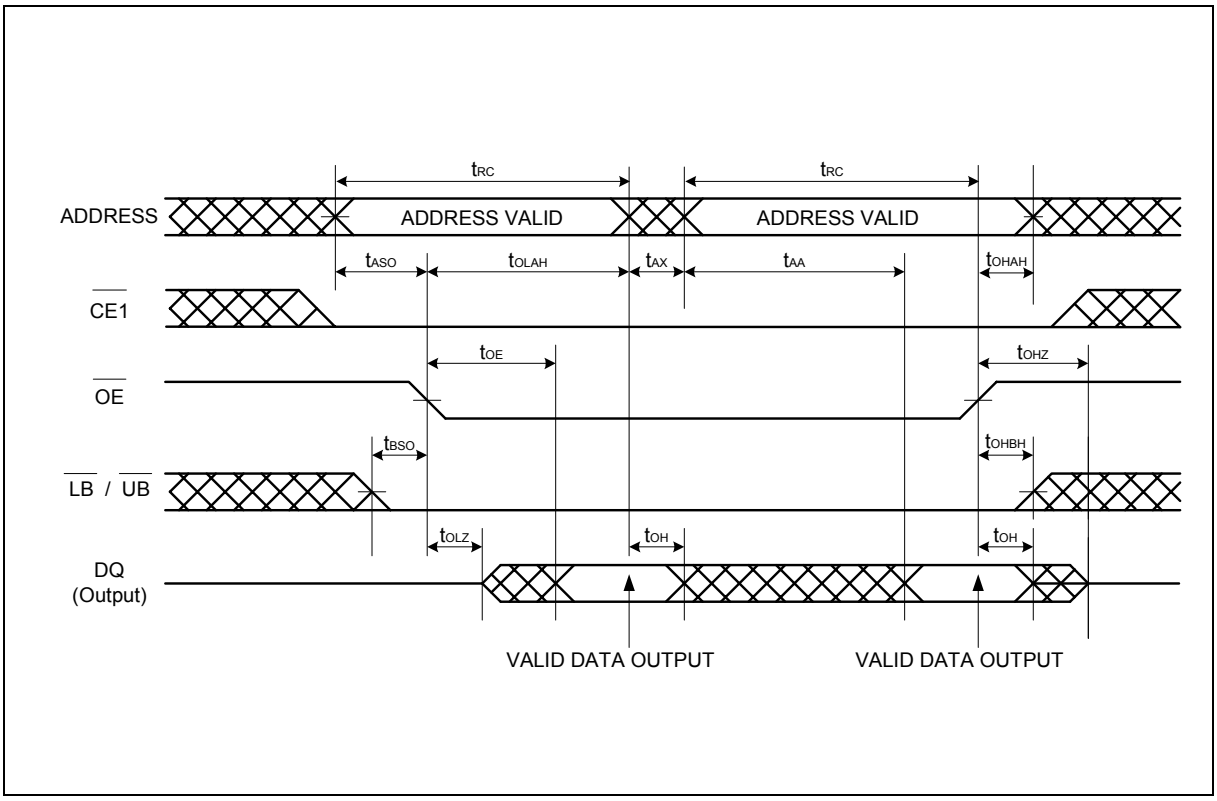


Note: CE2, $\overline{PE}$ and $\overline{WE}$ must be High for entire read cycle.

Either or both $\overline{LB}$ and $\overline{UB}$ must be Low when both $\overline{CE1}$ and $\overline{OE}$ are Low.

Timing Waveforms, Continued

Read Timing #3 (Address Access after $\overline{OE}$ Control Access)

