PARADIGM

PDM41532

64K x 16 CMOS Static SRAM

Features

- High-speed access times
  - Com'l: 10, 12, 15, 17 and 20 ns
  - Ind: 12, 15, 17 and 20 ns
- Low power operation (typical)
  - PDM41532SA
    Active: 400 mW
    Standby: 150 mW
  - PDM41532LA
    Active: 350 mW
    Standby: 100 mW
- High-density 64K x 16 architecture
- Single +5V (±10%) power supply
- Fully static operation
- TTL-compatible inputs and outputs
- Outbut buffer controls: $\overline{OE}$
- Data byte controls: $\overline{LB}$, $\overline{UB}$
- Packages:
  Plastic SOJ (400 mil) - SO
  Plastic TSOP - T

Description

The PDM41532 is a high-performance CMOS static RAM organized as 65,536 x 16 bits. The PDM41532 features low power dissipation using chip enable ($\overline{CE}$) and has an output enable input ($\overline{OE}$) for fast memory access. Byte access is supported by upper and lower byte controls.

The PDM41532 operates from a single 5.0V power supply and all inputs and outputs are fully TTL-compatible. The PDM41532 comes in two versions, the standard power version PDM41532SA and a low power version PDM41532LA. The two versions are functionally the same and only differ in their power consumption.

The PDM41532 is available in a 44-pin 400-mil plastic SOJ and a plastic TSOP package suitable for high-density surface assembly and is suitable for use in high-speed applications such as cache memory and high-speed storage.

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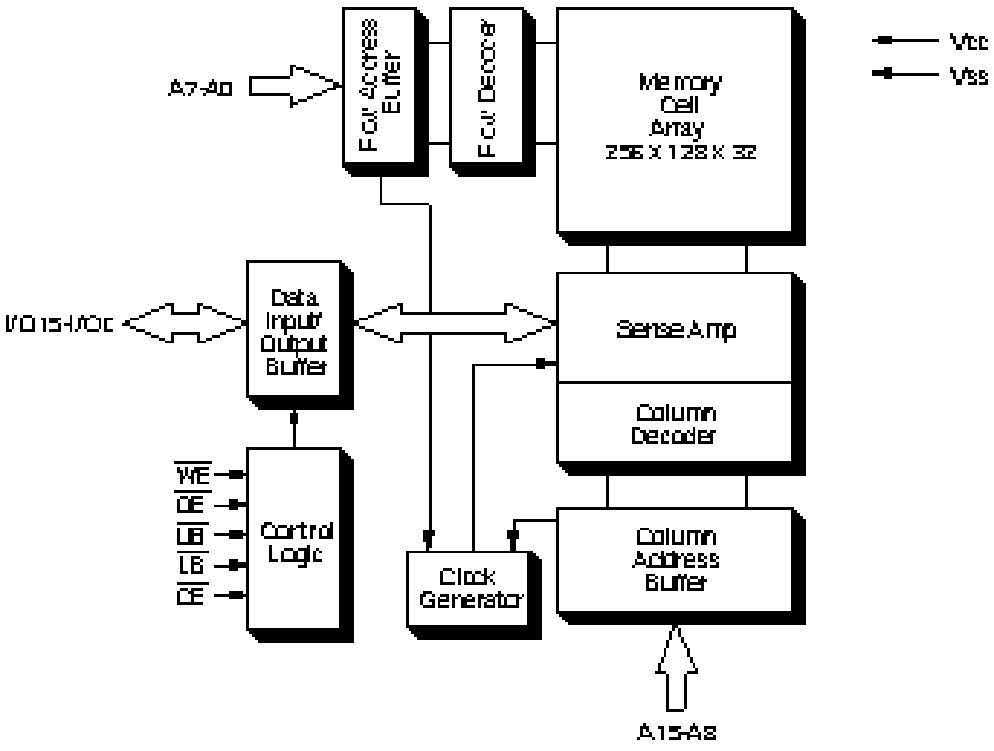
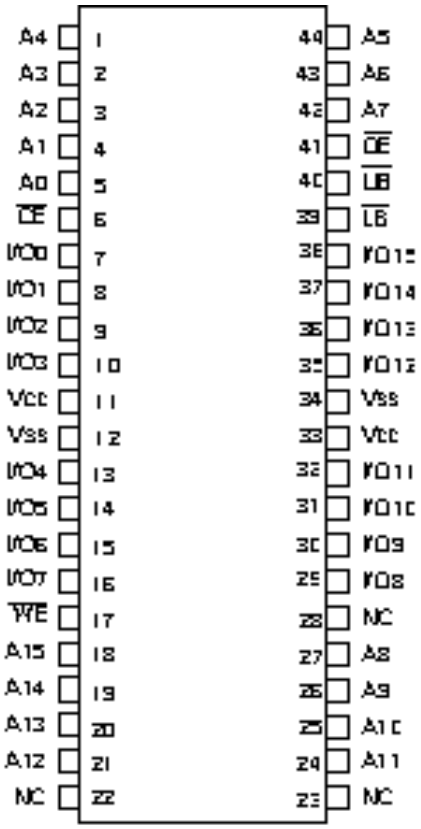
Functional Block Diagram

