

256K-BIT CMOS STATIC RAM

DESCRIPTION

The μ PD43256A is a high speed, low power, 32K words by 8 bits CMOS static RAM fabricated with advanced silicon-gate CMOS technology. The μ PD43256A is low standby power device using n-channel memory cell with polysilicon resistors. Furthermore, a novel circuitry technique makes the device a high speed and low operating power device which requires no clock or refreshing to operate.

Minimum standby power is drawn by this device when \overline{CS} is at high level, independently of the other inputs level.

Data retention is guaranteed at a power supply voltage as low 2 volts.

The μ PD43256A(F) is Extended-Temperature-Version ($T_a = -40$ to $+85$).

The μ PD43256A(F) is packed in 28-pin DIP, 28-pin SOP.

FEATURES

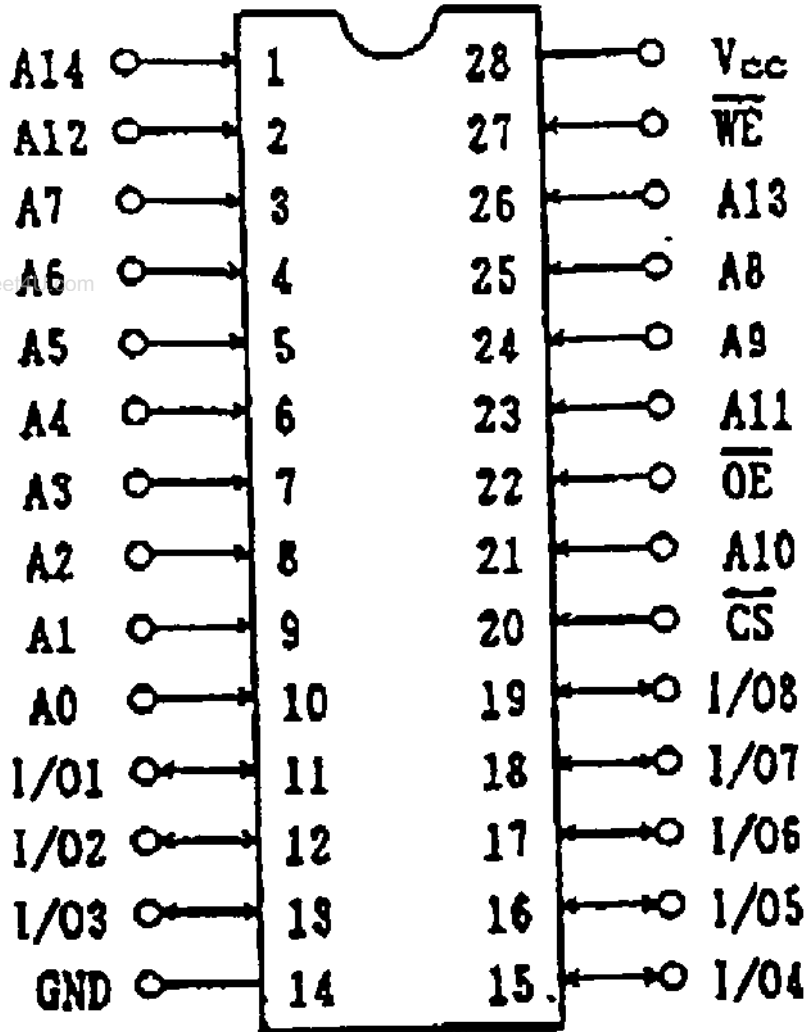
- 32768 words by 8 bits organization
- Fast Access Time
 - μ PD43256A(F)-10/10L----100 ns MAX.
 - μ PD43256A(F)-12/12L----120 ns MAX.
 - μ PD43256A(F)-15/15L----150 ns MAX.
- Low Power Dissipation (L-Version)
 - Standby Supply Current-----L-Version : 200 μ A MAX.
 - Data Retention Supply Current----L-Version----15 μ A MAX. ($T_a = 0$ to 40°C)
- Extended Temperature Range: $T_a = -40$ to 85°C
- Single +5V Supply
- Fully Static Operation: No clock or Refreshing required
- TTL Compatible: All Inputs and Outputs
- Common I/O Using Three-State Output
- One Chip Select and One Output Enable Inputs for Easy Application