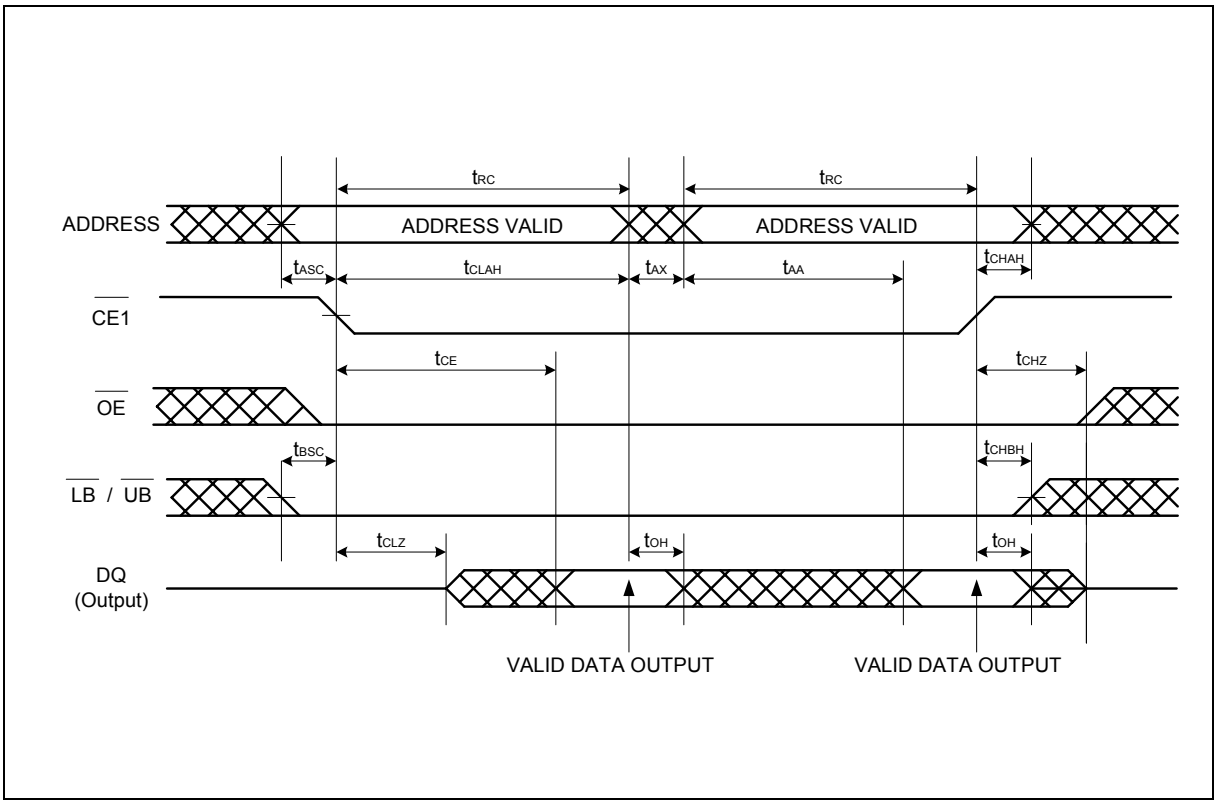


Note: CE2, $\overline{PE}$ and $\overline{WE}$ must be High for entire read cycle.

Either or both $\overline{LB}$ and $\overline{UB}$ must be Low when both $\overline{CE1}$ and $\overline{OE}$ are Low.

Timing Waveforms, Continued

Read Timing #4 (Address Access after $\overline{CE1}$ Control Access)

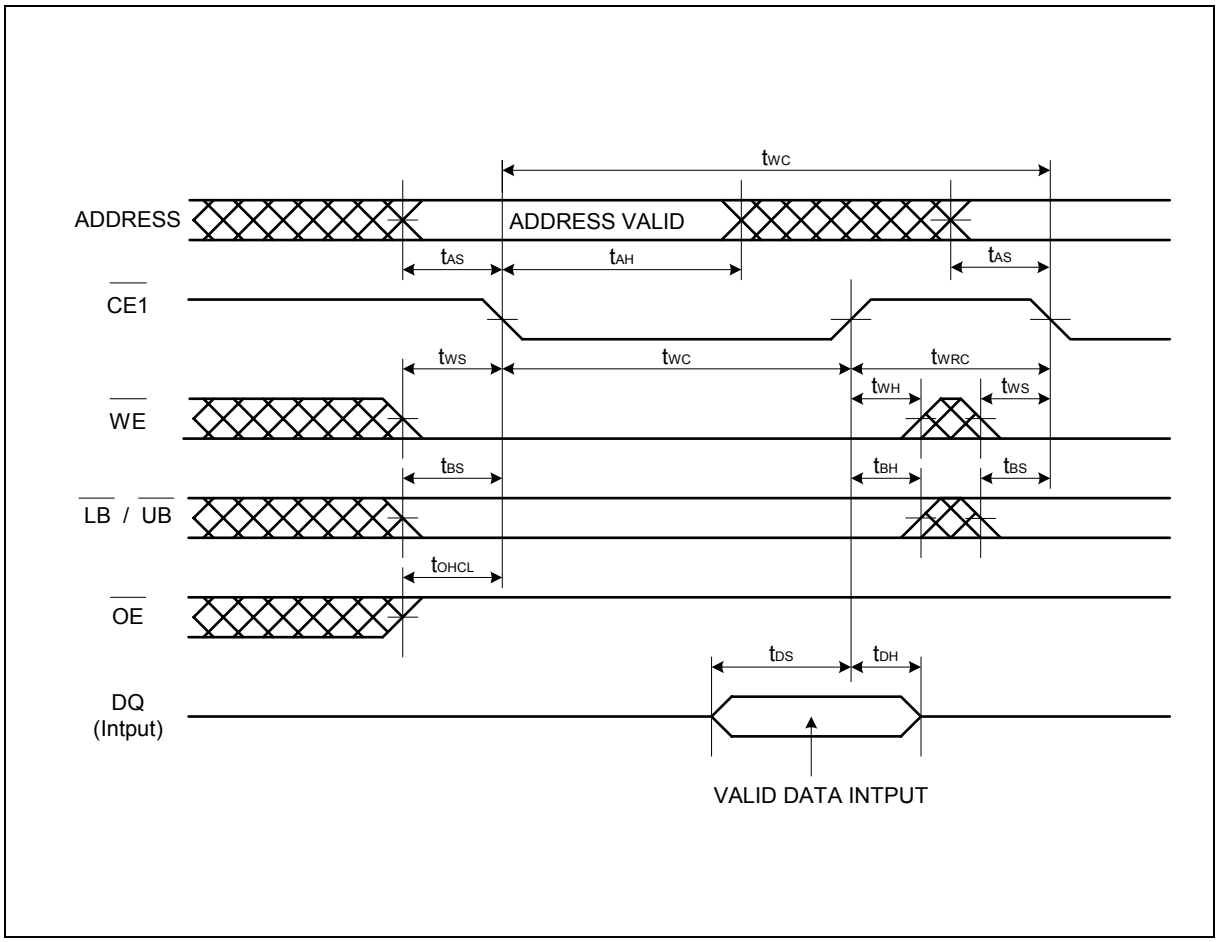


Note: CE2, $\overline{PE}$ and $\overline{WE}$ must be High for entire read cycle.

Either or both $\overline{LB}$ and $\overline{UB}$ must be Low when both $\overline{CE1}$ and $\overline{OE}$ are Low.