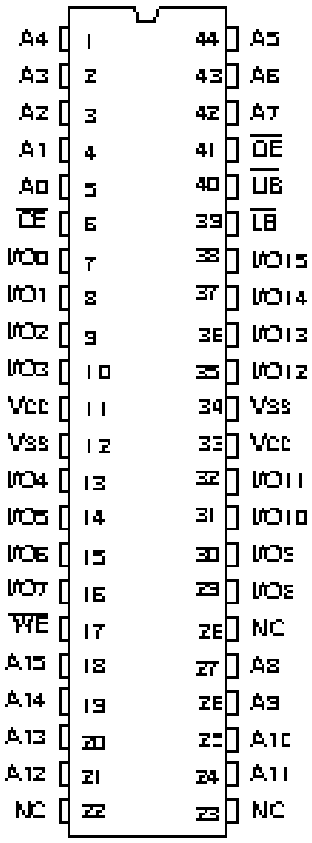


Pin Configuration

TSOP



SOJ



Pin Description

Name	Description
A15-A0	Address Inputs
I/O15-I/O0	Data Inputs/Outputs
$\overline{CE}$	Chip Enable Input
$\overline{WE}$	Write Enable Input
$\overline{OE}$	Output Enable Input
$\overline{LB}$, $\overline{UB}$	Data Byte Control Inputs
NC	No connect
V_{SS}	Ground
V_{CC}	Power (+5V)

Capacitance (T_A = +25°C, f = 1.0 MHz)

Symbol	Parameter	Conditions	Max.	Unit
C_{IN}	Input Capacitance	$V_{IN} = V_{SS}$	6	pF
$C_{I/O}$	Output Capacitance	$V_{I/O} = V_{SS}$	8	pF

NOTE:1. This parameter is determined by device characterization, but is not production tested.

Operating Mode

Mode	$\overline{CE}$	$\overline{OE}$	$\overline{WE}$	$\overline{LB}$	$\overline{UB}$	I/O7-I/O0	I/O15-I/O8	Power
Read	L	L	H	L	L	Output	Output	I_{CC}
				H	L	High Impedance	Output	I_{CC}
				L	H	Output	High Impedance	I_{CC}
Write	L	X	L	L	L	Input	Input	I_{CC}
				H	L	High Impedance	Input	I_{CC}
				L	H	Input	High Impedance	I_{CC}
Output Disable	L	H	H	X	x	High Impedance	High Impedance	I_{CC}
	L	X	X	H	H	High Impedance	High Impedance	I_{CC}
Standby	H	X	X	X	X	High Impedance	High Impedance	I_{SB}