ORDERING INFORMATION

PART NUMBER	PACKAGE	ACCESS TIME (MAX.)	NOTE
MPD43256AC(F)-10	28-pin Plastic DIP(600mil)	100ns	
MPD43256AC(F)-12	"	120ns	
MPD43256AC(F)-15	"	150ns	
MPD43256AC(F)-10L	"	100ns	L-Version
MPD43256AC(F)-12L	"	120ns	"
MPD43256AC(F)-15L	"	150ns	"
MPD43256AGU(F)-10L	28-pin Plastic SOP	100ns	L-Version
MPD43256AGU(F)-12L	"	120ns	"
MPD43256AGU(F)-15L	"	150ns	"



PIN CONFIGURATION

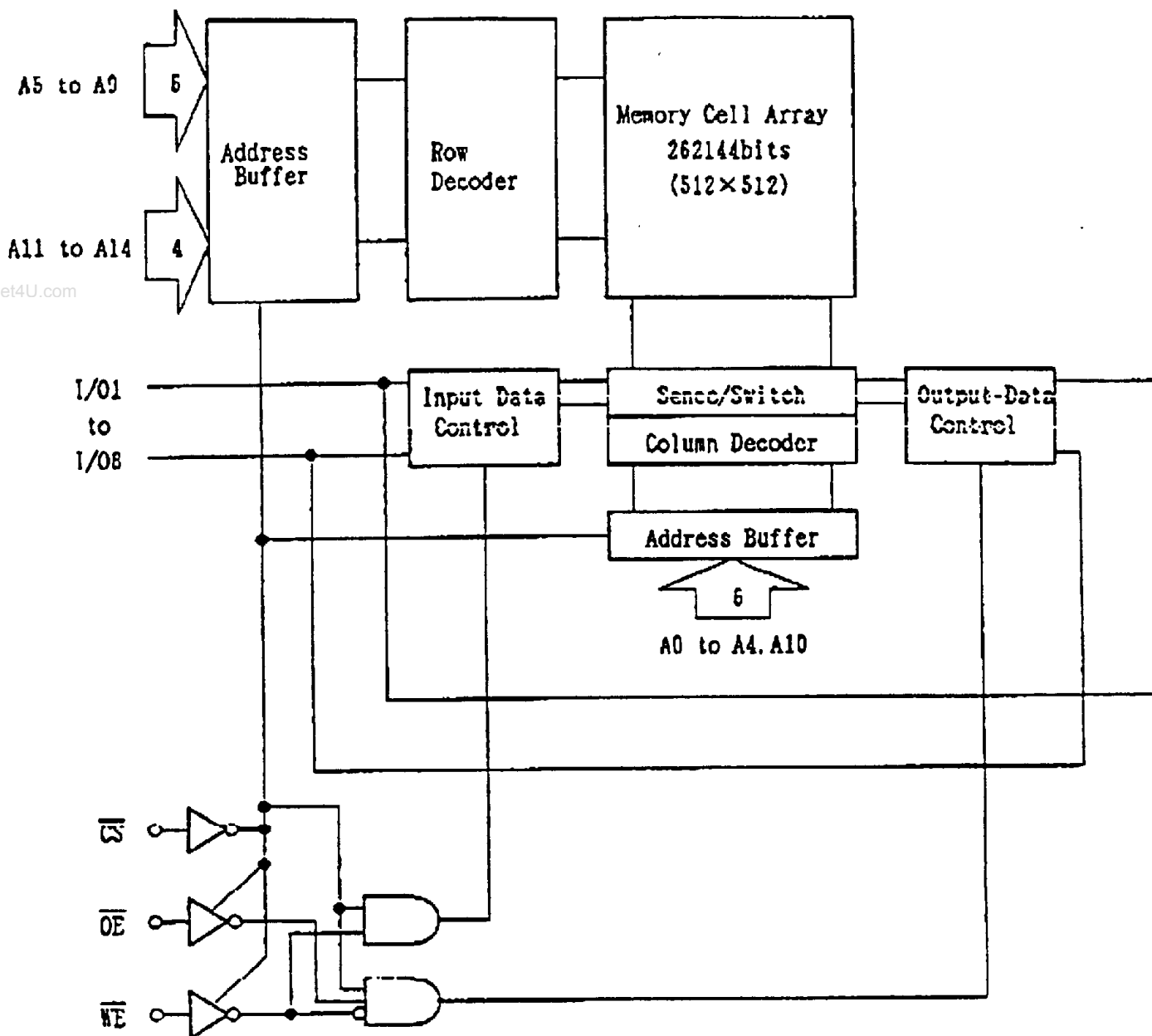
28-pin Plastic DIP/SOP
(TOP VIEW)