Timing Waveforms, Continued

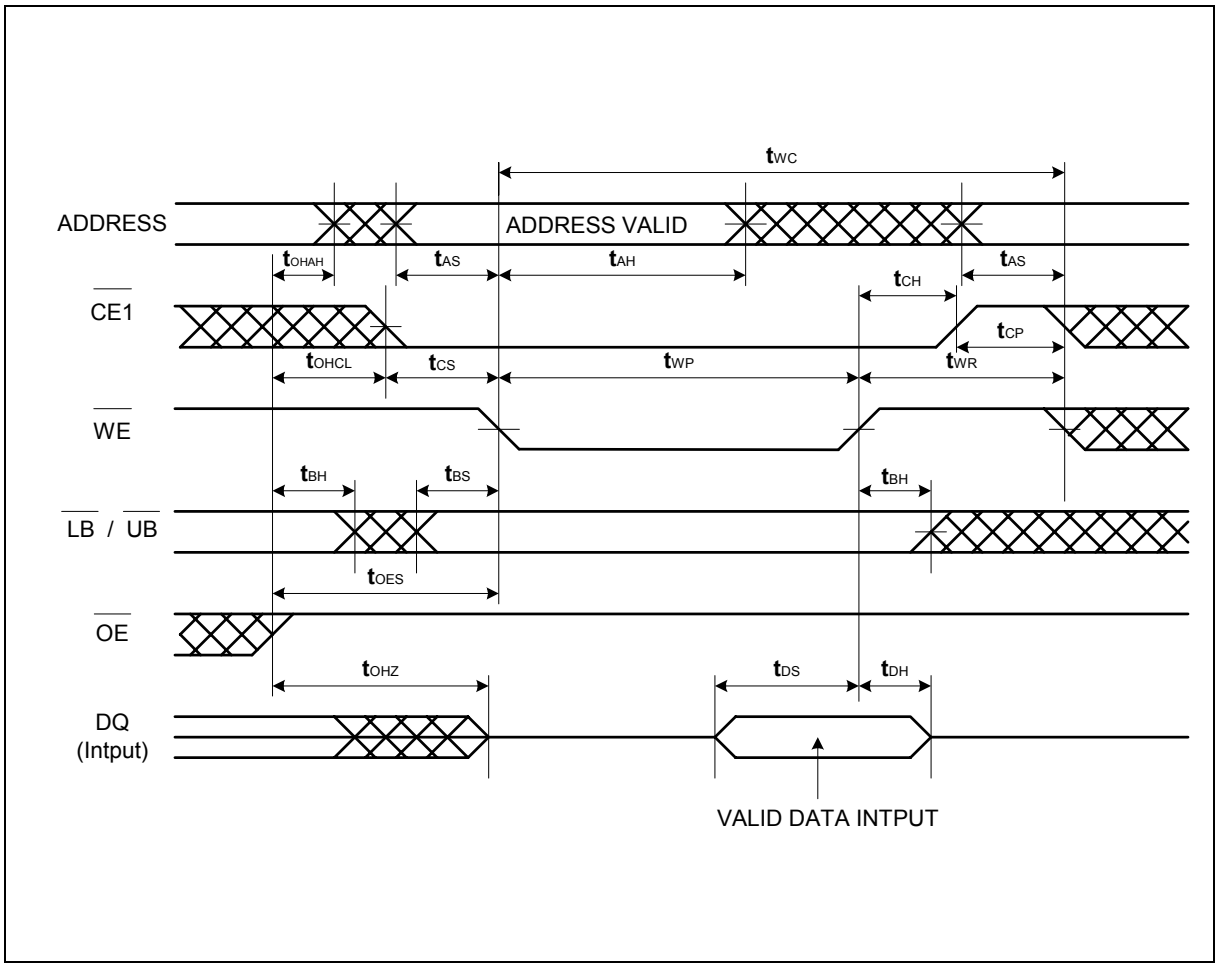
Write Timing #1 ($\overline{CE1}$ Control)



Note: CE2 and $\overline{PE}$ must be High for entire write cycle.

