

#### Features

- High speed access times  
Com'l: 15, 17, 20, 25, 35 and 45 ns  
Ind: 17, 20, 25, 35, and 45 ns
- TTL compatible inputs and outputs
- Single +5V ( $\pm 10\%$ ) power supply
- Three-State Output
- Packages  
Plastic SOJ (400 mil) - SO  
Ceramic Flatpack (500 mil) -F

#### Description

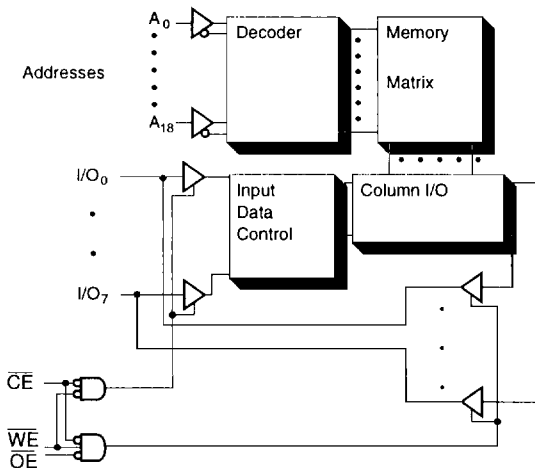
The PDM41096 is a high-performance CMOS static RAM organized as 524,288 x 8 bits. This product is produced in Paradigm's proprietary CMOS technology which offers the designer the highest speed parts. Writing is accomplished when the write enable (WE) and the chip enable (CE) inputs are both LOW. Reading is accomplished when WE remains HIGH and CE and OE are both LOW.

The PDM41096 operates from a single +5V power supply and all the inputs and outputs are fully TTL compatible. The PDM41096 comes in two versions, the standard power version PDM41096S and a low power version the PDM41096L. The two versions are functionally the same and only differ in their power consumption.

The PDM41096 is available in a 36-pin 400 mil Plastic SOJ and a 500 mil Ceramic Flatpack.

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#### Functional Block Diagram



#### Pin Configuration

##### SOJ, Flatpack

A4	1	36	NC
A3	2	35	A5
A2	3	34	A6
A1	4	33	A7
A0	5	32	A8
$\overline{CE}$	6	31	$\overline{OE}$
I/O0	7	30	I/O7
I/O1	8	29	I/O6
Vcc	9	28	GND
GND	10	27	Vcc
I/O2	11	26	I/O5
I/O3	12	25	I/O4
$\overline{WE}$	13	24	A9
A18	14	23	A10
A17	15	22	A11
A16	16	21	A12
A15	17	20	A13
A14	18	19	NC

Truth Table<sup>(1)</sup>

OE	WE	CE	VO	MODE
X	X	H	Hi-Z	Standby
L	H	L	D <sub>OUT</sub>	Read
X	L	L	D <sub>IN</sub>	Write
H	H	L	Hi-Z	Output Disable

NOTE: 1. H = V<sub>IH</sub>, L = V<sub>IL</sub>, X = DON'T CARE

Absolute Maximum Ratings<sup>(1)</sup>

Symbol	Rating	Com'1/ Ind.	Unit
V <sub>TERM</sub>	Terminal Voltage with Respect to GND	-0.5 to +7.0	V
T <sub>BIAS</sub>	Temperature Under Bias	-55 to +125	°C
T <sub>STG</sub>	Storage Temperature	-55 to +125	°C
P <sub>T</sub>	Power Dissipation	1.4	W
I <sub>OUT</sub>	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	Parameter	Min.	Typ.	Max.	Unit
V <sub>CC</sub>	Supply Voltage	4.5	5.0	5.5	V
GND	Supply Voltage	0	0	0	V
Commercial	Ambient Temperature	0	25	70	°C

**DC Electrical Characteristics** ( $V_{CC} = 5.0V \pm 10\%$ )

Symbol	Parameter	Test Conditions	PDM41096S		PDM41096 L		Unit	
			Min.	Max.	Min.	Max.		
$I_{LI}$	Input Leakage Current	$V_{CC} = MAX., V_{IN} = GND \text{ to } V_{CC}$	Com'l	-5	5	-2	2	$\mu A$
$I_{LO}$	Output Leakage Current	$V_{CC} = MAX., CE = V_{IH}, V_{OUT} = GND \text{ to } V_{CC}$	Com'l	-5	5	-2	2	$\mu A$
$V_{IH}$	Input High Voltage			2.2	6.0	2.2	6.0	V
$V_{IL}$	Input Low Voltage			-0.5 <sup>(1)</sup>	0.8	-0.5 <sup>(1)</sup>	0.8	V
$V_{OL}$	Output Low Voltage	$I_{OL} = 8 \text{ mA}, V_{CC} = \text{Min.}$ $I_{OL} = 10 \text{ mA}, V_{CC} = \text{Min.}$		—	0.4	—	0.4	V
$V_{OH}$	Output High Voltage	$I_{OH} = -4 \text{ mA}, V_{CC} = \text{Min.}$		—	0.5	—	0.5	V
				2.4	—	2.4	—	V