- A0 to A14 : Address input
- I/O1 to I/O8 : Data input/Output
- \overline{CS} : Chip Select Input
- \overline{WE} : Write Enable Input
- \overline{OE} : Output Enable Input
- V_{cc} : Power Supply (+5 V)
- GND : Ground
- NC : No Connection

BLOCK DIAGRAM

V_{cc} 
GND 



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TRUTH TABLE

\overline{CS}	\overline{OE}	\overline{WE}	MODE	I/O	I_{CC}
H	X	X	Not Selected	Hi-Z	I_{SD}
L	H	H	Output Disable		
L	L	H	Read	D_{OUT}	I_{CCA}
L	X	L	Write	D_{IN}	

ELECTRICAL SPECIFICATION

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITION	RATING	UNIT
Supply Voltage	V_{CC}		-0.5 ^{Note 1} to +7.0	V
Input/Output Voltage	V_T		-0.5 ^{Note 1} to $V_{CC}+0.5$	V
Operating Temperature	V_{OPC}		-40 to +85	°C
Storage Temperature	V_{STG}		-55 to +125	°C

Note: -3.0V MIN. (Pulse Width 50ns)

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage V_{CC}	V_{CC}		4.5	5.0	5.5	V
Input High Voltage	V_{IH}		2.4		$V_{CC}+0.5$	V
Input Low Voltage	V_{IL}		-0.3 ^{Note 1}		0.6	V
Ambient Temperature	T_a		-40		85	°C

Note: -3.0V MIN. (Pulse Width 50ns)

DC CHARACTERISTICS (Recommended Operating Conditions unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION	$\mu PD43256A(F)$			$\mu PD43256A(F)-L$			UNIT
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Input Leakage Current	I_{LR}	$V_{IN}=0V$ to V_{CC}	-1.0		1.0	-1.0		1.0	μA
I/O Leakage Current	I_{LO}	$V_{I/O}=0V$ to V_{CC} $\overline{CS}=V_{IN}$ or $\overline{WE}=V_{IL}$ or $\overline{OE}=V_{IN}$	-1.0		1.0	-1.0		1.0	μA
Operating Supply Current	I_{CCA1}	$\overline{CS}=V_{IL}$ MIN. Cycle $I_{I/O}=0mA$	$\mu PD43256A(F)$ -10		60			40	mA
			$\mu PD43256A(F)$ -12		40			40	mA
			$\mu PD43256A(F)$ -15		35			35	mA
	I_{CCA2}	$\overline{CS}=V_{IL}$, $I_{I/O}=0mA$			15			15	mA
	I_{CCA3}	$\overline{CS} \leq 0.2V$, Cycle=1MHz, $I_{I/O}=0mA$ $V_{IL} \leq 0.2V$, $V_{IN} \geq V_{CC}-0.2V$			15			15	mA
Standby Supply Current	I_{SD}	$\overline{CS}=V_{IN}$			5			3	mA
	I_{SD1}	$\overline{CS} \geq V_{CC}-0.2V$		0.02	2		0.002	0.2	mA
Output High Voltage	V_{OH1}	$I_{OH}=-1.0mA$	2.4			2.4			V
	V_{OH2}	$I_{OH}=-0.1mA$	$V_{CC}-0.5$			$V_{CC}-0.5$			V
Output Low Voltage	V_{OL}	$I_{OL}=2.1mA$			0.4			0.4	V

CAPACITANCE (Ta=25 °C, f=1 MHz)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	單位
Input/Output Capacitance	$C_{I/O}$	$V_{I/O}=0\text{ V}$			8	pF
Input Capacitance	C_{IN}	$V_{IN}=0\text{ V}$			5	pF

AC CHARACTERISTICS (Recommended Operating Conditions unless otherwise noted)

AC TEST CONDITIONS

- Input Pulse Levels : 0.5 ~ 2.4 V
- Input Pulse Rise and Fall Time : 5 ns
- Timing Reference Levels : 1.5 V
- Output Load : See Fig. 1.2.