NOTE: 1. H = V_{IH}, L = V_{IL}, X = DON'T CARE

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Absolute Maximum Ratings

Symbol	Rating	Com'l.	Unit
V_{TERM}	Terminal Voltage with Respect to V_{SS}	–0.5 to +7.0	V
T_{BIAS}	Temperature Under Bias	–55 to +125	°C
T_{STG}	Storage Temperature	–65 to +150	°C
P_D	Power Dissipation	1.5	W
I_{OUT}	DC Output Current	50	mA

NOTE:1.Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended DC Operating Conditions

Symbol	Description	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage	4.5	5.0	5.5	V
V_{SS}	Supply Voltage	0	0	0	V
Industrial	Ambient Temperature	–40	25	85	°C
Commercial	Ambient Temperature	0	25	70	°C

DC Electrical Characteristics (V_{CC} = 5.0V ± 10%)

Symbol	Parameter	Test Conditions		PDM41532SA		PDM41532LA		Unit
				Min.	Max.	Min.	Max.	
I_{LI}	Input Leakage Current	V_{CC} = Max., V_{IN} = Vss to V_{CC}	Com'l/ Ind.	–5	5	–5	5	µA
I_{LO}	Output Leakage Current	V_{CC}= Max., $\overline{CE}$ = V_{IH}, V_{OUT} = Vss to V_{CC}	Com'l/ Ind.	–5	5	–5	5	µA
V_{IL}	Input Low Voltage			–0.5(1)	0.8	–0.5(1)	0.8	V
V_{IH}	Input High Voltage			2.2	Vcc + 0.5	2.2	Vcc + 0.5	V
V_{OL}	Output Low Voltage	I_{OL} = 8 mA, V_{CC} = Min.		—	0.4	—	0.4	V
V_{OH}	Output High Voltage	I_{OH} = –4 mA, V_{CC} = Min.		2.4	—	2.4	—	V

NOTE: 1. V_{IL}(min) = –3.0V for pulse width less than 20 ns.

Power Supply Characteristics

Symbol	Parameter	Power	-10	-12		-15		-17		-20		Unit
			Com'l.	Com'l	Ind.	Com'l	Ind.	Com'l	Ind.	Com'l	Ind.	
I_{CC}	Operating Current $\overline{CE}$ = V_{IL}	SA	295	285	295	265	275	240	250	220	230	mA
	f = f_{MAX} = 1/t_{RC} V_{CC} = Max. I_{OUT} = 0 mA	LA	280	270	275	245	265	220	240	200	210	mA
I_{SB}	Standby Current $\overline{CE}$ = V_{IH}	SA	40	40	40	35	35	35	35	30	30	mA
	f = f_{MAX} = 1/t_{RC} V_{CC} = Max.	LA	30	30	30	25	25	25	25	20	20	mA
I_{SB1}	Full Standby Current $\overline{CE}$ ≥ V_{HC}	SA	10	10	15	10	15	10	15	10	15	mA
	f = 0 V_{CC} = Max., V_{IN} ≥ V_{CC} – 0.2V or ≤ 0.2V	LA	5	5	10	5	10	5	10	5	10	mA

NOTES: All values are maximum guaranteed values.
V_{LC} ≤ 0.2V, V_{HC} ≥ V_{CC} – 0.2V

AC Test Conditions

Input pulse levels	V_{SS} to 3.0V
Input rise and fall times	3 ns
Input timing reference levels	1.5V
Output reference levels	1.5V
Output load	See Figures 1 and 2

