μPD43256A
32,768 x 8-Bit
Static CMOS RAM

T-46-23-13

Description

The μPD43256A is a 32,768-word by 8-bit static RAM fabricated with advanced silicon-gate technology. Its unique design uses CMOS peripheral circuits and N-channel memory cells with polysilicon resistors to make the μPD43256A a high-speed device that requires very low power and no clock or refreshing.

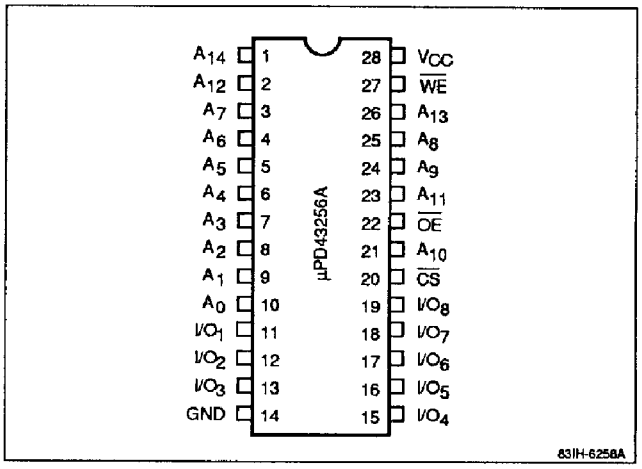
Minimum standby power is drawn when $\overline{CS}$ is high, independent of the other inputs' levels. Data retention is guaranteed at a power supply voltage as low as 2 V. The μPD43256A is available in standard 28-pin plastic DIP, 28-pin plastic miniflat, or 32-pin plastic TSOP packaging.

Features

- Single +5-volt power supply
- Fully static operation—no clock or refreshing required
- TTL-compatible inputs and outputs
- Common I/O using three-state outputs
- One $\overline{CS}$ pin and one $\overline{OE}$ pin for easy application
- Data retention of 2 V minimum
- Standard 28-pin plastic DIP and miniflat packaging
- Standard 32-pin plastic TSOP packaging (with either normal or reverse bent leads)