Fig. 1

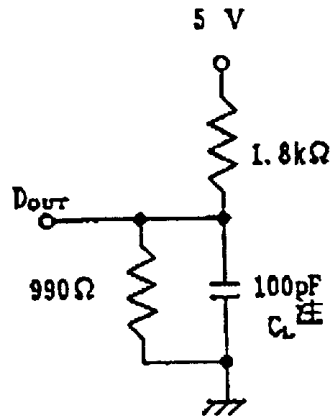
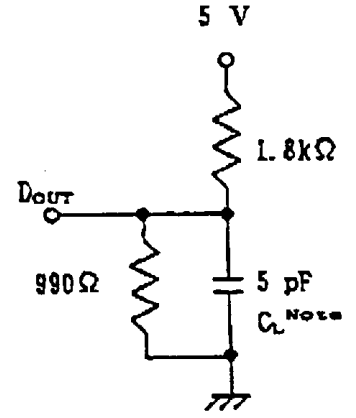


Fig. 2

(t_{CHZ} , t_{OHZ} , t_{CLZ} , t_{OLZ})
(t_{WHZ} , t_{OW})



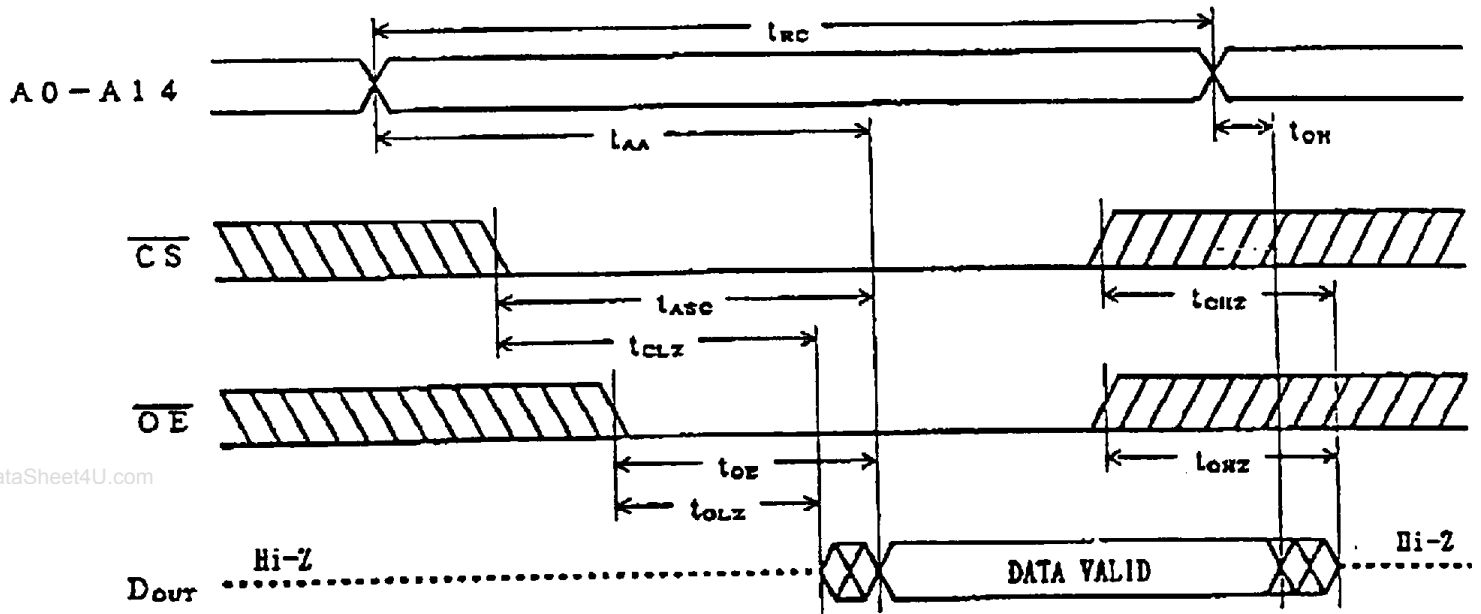
Note: including scope and jig.