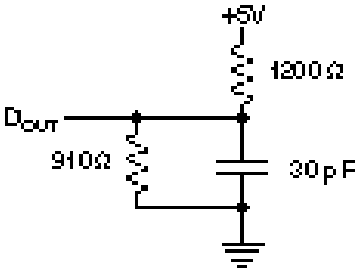

Figure 1. Output Load

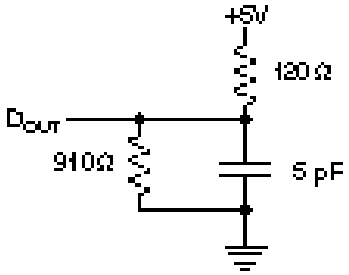

Figure 2. Output Load Equivalent (for t_{LZCE}, t_{HZCE}, t_{LZWE}, t_{HZWE})

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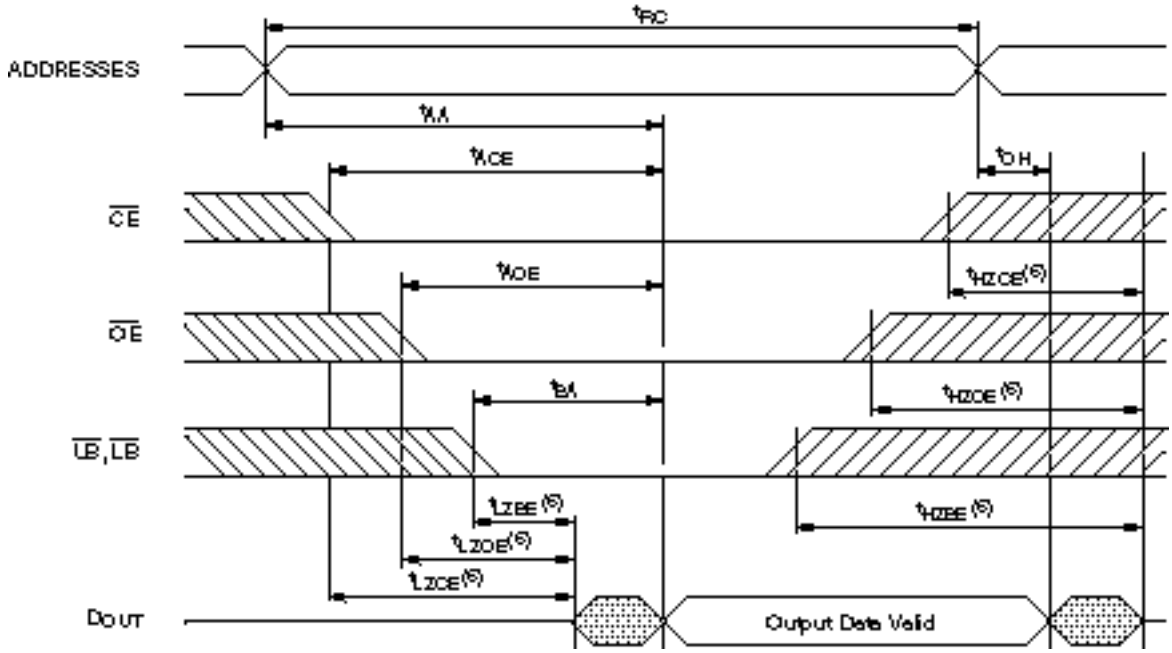
Read Cycle Timing Diagram(1)