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

**Power Supply Characteristics**

Symbol	Parameter	Power	-15	-17	-20	-25	-35, -45	Unit
$I_{CC}$	Operating Current $CE \geq V_{IL}$	S	280	270	250	220	200	mA
	$V_{CC} = \text{Max.}, f = f_{MAX} = 1/\text{trc}$ $I_{OUT} = 0 \text{ mA}$	L	240	230	210	180	160	mA
$I_{SB}$	Standby Current (TTL Level)	S	130	120	110	100	90	mA
	$CE \geq V_{IH}$ $V_{CC} = \text{Max.}, f = f_{MAX} = 1/\text{trc}$	L	100	90	80	70	60	mA
$I_{SB1}$	Full Standby Current (CMOS Level)	S	40	40	40	40	40	mA
	$CE \geq V_{IH}$ $V_{CC} = \text{Max.}, f = 0 = 1/\text{trc}$ $V_{IN} \geq V_{CC} - 0.2V \text{ or } \leq 0.2V$	L	20	20	20	20	20	mA

SHADED AREA = PRELIMINARY DATA.

NOTE: All values are maximum guaranteed values.

$V_{LC} \leq 0.2V, V_{HC} \geq V_{CC} - 0.2V.$

**Capacitance<sup>(1)</sup>** ( $T_A = +25^\circ C, f = 1.0 \text{ MHz}$ )

Symbol	Parameter	Max.	Unit
$C_{IN}$	Input Capacitance	8	pF
$C_{OUT}$	Output Capacitance	8	pF

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

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**AC Test Conditions**

Input Pulse Levels	GND to 3.0V
Input rise and fall times	5 ns
Input timing reference levels	1.5V
Output reference levels	1.5V
Output load	See figures 1 and 2

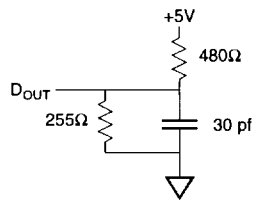


Figure 1. Output Load Equivalent

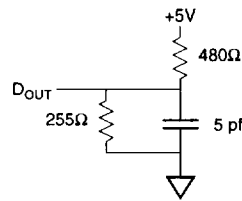
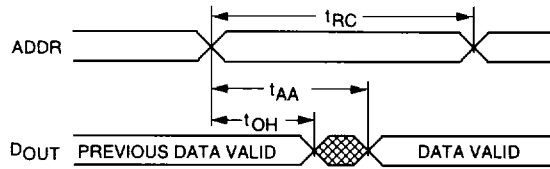
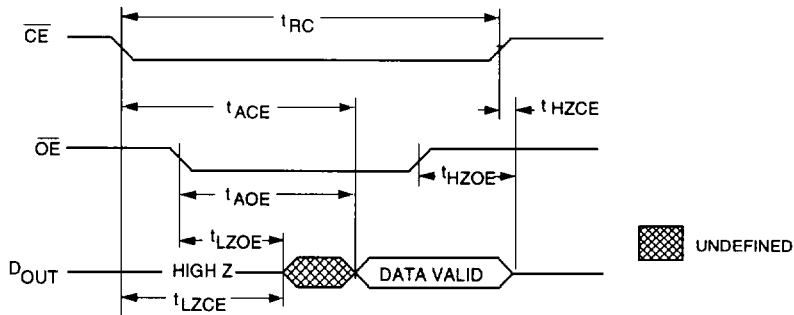


Figure 2. Output Load Equivalent  
(for  $t_{LZCE}$ ,  $t_{HZCE}$ ,  $t_{LZWE}$ ,  $t_{HZWE}$ ,  $t_{LZOE}$ ,  $t_{HZOE}$ )

Read Cycle No. 1(6, 7)



Read Cycle No. 2(3, 6, 8)