READ CYCLE

PARAMETER	SYMBOL	$\mu\text{PD43256A(F)}_{-10}$		$\mu\text{PD43256A(F)}_{-12}$		$\mu\text{PD43256A(F)}_{-15}$		UNIT
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
Read Cycle Time	t_{WC}	100		120		150		ns
Address Access Time	t_{AA}		100		120		150	ns
Chip Select Access Time	t_{ACE}		100		120		150	ns
Output Enable to Output Valid	t_{OE}		50		60		70	ns
Output Hold from Address Change	t_{OH}	10		10		10		ns
Chip Select to Output in Lo-z	t_{CLZ}	10		10		10		ns
Output Enable to Output in Lo-z	t_{OLZ}	5		5		5		ns
Chip Select to Output in Hi-z	t_{CHZ}		35		40		50	ns
Output Enable to Output in Hi-z	t_{OHZ}		35		40		50	ns

READ CYCLE TIMING CHART

NOTE1



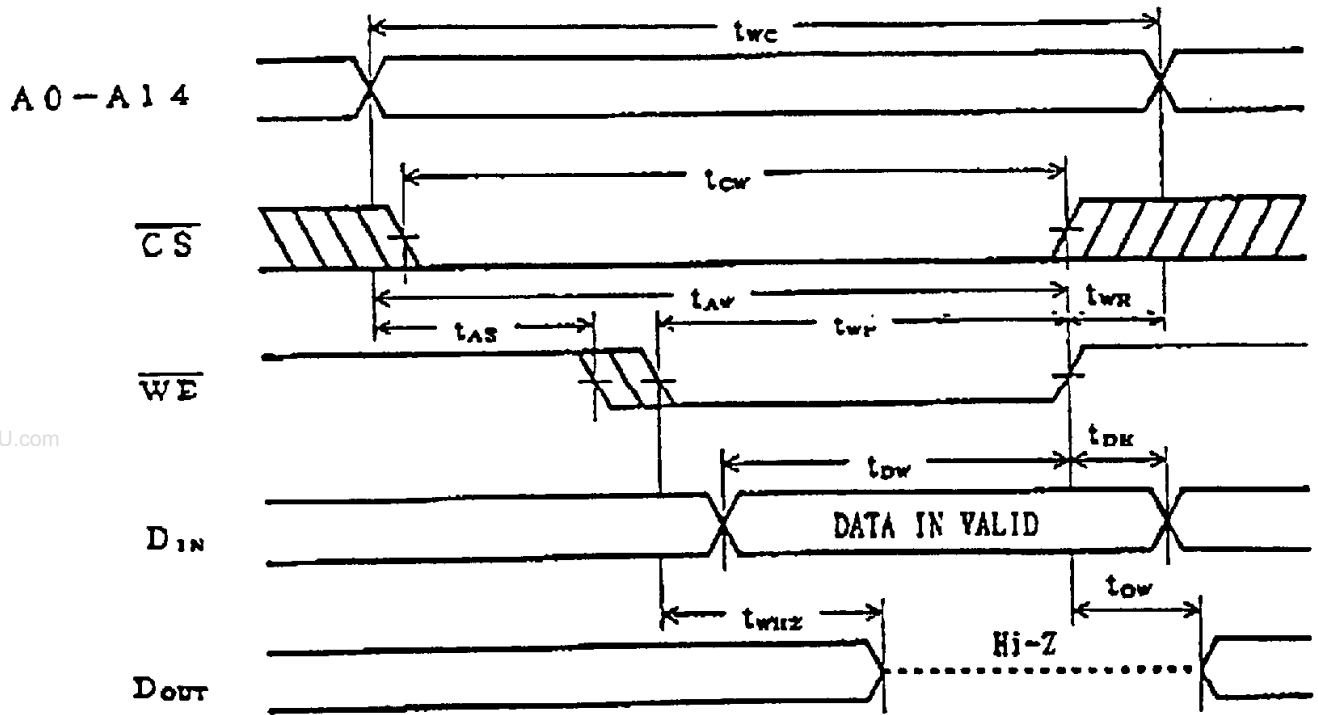
Note 1 : \overline{WE} is high for read cycle.