Pin Configurations

28-Pin Plastic DIP or Miniflat



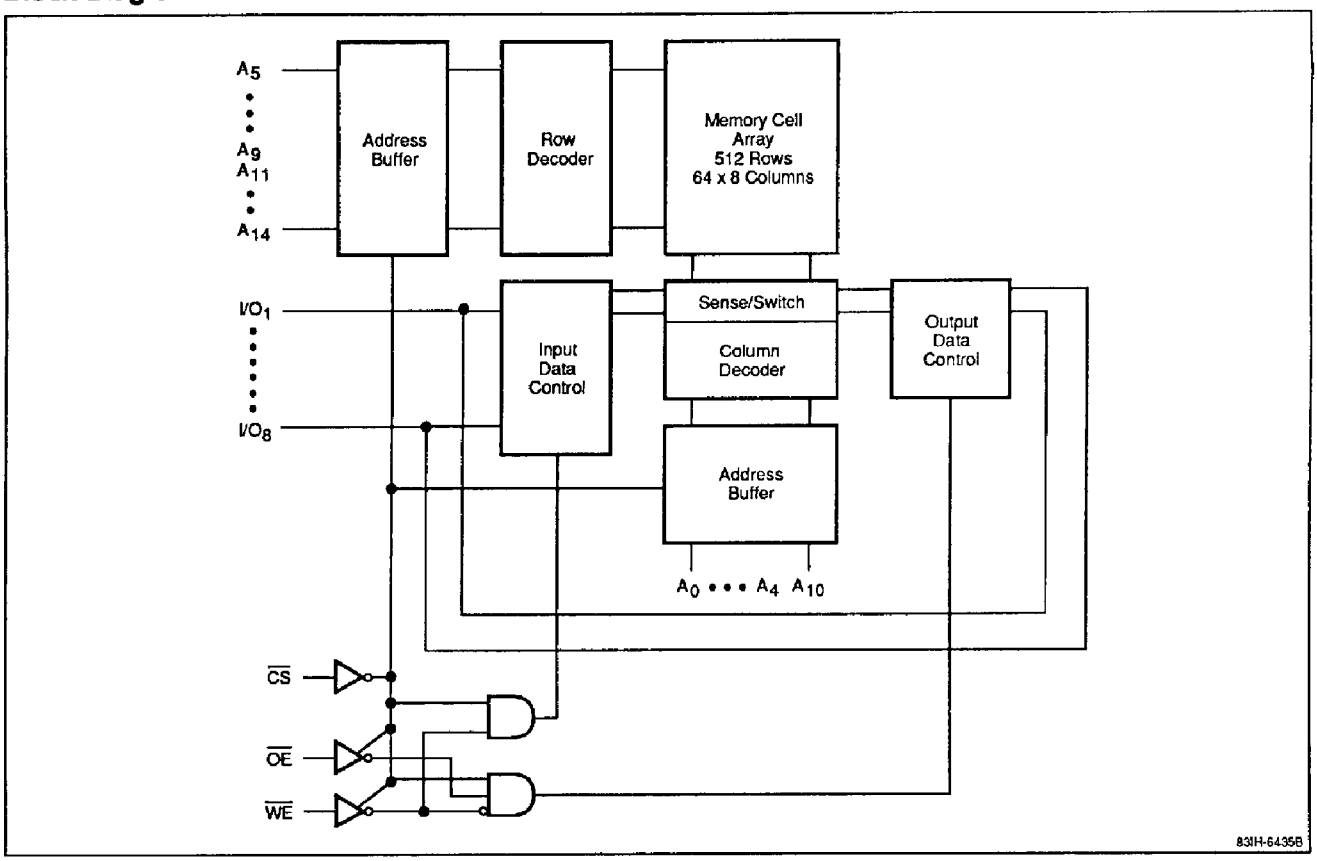
Pin Identification

Symbol	Function
A_0 - A_{14}	Address inputs
I/O_1 - I/O_8	Data inputs and outputs
$\overline{CS}$	Chip select
$\overline{OE}$	Output enable
$\overline{WE}$	Write enable
GND	Ground
V_{CC}	+5-volt power supply
NC	No connection

Ordering Information

Catalog Part Number	Access Time (max)	Data Retention Current (max) T_A = 0 to 70°C(max)	Package
μPD43256AC-85L	85 ns	50 μA	28-pin plastic DIP(600 mil)
C-10L	100 ns		
C-12L	120 ns		
C-15L	150 ns		
μPD43256AC-85LL	85 ns	20 μA	28-pin plastic DIP(600 mil)
C-10LL	100 ns		
C-12LL	120 ns		
C-15LL	150 ns		
μPD43256AGU-85L	85 ns	50 μA	28-pin plastic miniflat
GU-10L	100 ns		
GU-12L	120 ns		
GU-15L	150 ns		
μPD43256AGU-85LL	85 ns	20 μA	28-pin plastic miniflat
GU-10LL	100 ns		
GU-12LL	120 ns		
GU-15LL	150 ns		
μPD43256AGX-10L	100 ns	50 μA	32-pin plastic TSOP (normal pinouts)
GX-12L	1200 ns		
μPD43256AGX-10LL	100 ns	20 μA	
GX-12LL	120 ns		
μPD43256AGXM-10L	100 ns	50 μA	32-pin plastic TSOP (reverse pinouts)
GXM-12L	1200 ns		
μPD43256AGXM-10LL	100 ns	20 μA	
GXM-12LL	120 ns		

Block Diagram



Absolute Maximum Ratings

Supply voltage, V_{CC} (Note 1)	−0.5 to +7.0 V
Input voltage, V_{IN} (Note 1)	−0.5 to V_{CC} + 0.5 V
Output voltage, $V_{I/O}$ (Note 1)	−0.5 to V_{CC} + 0.5 V
Operating temperature, T_{OPR}	0 to +70°C
Storage temperature, T_{STG}	−55 to +125°C
Power dissipation, P_D	1.0 W

Exposure to Absolute Maximum Ratings for extended periods may affect device reliability; exceeding the ratings could cause permanent damage. The device should be operated within the limits specified under DC and AC Characteristics.