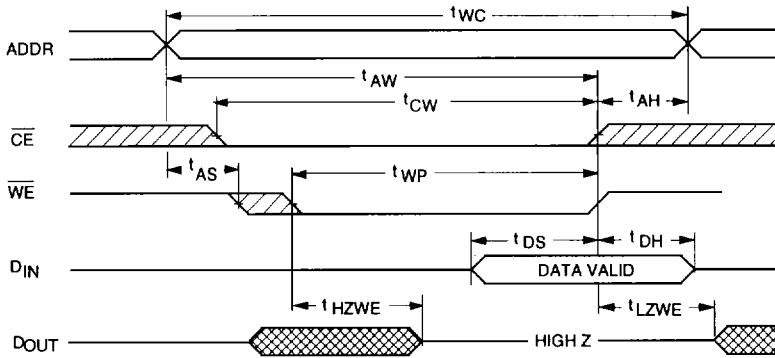
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AC Electrical Characteristics (V<sub>CC</sub> = 5V ± 10%, All Temperature Ranges)

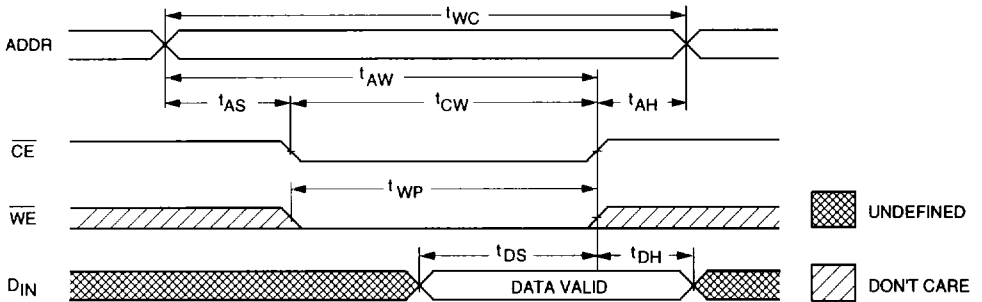
Description	Symbol	-15 <sup>(9)</sup>		-17 <sup>(8)</sup>		-20		-25		-35		-45		Units
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
READ Cycle time	t <sub>RC</sub>	15	18	17		20		25		35		45		ns
Address access time	t <sub>AA</sub>		16		17		20		25		35		45	ns
Chip enable access time	t <sub>ACE</sub>		18		17		20		25		35		45	ns
Output hold from address change	t <sub>OH</sub>	5		5		5		5		5		5		ns
Chip enable to output in low Z <sup>(2, 4)</sup>	t <sub>LZCE</sub>	5		5		5		5		5		5		ns
Chip disable to output in high Z <sup>(2, 3, 4)</sup>	t <sub>HZCE</sub>		8		7		8		10		15		18	ns
Chip enable to power up time <sup>(4)</sup>	t <sub>PU</sub>	0		0		0		0		0		0		ns
Chip disable to power down time <sup>(4)</sup>	t <sub>PD</sub>		15		17		20		25		35		45	ns
Output enable access time	t <sub>AOE</sub>		6		7		8		10		12		15	ns
Output Enable to output in low Z <sup>(2, 4)</sup>	t <sub>LZOE</sub>	0		0		0		0		0		0		ns
Output disable to output in high Z <sup>(2, 4)</sup>	t <sub>HZOE</sub>		8		7		8		10		12		15	ns

SHADED AREA = PRELIMINARY DATA.  
Notes referenced are after Data Retention Table.