WRITE CYCLE

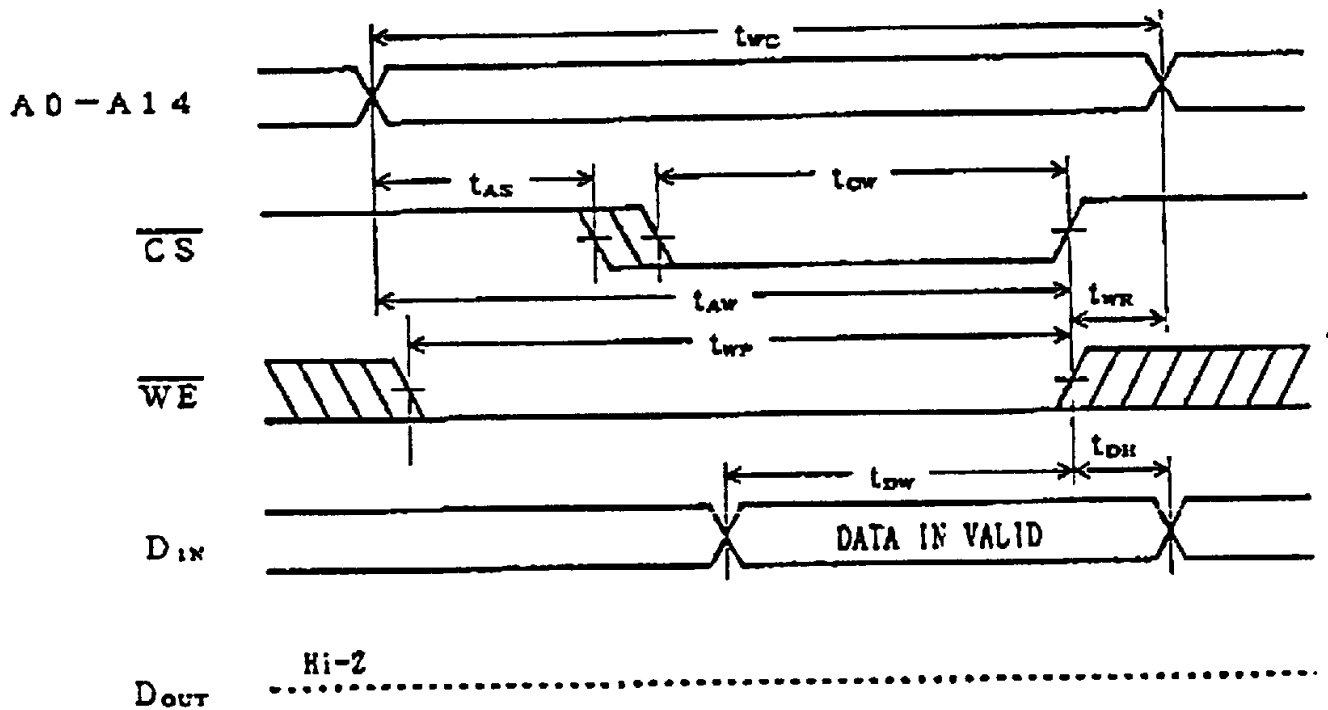
PARAMETER	SYMBOL	μ PD49256A(F) -10		μ PD43256A(F) -12		μ PD43256A(F) -15		UNIT
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
Write Cycle Time	t_{WC}	100		120		150		n s
Chip Select to end of Write	t_{CW}	80		85		100		n s
Address Valid to end of Write	t_{AW}	80		85		100		n s
Address Setup Time	t_{AS}	0		0		0		n s
Write Pulse Width	t_{WP}	70		70		90		n s
Write Recovery Time	t_{WR}	10		10		10		n s
Data Valid to end of Write	t_{DW}	40		50		60		n s
Data Hold Time	t_{DH}	0		0		0		n s
Write Enable to Output in Hi-Z	t_{WEZ}		35		40		50	n s
Output Active from end of Write	t_{OW}	10		10		10		n s

WRITE CYCLE TIMING CHART

WRITE CYCLE (\overline{WE} CONTROLLED) NOTE 1.2.3



WRITE CYCLE (\overline{CS} CONTROLLED) NOTE 1.2



NOTE1: A write 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, I/O pins remain in a high impedance state.