Timing Waveforms, Continued

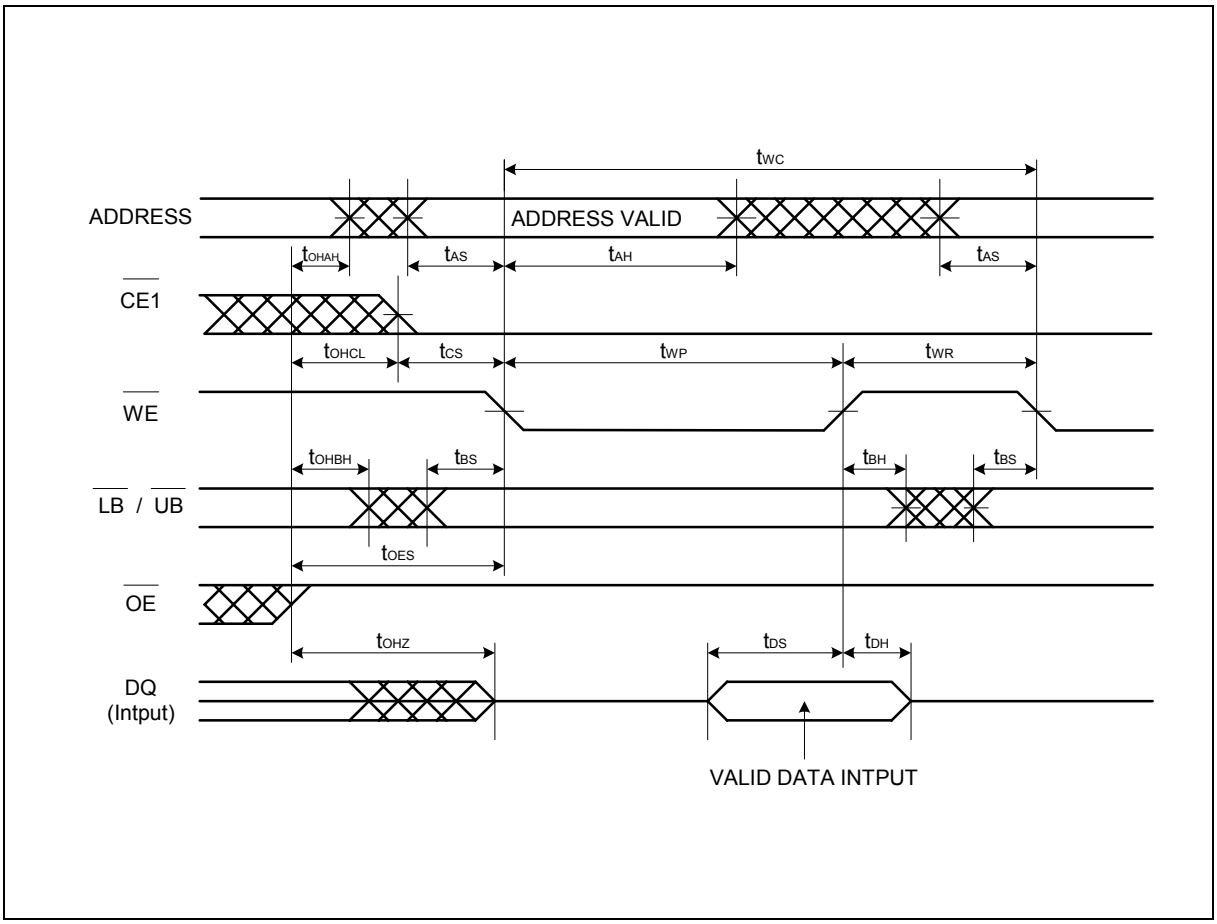
Write Timing #2-1 ($\overline{WE}$ Control, Single Write Operation)



Note: CE2 and $\overline{PE}$ must be High for entire write cycle.

Timing Waveforms, Continued

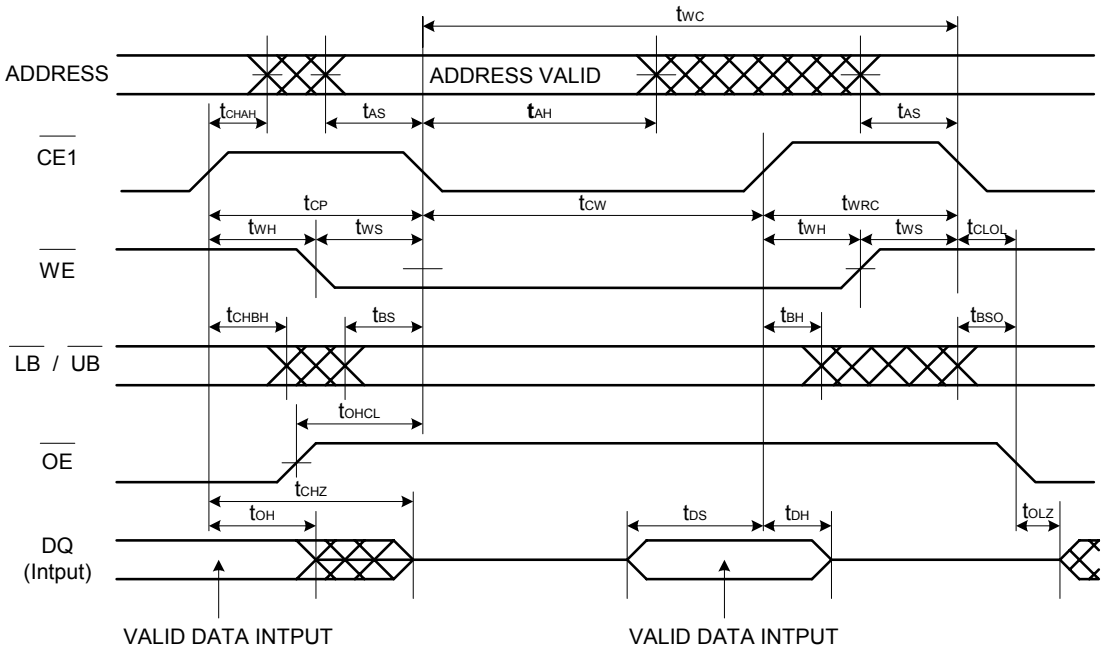
Write Timing #2 ($\overline{WE}$ Control, Continuous Write Operation)



Note: CE2 and $\overline{PE}$ must be High for entire write cycle.

