

NEC

NEC Electronics Inc.

μPD43256B
32,768 x 8-Bit
Static CMOS RAM

T-46-23-14

Description

The μPD43256B 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 μPD43256B a high-speed device that requires very low power and no clock or refreshing.

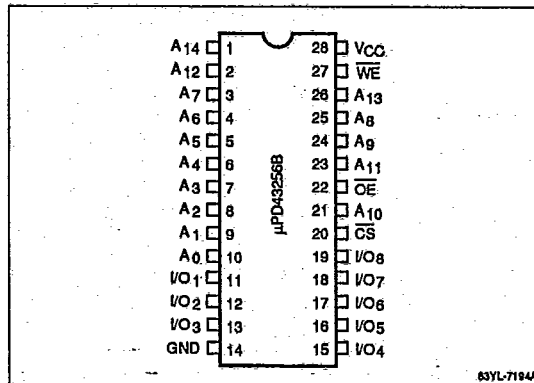
Minimum standby power is drawn when $\overline{CS}$ is high, independent of the other inputs' levels. Data retention is guaranteed at a power supply voltage as low as 2 V. The μPD43256B is available in standard 28-pin plastic DIP, 28-pin plastic miniflat, or 32-pin plastic TSOP packaging.

Features

- Single +5-volt power supply
- Fully static operation—no clock or refreshing
- 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)
- Fast access time of 55 ns

Ordering Information

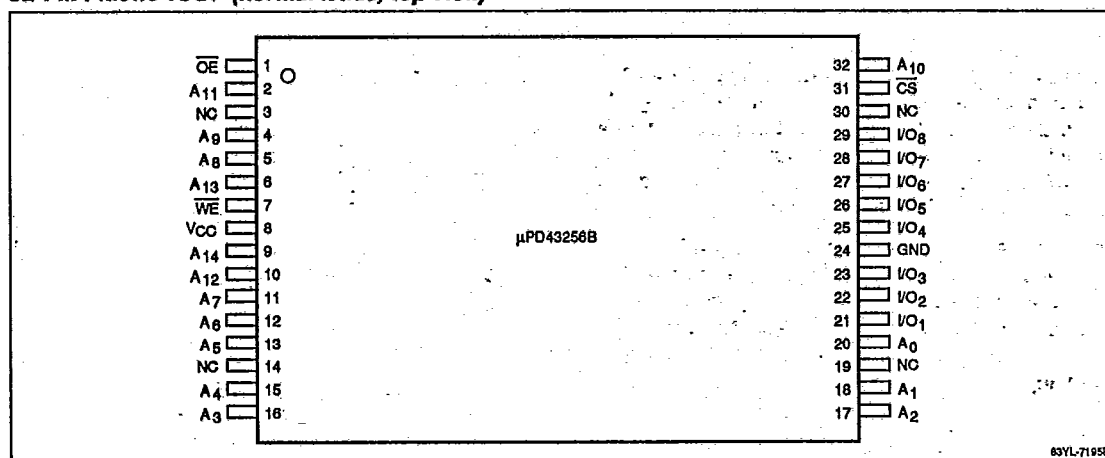
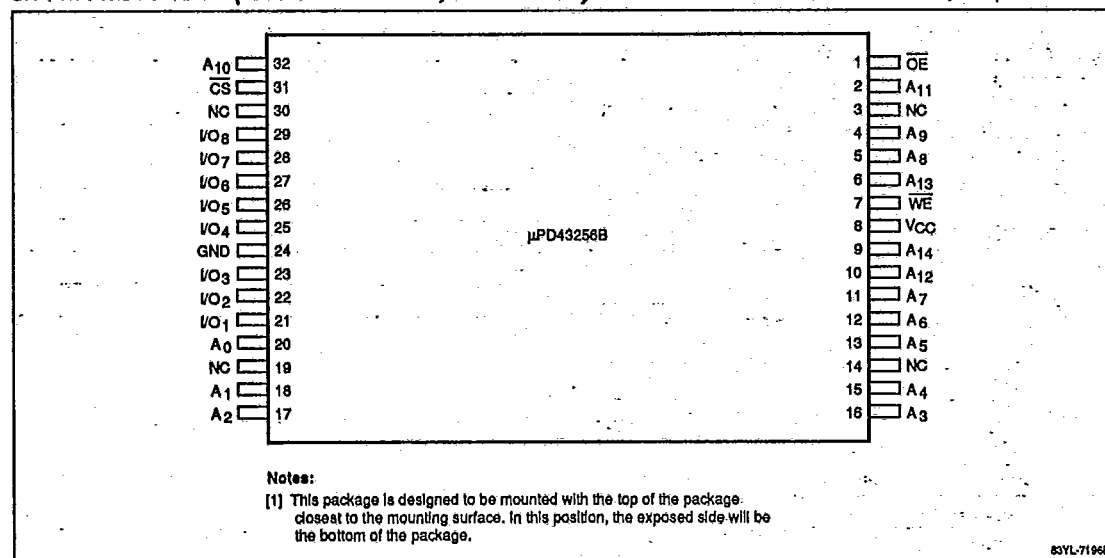
Part Number	Access Time (max)	Package
μPD43256BC-55L	55 ns	28-pin plastic DIP
C-70L	70 ns	
C-85L	85 ns	
μPD43256BGU-55L	55 ns	28-pin plastic miniflat
GU-70L	70 ns	
GU-85L	85 ns	
μPD43256BGX55L-EJA	55 ns	32-pin plastic TSOP (normal leads)
GX70L-EJA	70 ns	
GX85L-EJA	85 ns	
μPD43256BGX55L-EKA	55 ns	32-pin plastic TSOP (reverse bent leads)
GX70L-EKA	70 ns	
GX85L-EKA	85 ns	