Notes:

(1) −3.0 V minimum (pulse width = 50 ns).

Capacitance

T_A = +25°C; f = 1 MHz; V_{IN} and V_{OUT} = 0 V

Parameter	Symbol	Min	Max	Unit
Input capacitance	C_I		5	pF
Input/output capacitance	$C_{I/O}$		8	pF

Notes:

(1) This parameter is sampled and not 100% tested.

Truth Table

$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	Function	I/O	I_{CC}
H	X	X	Not selected	High-Z	Standby
L	H	H	Not selected	High-Z	Active
L	L	H	Read	D_{OUT}	Active
L	X	L	Write	D_{IN}	Active

Notes:

(1) X = don't care.

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{CC}	4.5	5.0	5.5	V
Input voltage, low (Note 1)	V_{IL}	−0.3		0.8	V
Input voltage, high	V_{IH}	2.2		V_{CC} + 0.5	V
Ambient temperature	T_A	0		70	°C

Notes:

(1) −3.0 V minimum (pulse width = 50 ns).

DC Characteristics

T_A = 0 to +70°C; V_{CC} = +5.0 V ± 10%

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
Input leakage current	I_{LI}	−1		1	μA	V_{IN} = 0 V to V_{CC}
I/O leakage current	I_{LO}	−1		1	μA	$V_{I/O}$ = 0 V to V_{CC}; $\overline{CS} \geq V_{IH}$ or $\overline{OE} \geq V_{IH}$ or $\overline{WE} \leq V_{IL}$
Operating supply current	I_{CCA1}			45	mA	$\overline{CS} \leq V_{IL}$ (min cycle); $I_{I/O}$ = 0 V (Note 1)
	I_{CCA2}			10	mA	$\overline{CS}$ = V_{IL}; $I_{I/O}$ = 0 V
	I_{CCA3}			10	mA	$\overline{CS} \leq$ 0.2 V; f = 1 MHz; $I_{I/O}$ = 0 V; $V_{IL} \leq$ 0.2 V; $V_{IH} \geq V_{CC}$ − 0.2 V
Standby supply current	I_{SB}			3	ma	$\overline{CS} \geq V_{IH}$
	I_{SB1}		0.002	0.1	mA	$\overline{CS} \geq V_{CC}$ − 0.2 V (Note 2)
Output voltage, low	V_{OL}			0.4	V	I_{OL} = 2.1 mA
Output voltage, high	V_{OH1}	2.4			V	I_{OH} = −1.0 mA
	V_{OH2}	V_{CC} − 0.5			V	I_{OH} = −0.1 mA

Notes:

(1) μPD43256A-10L/-10LL/-12L/-12LL = 40 mA (max).
μPD43256A-15L/-15LL = 35 mA (max).

(2) μPD43256AGX-10LL/-12LL = 50 μA (max).

AC Characteristics (for L and LL Versions)