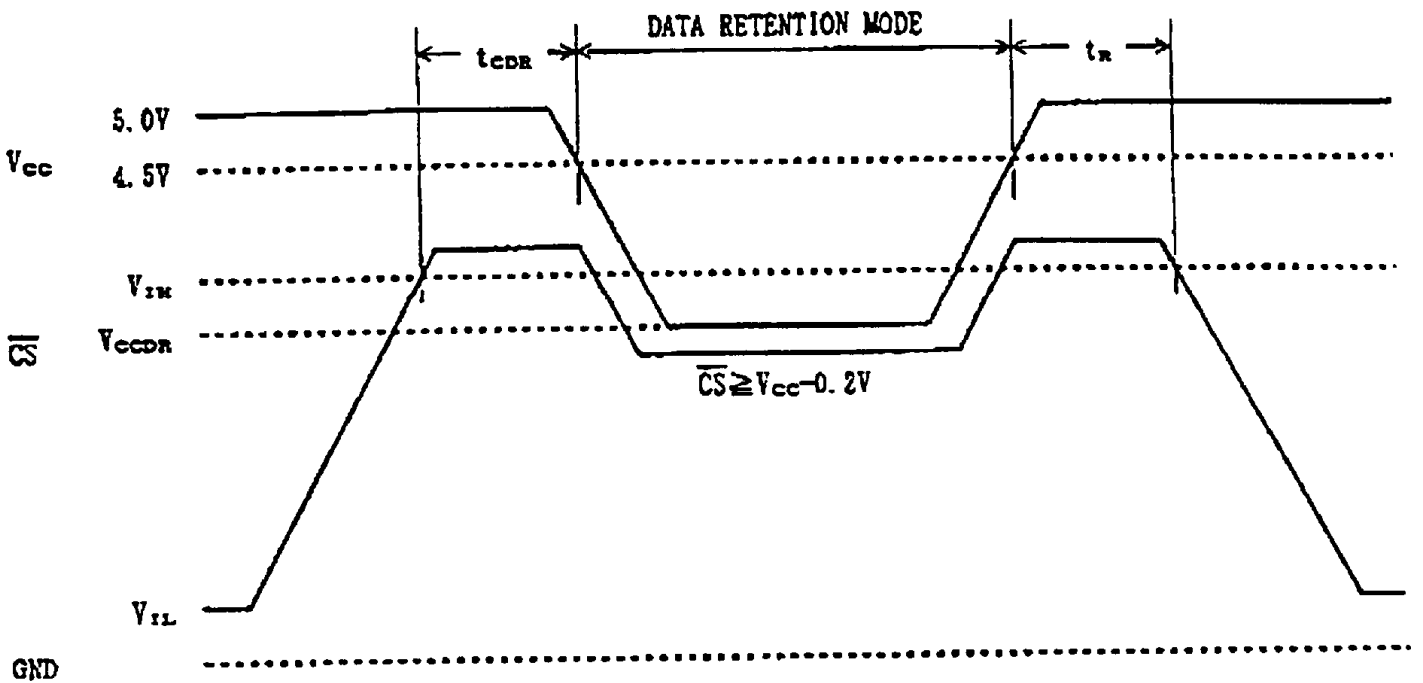
LOW V_{CC} DATA RETENTION CHARACTERISTICS (T_a=-40 to 85°C) L-Version

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Data Retention Supply Voltage	V _{CCDR}	$\overline{CS} \geq V_{CC} - 0.2V$	2.0		5.5	V
Data Retention Supply Current	I _{CCDR}	V _{CC} =3.0V, $\overline{CS} \geq V_{CC} - 0.2V$		1	100 ^{Note}	μA
Chip Deselection to Data Retention Mode	t _{CDR}		0			ns
Operation Recovery Time	t _R		t _{RC}			ns

Note T_a=0 to 40°C : 15μA MAX.

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DATA RETENTION TIMING CHART Note 1



Note: The other inputs (Addresses \overline{OE} , \overline{WE} , \overline{A}/O_s) can be in a high impedance state.