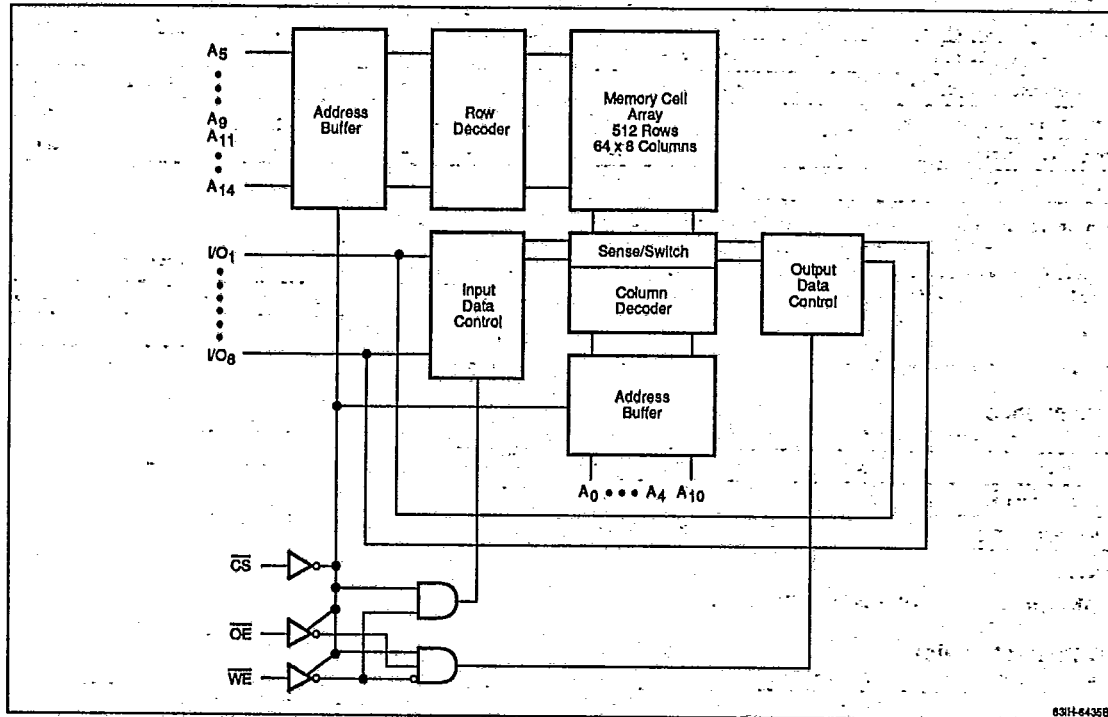
Pin Configurations**28-Pin Plastic DIP or Miniflat****Pin Identification**