T_A = 0 to +70°C; V_{CC} = +5.0 V ± 10%

Parameter	Symbol	μPD43256A-85		μPD43256A-10		μPD43256A-12		μPD43256A-15		Unit	Test Conditions
		Min	Max	Min	Max	Min	Max	Min	Max		
Read Operation											
Read cycle time	t_{RC}	85		100		120		150		ns	
Address access time	t_{AA}		85		100		120		150	ns	(Note 2)
Chip select access time	t_{ACS}		85		100		120		150	ns	(Note 2)
Output enable to output valid	t_{OE}		40		50		60		70	ns	(Note 2)
Output hold from address change	t_{OH}	10		10		10		10		ns	
Chip select to output in low-Z	t_{CLZ}	10		10		10		10		ns	(Note 3)
Output enable to output in low-Z	t_{OLZ}	5		5		5		5		ns	(Note 3)
Chip select to output in high-Z	t_{CHZ}		30		35		40		50	ns	(Note 3)
Output enable to output in high-Z	t_{OHZ}		30		35		40		50	ns	(Note 3)
Write Operation											
Write cycle time	t_{WC}	85		100		120		150		ns	
Chip select to end of write	t_{CW}	70		80		85		100		ns	
Address valid to end of write	t_{AW}	70		80		85		100		ns	
Address setup time	t_{AS}	0		0		0		0		ns	
Write pulse width	t_{WP}	65		70		70		90		ns	
Write recovery time	t_{WR}	5		5		5		5		ns	
Data valid to end of write	t_{DW}	35		40		50		60		ns	
Data hold time	t_{DH}	0		0		0		0		ns	
Write enable to output in high-Z	t_{WHZ}		30		35		40		50	ns	(Note 3)
Output active from end of write	t_{OW}	10		10		10		10		ns	(Note 3)

Notes:

(1) Input pulse levels = 0.8 to 2.2 V; input pulse rise and fall times = 5 ns; timing reference levels = 1.5 V.

(2) See figure 1 for output load.

(3) See figure 2 for output load.

Low V_{CC} Data Retention Characteristics

T_A = 0 to 70°C

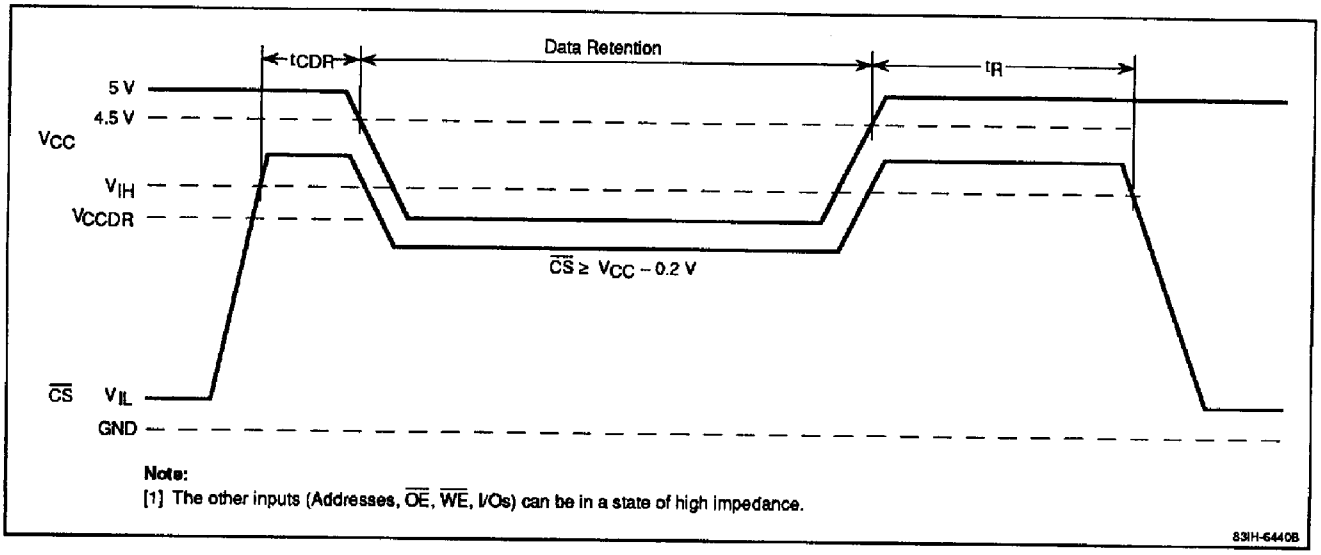
Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
Data retention supply voltage	V_{CCDR}	2.0		5.5	V	$\overline{CS} \geq V_{CC} - 0.2$ V
Data retention supply current	I_{CCDR}		1	50	μA	V_{CC} = 3.0 V; $\overline{CS} \geq V_{CC} - 0.2$ V (Notes 1, 2)
Chip deselection to data retention	t_{CDR}	0			ns	
Operation recovery time	t_R	t_{RC}			ns	

Notes:

(1) For μPD43256A-LL, I_{CCDR} = 20 μA (max) at T_A = 0 to 70°C and 3 μA (max) at T_A = 0 to 40°C.