Timing Waveforms, Continued

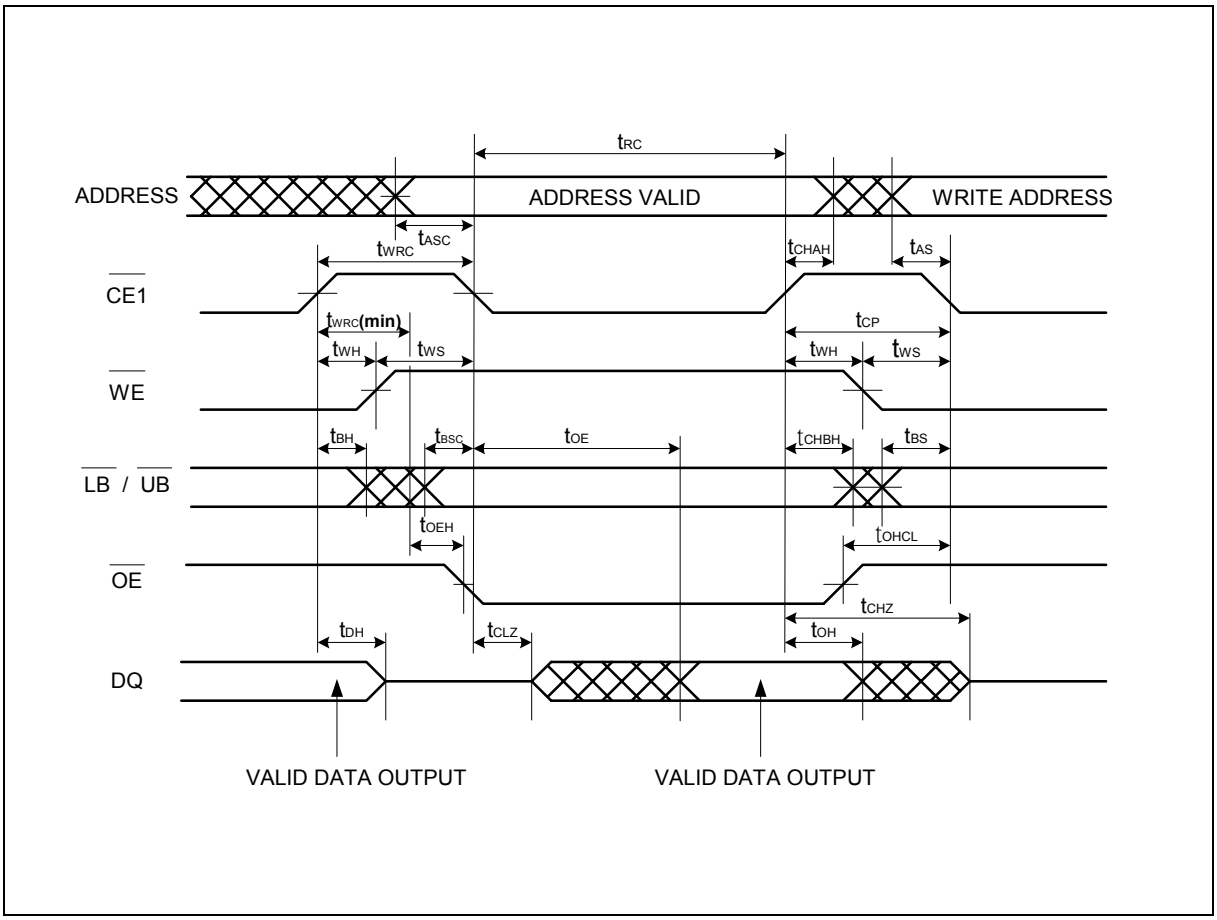
Read/Write Timing #1-1 ($\overline{CE1}$ Control)



Note: Write address is valid from either $\overline{CE1}$ or $\overline{WE}$ of last falling edge.

Timing Waveforms, Continued

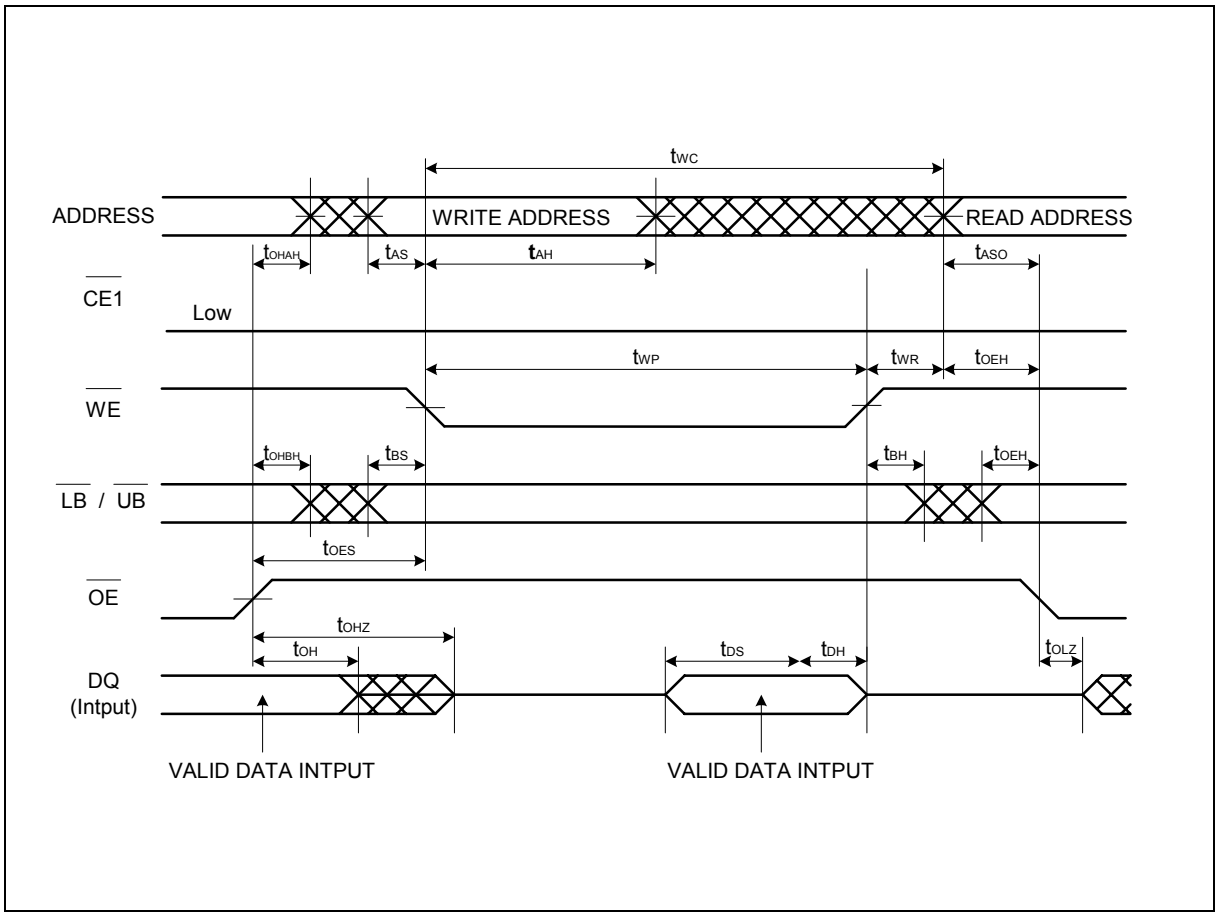
Read/Write Timing #1-2 ($\overline{CE1}$ Control)