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

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Pin Configurations (cont)**32-Pin Plastic TSOP (normal leads, top view)****32-Pin Plastic TSOP (reverse bent leads, bottom view)**

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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_{IO} (Note 1)	-0.5 to $V_{CC} + 0.5$ V
Operating temperature, T_{OPR}	0 to +70°C
Storage temperature, T_{STA}	-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

$T_A = +25^\circ\text{C}$; $f = 1$ MHz; V_{IN} and $V_{OUT} = 0$ V

Parameter	Symbol	Min	Max	Unit
Input capacitance	C_i		5	pF
Input/output capacitance	C_{IO}		8	pF

Notes:

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

DC Characteristics

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

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	$V_{IO} = 0$ 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}			50	mA	$\overline{CS} \leq V_{IL}$ (min cycle); $I_{IO} = 0$ V (Note 1)
	I_{CCA2}			10	mA	$\overline{CS} = V_{IL}$; $I_{IO} = 0$ V
	I_{CCA3}			10	mA	$\overline{CS} \leq 0.2$ V; $f = 1$ MHz; $I_{IO} = 0$ 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}		2	100	μA	$\overline{CS} \geq V_{CC} - 0.2$ V
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) μPD43256B-55L = 50 mA (max).
μPD43256B-70L/-85L = 45 mA (max).

Truth Table

$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	Function	I/O	I_{CC}
H	X	X	Not selected	High-Z	Standby
L	H	H	Outputs disabled	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).

NEC**μPD43256B****T-46-23-14****AC Characteristics (All Versions)** $T_A = 0 \text{ to } +70^\circ\text{C}$; $V_{CC} = +5.0 \text{ V} \pm 10\%$

Parameter	Symbol	μPD43256B-55		μPD43256B-70		μPD43256B-85		Unit	Test Conditions
		Min	Max	Min	Max	Min	Max		
Read Operation									
Read cycle time	t _{RO}	55		70		85		ns	(Note 2)
Address access time	t _{AA}		55		70		85	ns	(Note 2)
Chip select access time	t _{AOS}		55		70		85	ns	(Note 2)
Output enable to output valid	t _{OE}		30		35		40	ns	(Note 2)
Output hold from address change	t _{OH}	10		10		10		ns	(Note 2)
Chip select to output in low-Z	t _{OLZ}	10		10		10		ns	(Note 3)
Output enable to output in low-Z	t _{OLZ}	5		5		5		ns	(Note 3)
Chip select to output in high-Z	t _{OHZ}		30		30		30	ns	(Note 3)
Output enable to output in high-Z	t _{OHZ}		30		30		30	ns	(Note 3)
Write Operation									
Write cycle time	t _{WC}	55		70		85		ns	
Chip select to end of write	t _{OW}	50		60		70		ns	
Address valid to end of write	t _{AW}	50		60		70		ns	
Address setup time	t _{AS}	0		0		0		ns	
Write pulse width	t _{WP}	45		55		65		ns	
Write recovery time	t _{WR}	5		5		5		ns	
Data valid to end of write	t _{DW}	30		30		35		ns	
Data hold time	t _{DH}	0		0		0		ns	
Write enable to output in high-Z	t _{WHZ}		30		30		30	ns	(Note 3)
Output active from end of write	t _{OW}	10		10		10		ns	(Note 3)