(2) For μPD43256A-L, I_{CCDR} = 15 μA (max) at T_A = 0 to 40°C.

Data Retention Timing



Note:

[1] The other inputs (Addresses, $\overline{OE}$, $\overline{WE}$, I/Os) can be in a state of high impedance.

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Figure 1. Output Load

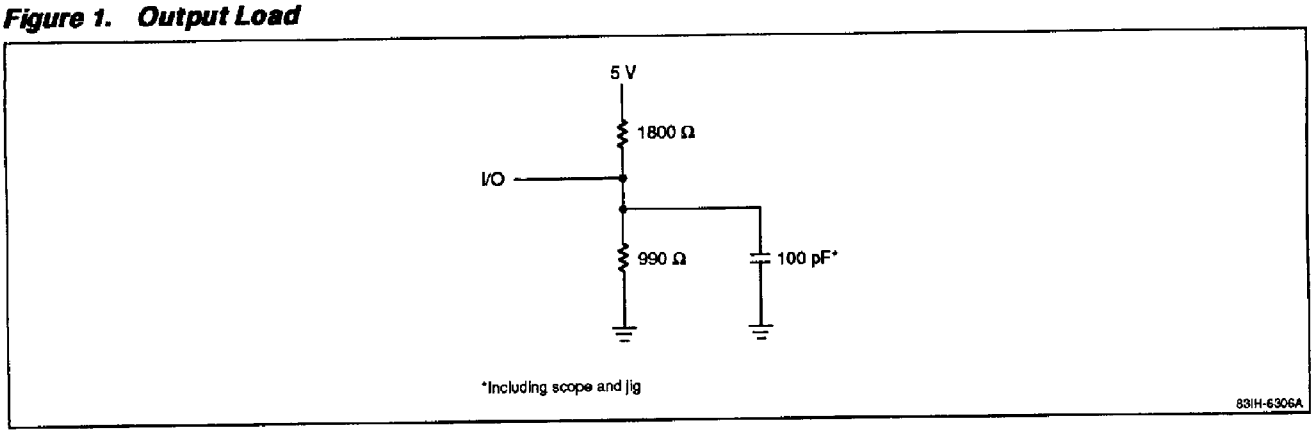
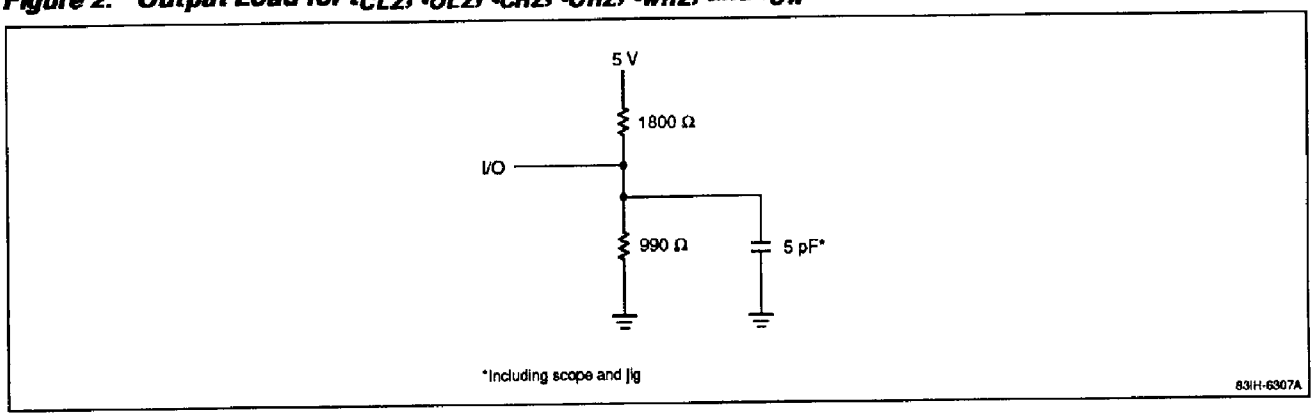
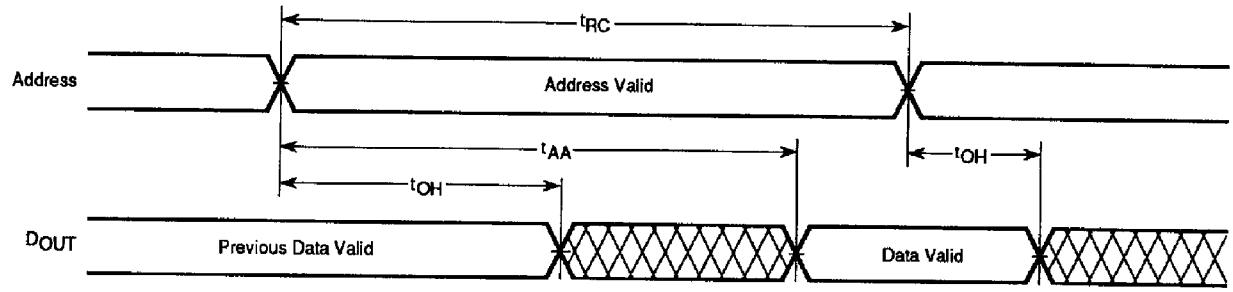