Note: The t_{OEH} is specified from the time satisfied both t_{WRC} and t_{WR}(min).

Timing Waveforms, Continued

Read ($\overline{OE}$ Control) / Write ($\overline{WE}$ Control) Timing #2-1

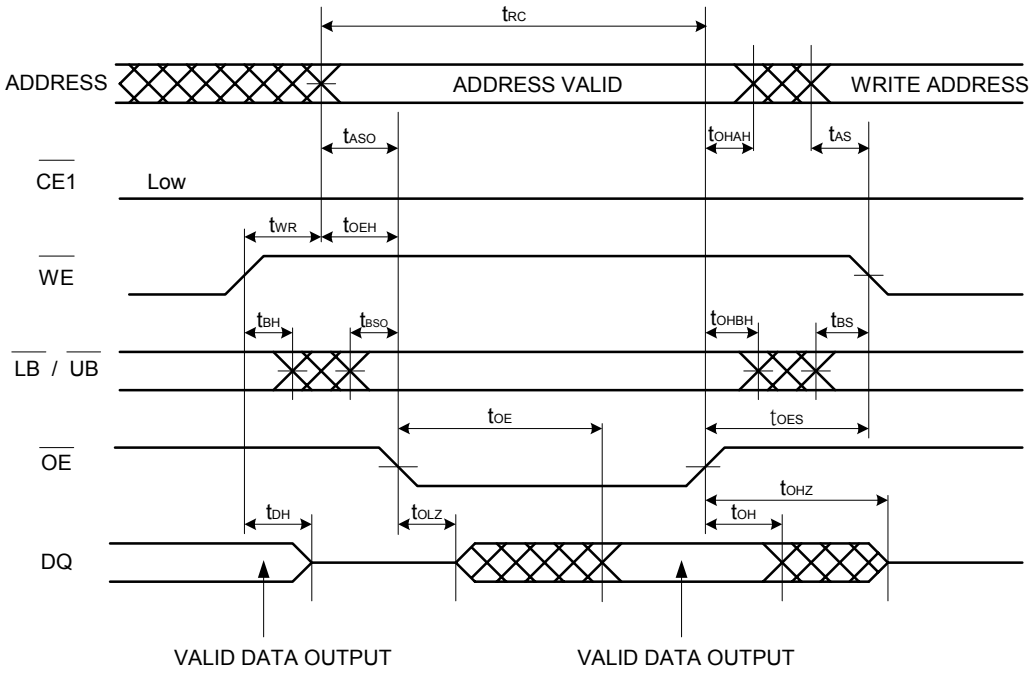


Note: $\overline{CE1}$ can be tied to Low for $\overline{WE}$ and $\overline{OE}$ controlled operation.

When $\overline{CE1}$ is tied to Low, output is exclusively controlled by $\overline{OE}$.

Timing Waveforms, Continued

Read ($\overline{OE}$ Control) / Write ($\overline{WE}$ Control) Timing #2-2

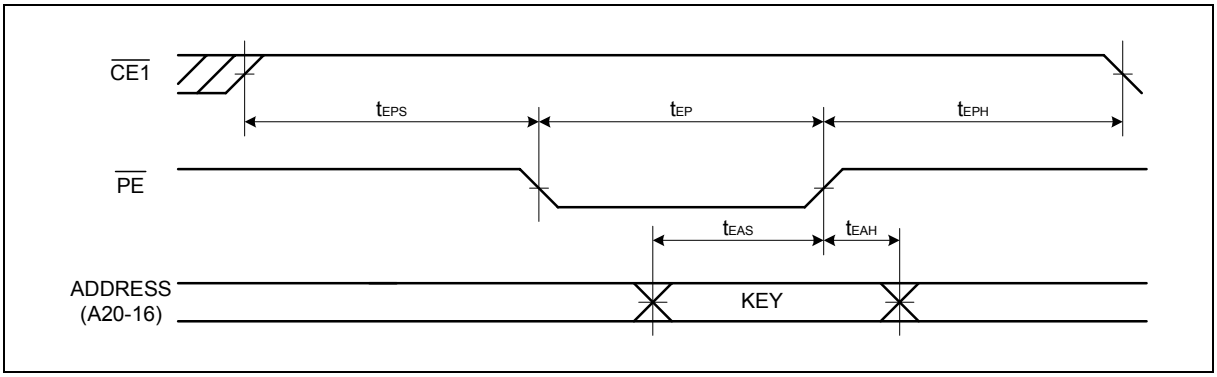


Note: $\overline{CE1}$ can be tied to Low for $\overline{WE}$ and $\overline{OE}$ controlled operation.