Notes:

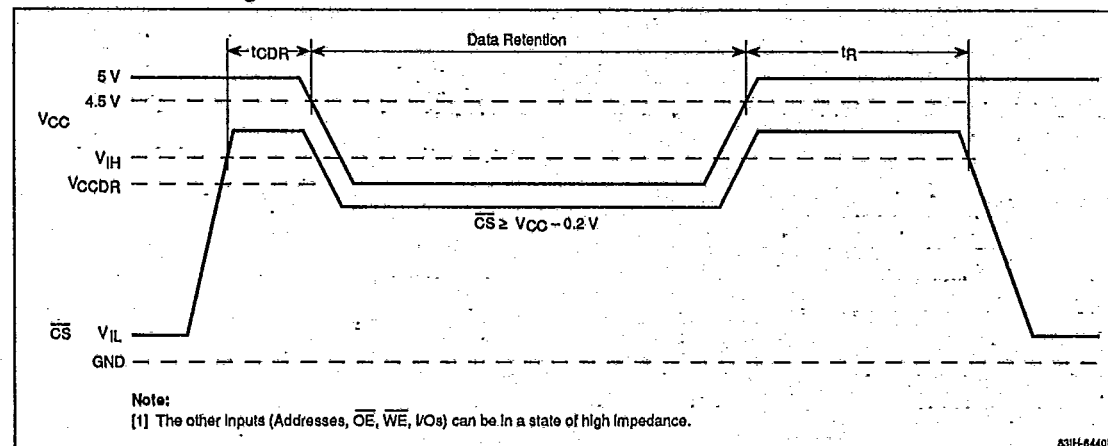
- (1) Input pulse levels = 0.8 to 2.2 V; Input pulse rise and fall times = 5 ns; timing reference levels = 1.5 V.
- (2) See figure 1 for output load.
- (3) See figure 2 for output load.

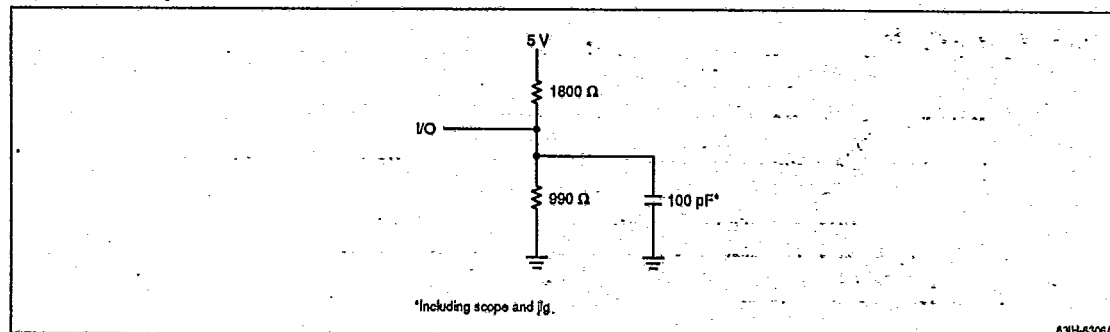
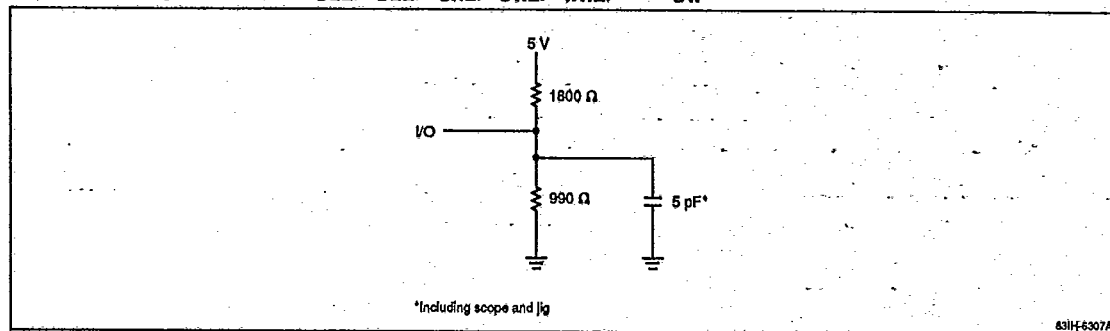
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Low V_{CC} Data Retention Characteristics $T_A = 0 \text{ to } 70^\circ\text{C}$