Figure 2. Output Load for t_{CLZ}, t_{OLZ}, t_{CHZ}, t_{OHZ}, t_{WHZ}, and t_{OW}



Timing Waveforms

Address Access Cycle



Notes:

[1] $\overline{WE}$ is held high for a read cycle.

[2] The device is continually selected, where $\overline{CS} = \overline{OE} = V_{IL}$.

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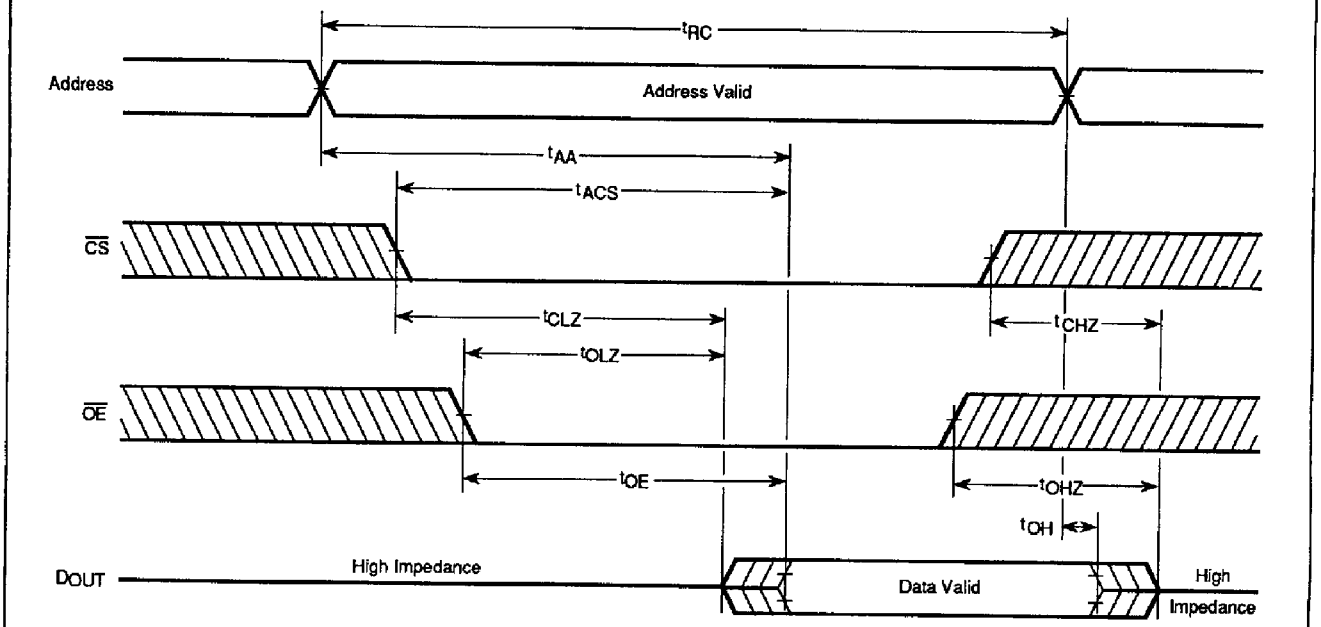
Chip Select Access Cycle