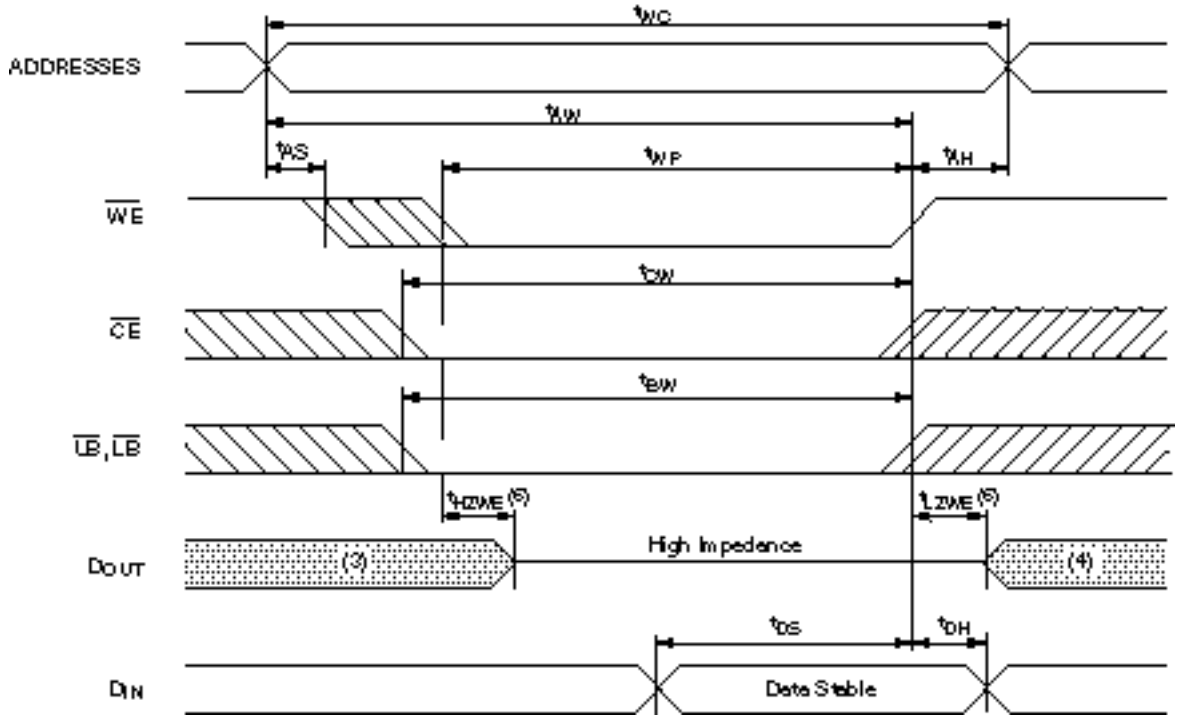


AC Electrical Characteristics

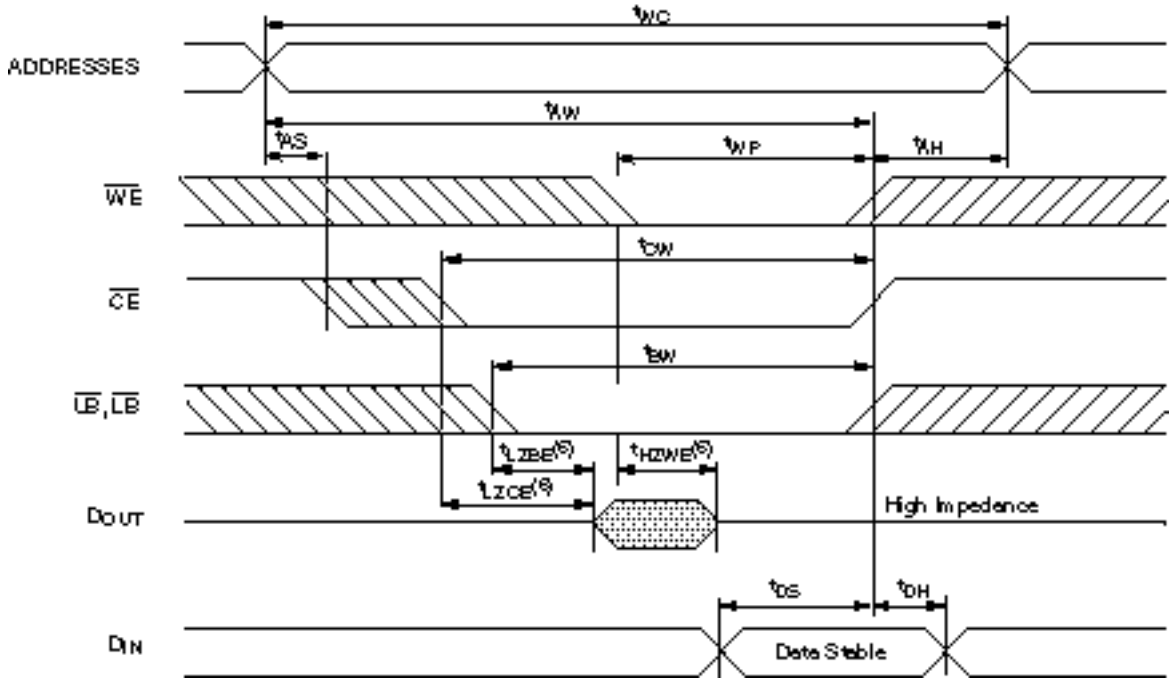
Description		–10		–12		–15		–17		–20		
READ Cycle	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Unit**
READ cycle time	t_{RC}	10	—	12	—	15	—	17	—	20	—	ns
Address access time	t_{AA}	—	10	—	12	—	15	—	17	—	20	ns
Chip enable access time	t_{ACE}	—	10	—	12	—	15	—	17	—	20	ns
Byte access time	t_{BA}	—	6	—	7	—	8	—	9	—	9	ns
Output hold from address change	t_{OH}	3	—	3	—	3	—	3	—	3	—	ns
Byte disable to output in low-Z	t_{LZBE}	0	—	0	—	0	—	0	—	0	—	ns
Byte enable to output in high-Z	t_{HZBE}	—	7	—	8	—	9	—	9	—	7	ns