When $\overline{CE1}$ is tied to Low, output is exclusively controlled by $\overline{OE}$.

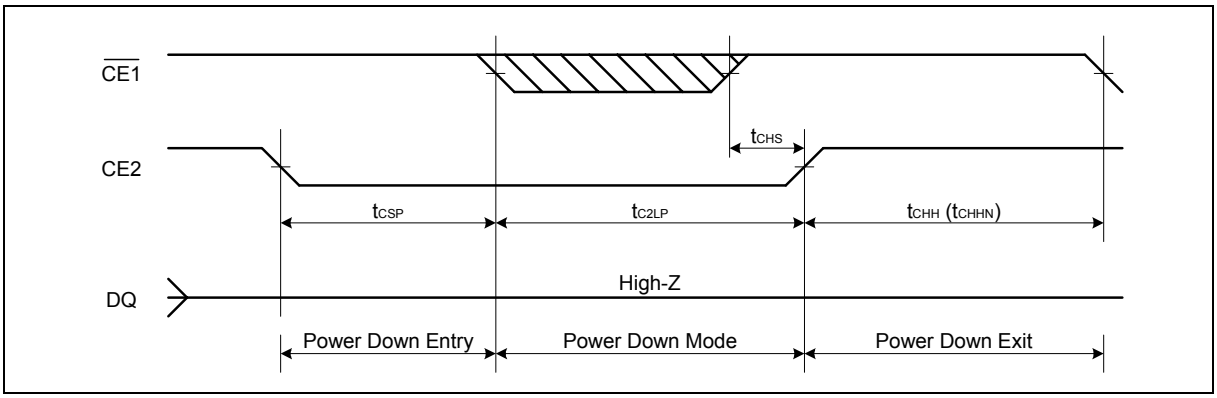
Timing Waveforms, Continued

Power Down Program Timing



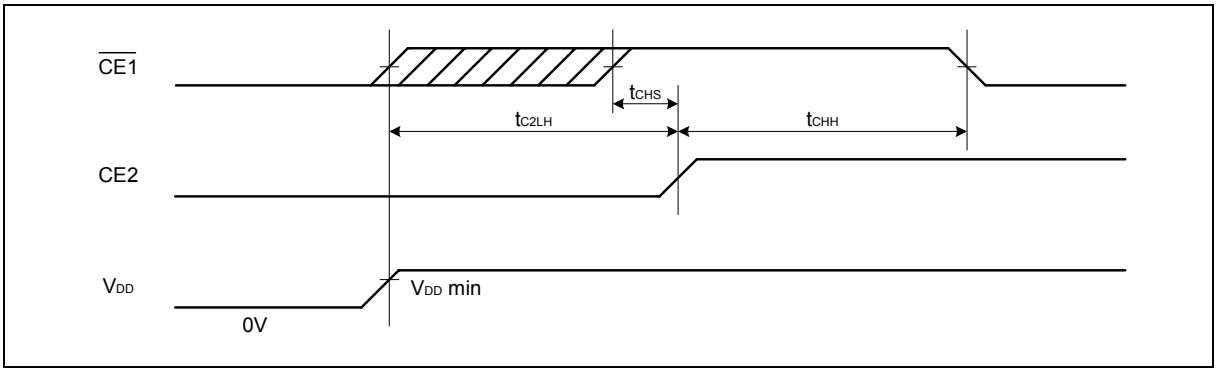
Note: CE2 must be High for Power Down Program operation.
Any other inputs not specified above can be either High or Low.

Power Down Entry and Exit Timing



Note: This Power Down mode can be also used for Power-up #2 below except that t_{CHHN} can not be used at Power-up timing.

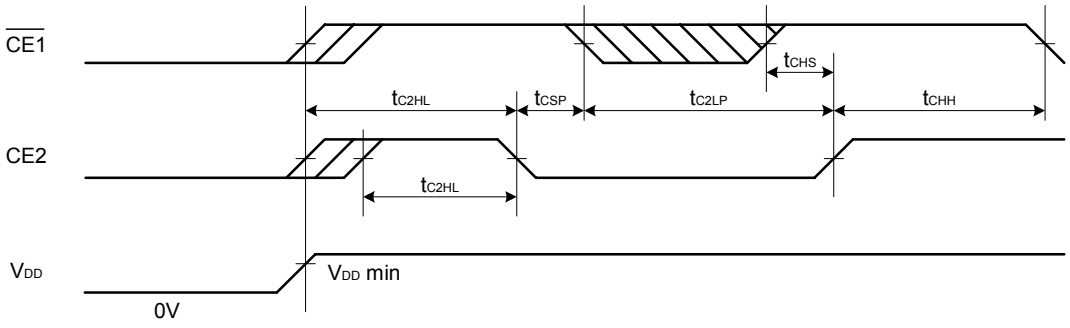
Power-up Timing #1



Note: The t_{C2LH} specifies after V_{DD} reaches specified minimum level.