Notes:

[1] $\overline{WE}$ is high for a read cycle.

[2] Address valid prior to or coincident with the low transition of $\overline{CS}$.

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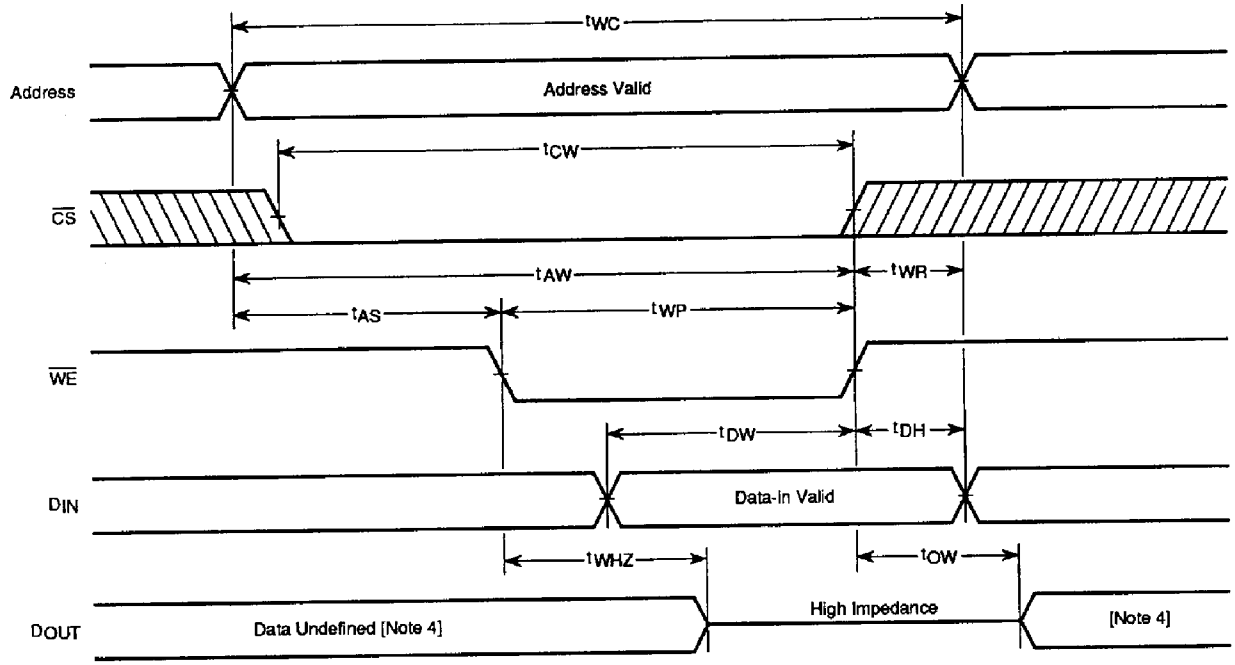
Timing Waveforms (cont)

WE-Controlled Write Cycle



Notes:

[1] A write cycle occurs during the overlap of a low $\overline{CS}$ and a low $\overline{WE}$.

[2] $\overline{CS}$ or $\overline{WE}$ must be high during address transition.

[3] If $\overline{OE}$ is high, the I/O pins remain in a state of high impedance.

[4] During this period, the I/O pins may be in the output state. Therefore, input signals of opposite phase must not be applied.

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