Chip enable to output in low-Z(1)	t_{LZCE}	3	—	3	—	3	—	3	—	3	—	ns
Chip disable to output high-Z(1, 2)	t_{HZCE}	—	6	—	7	—	8	—	9	—	9	ns
Output enable access time	t_{AOE}	—	6	—	7	—	8	—	9	—	9	ns
Output enable to output in low-Z	t_{LZOE}	1	—	1	—	1	—	1	—	1	—	ns
Output disable to output in high-Z(2)	t_{HZOE}	—	6	—	7	—	8	—	9	—	9	ns

NOTES: 1. At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} and t_{HZWE} is less than t_{LZWE}.
2. t_{HZCE}, t_{HZOE}, and t_{HZWE} are specified with C_L = 5 pF as in Figure 2. Transition is measured ± 200 mV from steady state voltage.

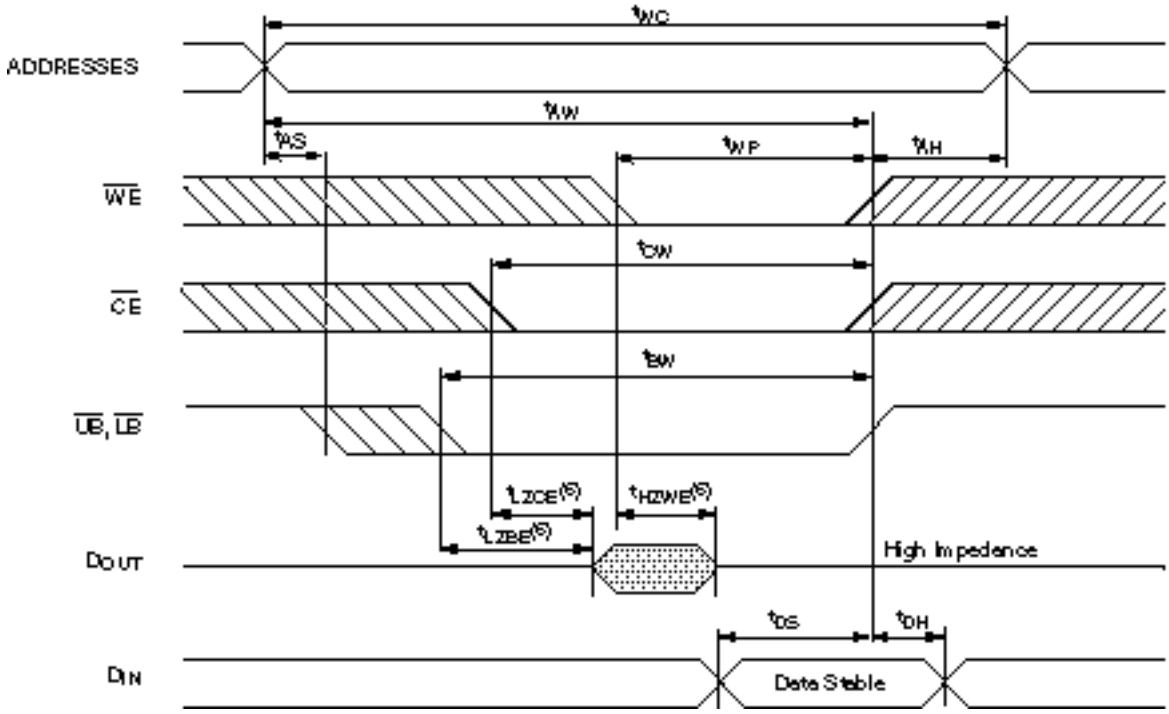
Write Cycle 1 Timing Diagram[5] ($\overline{WE}$ Controlled)