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

Notes:(1) $I_{CCDR} = 15 \mu\text{A}$ (max) at $T_A = 0 \text{ to } 40^\circ\text{C}$.**Data Retention Timing**

NEC**μPD43256B****T-46-23-14****Figure 1. Output Load****Figure 2. Output Load for t_{CLZ} , t_{OLZ} , t_{CHZ} , t_{OHZ} , t_{WHZ} , and t_{OW}** 

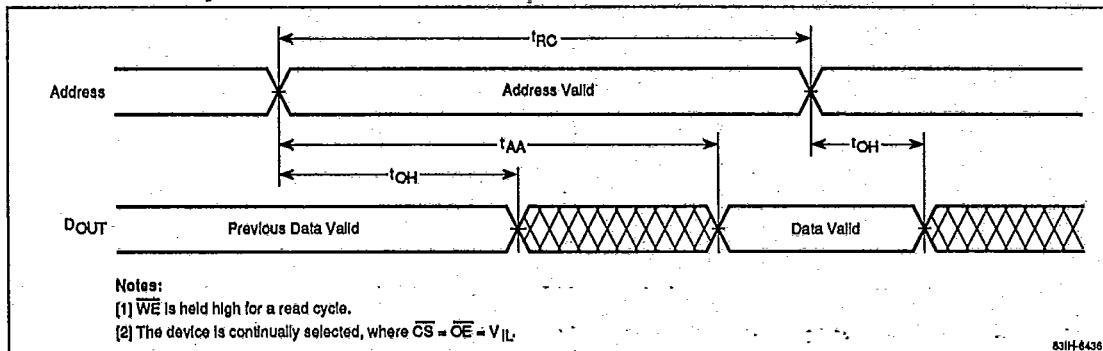
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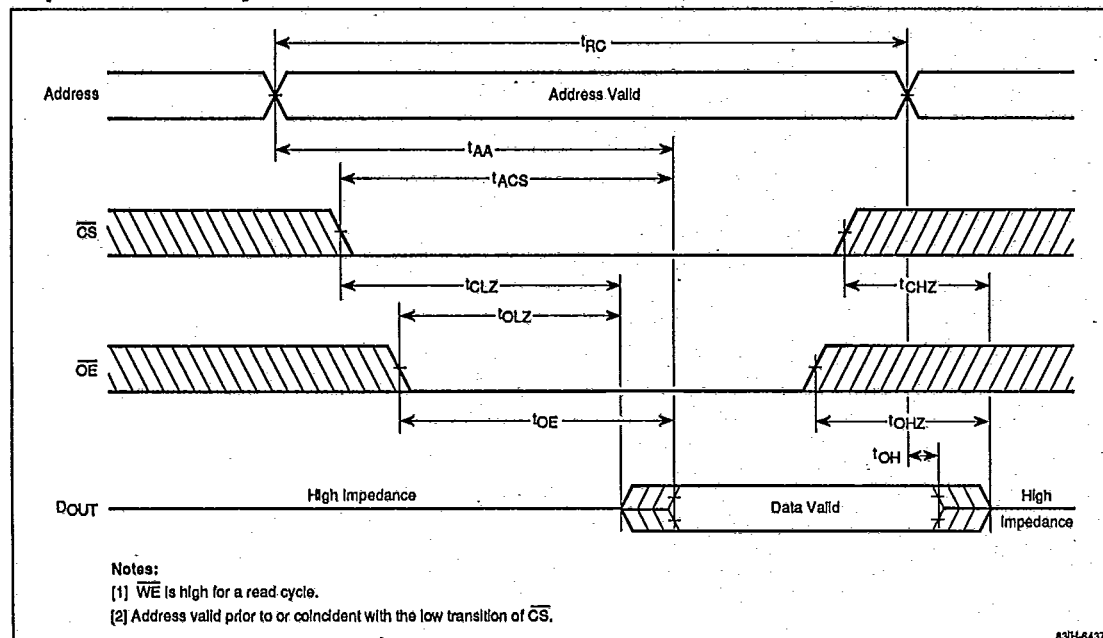
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Timing Waveforms