Timing Waveforms, Continued

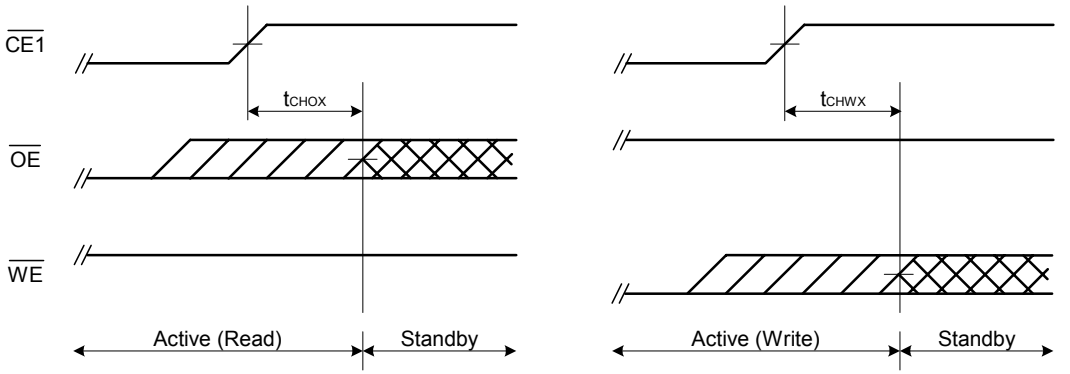
Power-up Timing #2



Note: The t_{C2HL} specifies from CE2 low to High transition after V_{DD} reaches specified minimum level.

$\overline{CE1}$ must be brought to High prior to or together with CE2 Low to High transition.

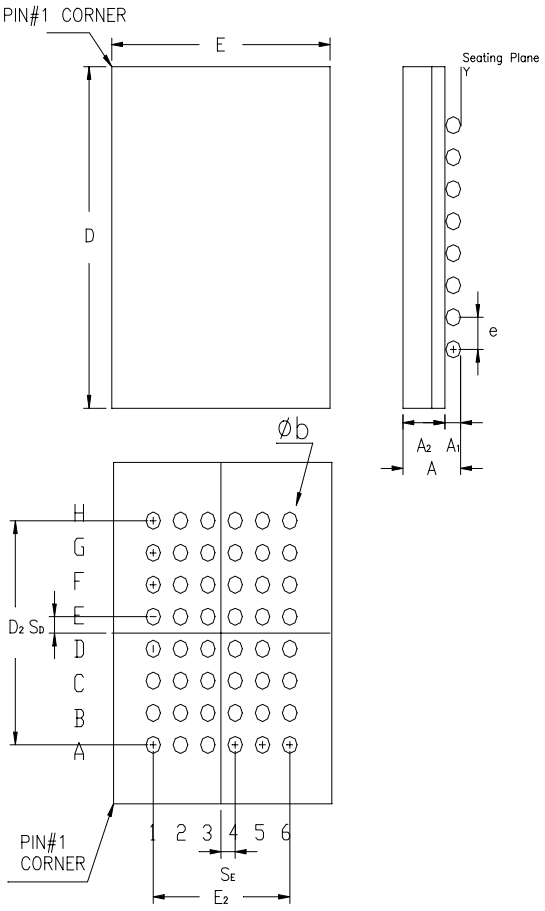
Standby Entry Timing after Read or Write



Note: Both t_{CHOX} and t_{CHWX} define the earliest entry timing for Standby mode. If either of timing is not satisfied, it takes t_{RC}(min) period from either last address transition of A0, A1 and A2, or $\overline{CE1}$ Low to High transition.

10. PACKAGE DIMENSION

TFBGA 48 Balls (6 x 8 mm^2, pitch 0.75 mm)



COTROL DIMENSIONS ARE IN MILLIMETERS.

SYMBOL	inch			millimeter		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.035	0.039	0.043	0.9	1.0	1.10
A1	0.008	0.01	0.012	0.20	0.27	0.30
A2	0.025	0.028	0.031	0.64	0.72	0.8
øb	0.012	0.014	0.016	0.30	0.35	0.40
D	0.313	0.315	0.317	7.95	8.00	8.05
E	0.234	0.236	0.238	5.95	6.00	6.05
e	–	0.030	–	–	0.75	–
E2	0.148 BASIC			3.75 BASIC		
D2	0.207 BASIC			5.25 BASIC		
SD	0.015 BASIC			0.375 BASIC		
SE	0.015 BASIC			0.375 BASIC		
y	–	–	0.004	–	–	0.10

11. ORDERING INFORMATION

PART NO.	SPEED	OPERATING TEMPERATURE	PACKAGE
W964B6BBN70	70 nS	0 to 70	TFBGA 48, 6 mm x 8 mm, BALL PITCH 0.75 mm
W964B6BBN70E	70 nS	-25 to 85	TFBGA 48, 6 mm x 8 mm, BALL PITCH 0.75 mm
W964B6BBN70I	70 nS	-40 to 85	TFBGA 48, 6 mm x 8 mm, BALL PITCH 0.75 mm
W964B6BBN80	80 nS	0 to 70	TFBGA 48, 6 mm x 8 mm, BALL PITCH 0.75 mm
W964B6BBN80E	80 nS	-25 to 85	TFBGA 48, 6 mm x 8 mm, BALL PITCH 0.75 mm
W964B6BBN80I	80 nS	-40 to 85	TFBGA 48, 6 mm x 8 mm, BALL PITCH 0.75 mm

Notes:

1. Winbond reserves the right to make changes to its products without prior notice.
2. Purchasers are responsible for performing appropriate quality assurance testing on products intended for use in applications where personal injury might occur as a consequence of product failure.

12. VERSION HISTORY

VERSION	DATE	PAGE	DESCRIPTION
A1	March 31, 2003	-	Create new document

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