Write Cycle 2 Timing Diagram[5] ($\overline{CE}$ Controlled)



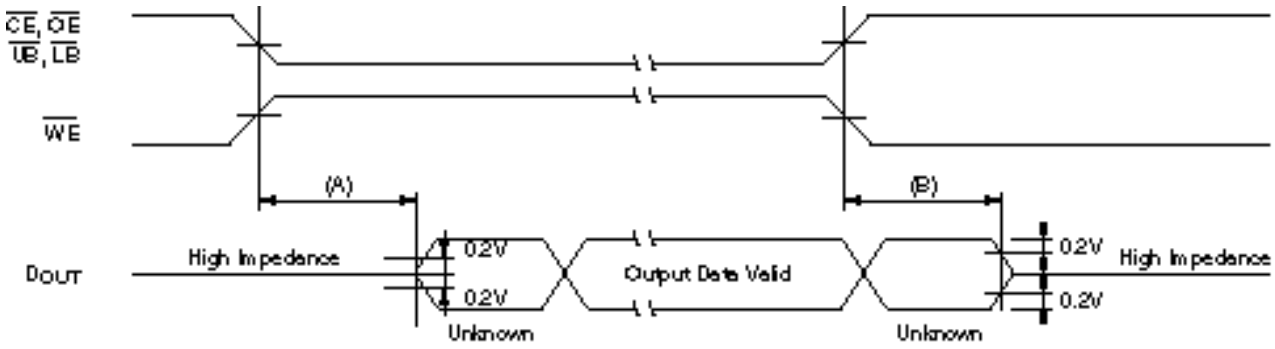
Write Cycle 3 Timing Diagram[5] ($\overline{UB}$, $\overline{LB}$ Controlled)