Address Access Cycle



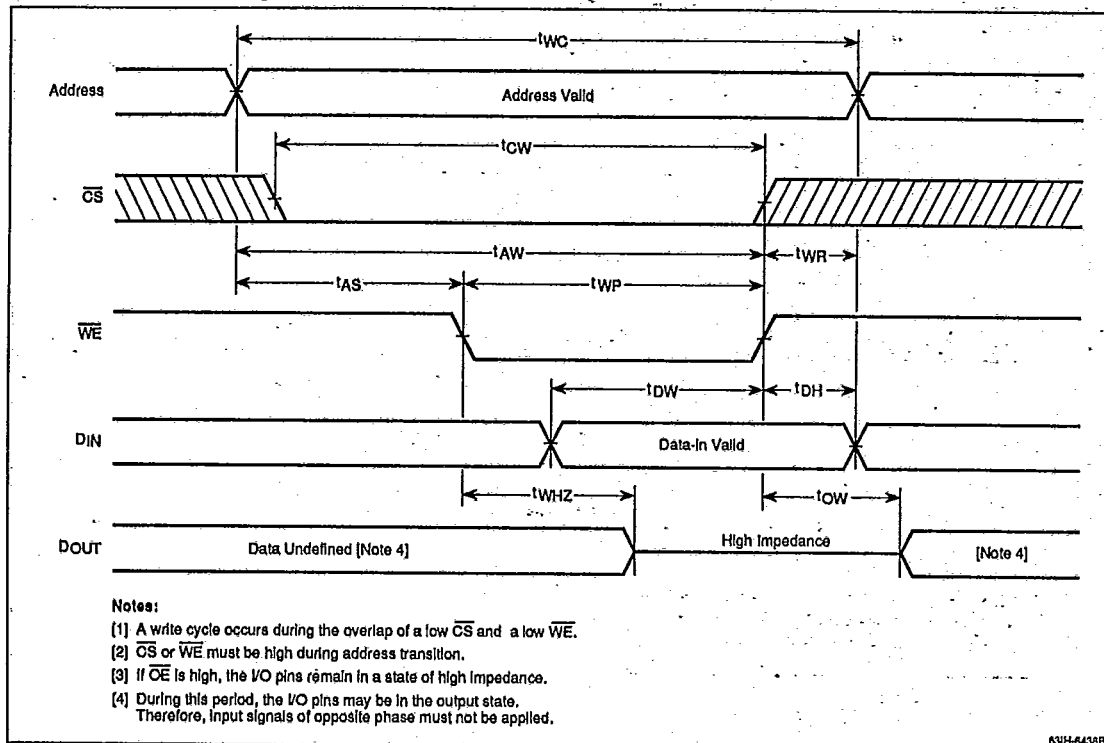
Chip Select Access Cycle



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Timing Waveforms (cont)

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WE-Controlled Write Cycle

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Timing Waveforms (cont)

 $\overline{CS}$ -Controlled Write Cycle