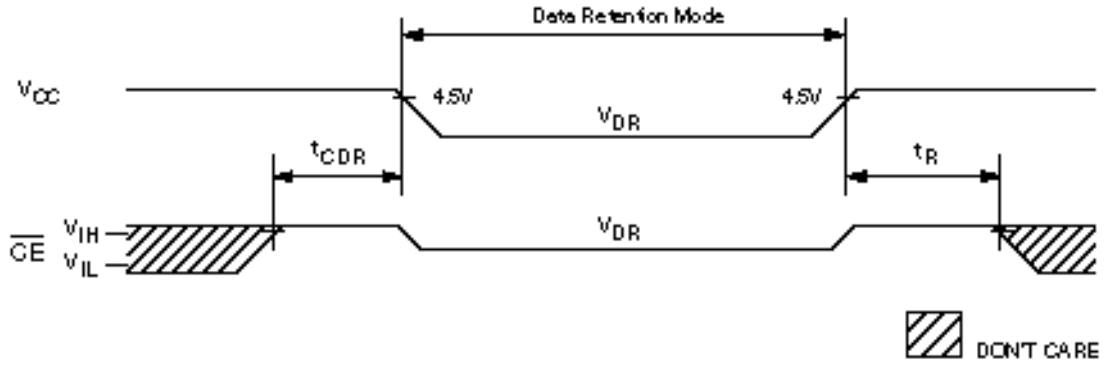
AC Electrical Characteristics

Description		-10		-12		-15		-17		-20		
WRITE Cycle	**Sym**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Unit**
WRITE cycle time	t_{WC}	10	—	12	—	15	—	17	—	20	—	ns
Chip enable to end of write	t_{CW}	9	—	10	—	11	—	11	—	12	—	ns
Address valid to end of write	t_{AW}	9	—	10	—	11	—	11	—	12	—	ns
Byte pulse width	t_{BW}	9	—	10	—	12	—	12	—	13	—	ns
Address setup time	t_{AS}	0	—	0	—	0	—	0	—	0	—	ns
Address hold from end of write	t_{AH}	0	—	0	—	0	—	0	—	0	—	ns
Write pulse width	t_{WP}	7	—	8	—	9	—	9	—	10	—	ns
Data setup time	t_{DS}	6	—	7	—	8	—	9	—	9	—	ns
Data hold time	t_{DH}	0	—	0	—	0	—	0	—	0	—	ns
Byte disable to output in low-Z[4, 5]	t_{LZBE}	1	—	1	—	1	—	1	—	1	—	ns
Byte enable to output in high-Z[4, 5]	t_{HZBE}	—	6	—	7	—	8	—	8	—	9	ns
Output disable to output in low-Z[4, 5]	t_{LZOE}	0	—	0	—	0	—	0	—	0	—	ns
Output enable to output in high-Z[4, 5]	t_{HZOE}	—	6	—	7	—	8	—	8	—	9	ns
Write disable to output in low-Z[4, 5]	t_{LZWE}	1	—	1	—	1	—	1	—	1	—	ns
Write enable to output in high-Z[4, 5]	t_{HZWE}		6	—	7	—	8	—	8	—	9	ns

NOTES: 1. The operating temperature (T_A) is guaranteed with transverse air flow exceeding 400 linear feet per minute.
2. $\overline{WE}$ is HIGH for read cycles.
3. If the $\overline{CE}$ LOW transition occurs coincident with or after the $\overline{WE}$ LOW transition, outputs remain in a high impedance state.
4. If the $\overline{CE}$ HIGH transition occurs coincident with or after the $\overline{WE}$ HIGH transition, outputs remain in a high impedance state.
5. If $\overline{OE}$ is HIGH during a write cycle, the outputs are in a high-impedance state during this period.
6. The following parameters are measured using the load shown in Figures 1 and 2.
(A) t_{COE}, t_{OEE}, t_{BE}, t_{OEW} .....Output Enable Time
(B) t_{COD}, t_{ODO}, t_{BD}, t_{ODW} ....Output Disable Time



Low V_{CC} Data Retention Waveform



Data Retention Electrical Characteristics (LA Version Only)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_{DR}	V_{CC} for Retention Data			2	—	—	V
I_{CCDR}	Data Retention Current	$\overline{CE} \geq V_{CC} - 0.2V$ $V_{IN} \geq V_{CC} - 0.2V$ or $\leq 0.2V$	V_{CC} = 2V	—	95	500	µA
			V_{CC} = 3V	—	350	750	µA
t_{CDR}	Chip Deselect to Data Retention Time			0	—	—	ns
t_R[(1)]	Operation Recovery Time			t_{RC}	—	—	ns

NOTE: 1. This parameter is sampled

Ordering Information