**Write Cycle No. 1 (Write Enable Controlled)**



**Write Cycle No. 2 (Chip Enable Controlled)**

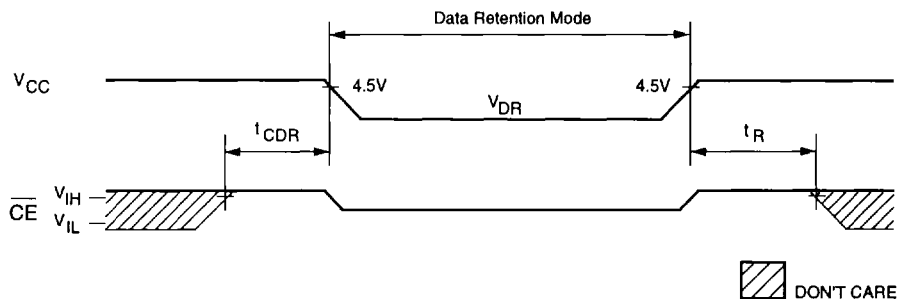


**AC Electrical Characteristics** (V<sub>CC</sub> = 5V ± 10%, All Temperature Ranges)

Description	Symbol	-10 <sup>(6)</sup>		-17 <sup>(6)</sup>		-20		-25		-35		-45		Units
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
WRITE Cycle time	t <sub>WC</sub>	15	17	17	20	20	25	25	35	35	45	45		ns
Chip enable to end of write	t <sub>CW</sub>	12	15	15	15	15	20	20	25	25	25	25		ns
Address Valid to end of write	t <sub>AW</sub>	15	15	15	15	15	20	20	25	25	25	25		ns
Address setup time	t <sub>AS</sub>	0	0	0	0	0	0	0	0	0	0	0		ns
Address hold from end of write	t <sub>AH</sub>	0	0	0	0	0	0	0	0	0	0	0		ns
Write pulse width	t <sub>WP</sub>	12	12	12	12	12	20	20	25	25	25	25		ns
Data setup time	t <sub>DS</sub>	9	9	9	10	10	15	15	20	20	20	20		ns
Data hold time	t <sub>DH</sub>	0	0	0	0	0	0	0	0	0	0	0		ns
Write disable to output in low Z <sup>(2, 3)</sup>	t <sub>LZWE</sub>	0	0	0	0	0	0	0	0	0	0	0		ns
Write enable to output in high Z <sup>(2, 3)</sup>	t <sub>HZWE</sub>	5	5	5	7	7	8	8	10	10	15	15	20	ns

SHADED AREA = PRELIMINARY DATA.  
Notes referenced are after Data Retention Table.

Low V<sub>CC</sub> Data Retention Waveform



Data Retention Electrical Characteristics (L Version Only)

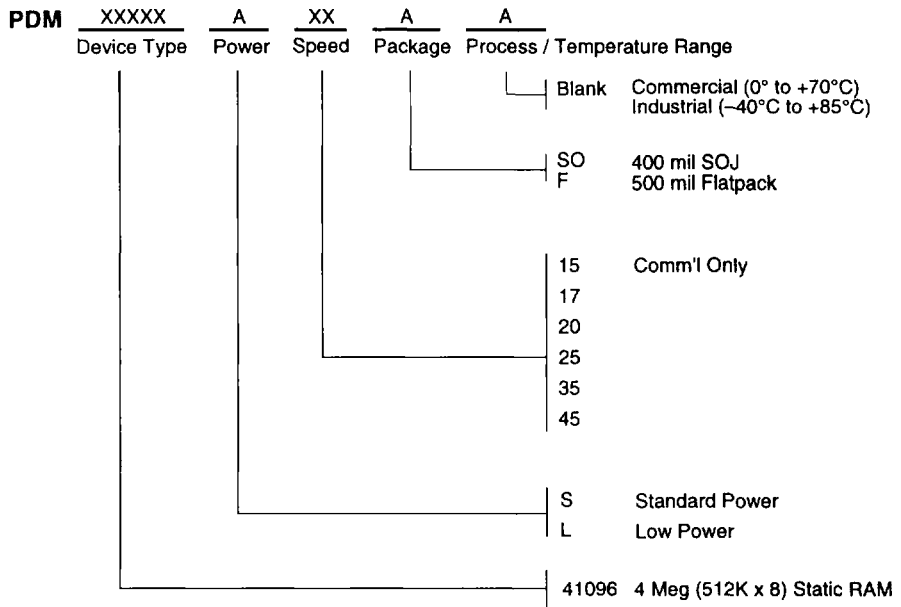
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>DR</sub>	V <sub>CC</sub> for Retention Data		2	—	—	V
I <sub>CCDR</sub>	Data Retention Current	CE ≥ V <sub>CC</sub> - 0.2V V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.2V or ≤ 0.2V	V <sub>CC</sub> = 2V Com'l	—	1,000	μA
			V <sub>CC</sub> = 3V Com'l	—	1,500	μA
t <sub>CDR</sub>	Chip Deselect to Data Retention Time		0	—	—	ns
t <sub>R</sub> <sup>(4)</sup>	Operation Recovery Time		t <sub>RC</sub> <sup>(5)</sup>	—	—	ns

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NOTES: (For 3 previous Electrical Characteristics tables)

1. -55°C to + 125°C temperature range only.
2. The parameter is tested with CL = 5 pF as shown in Fig. #2. Transition is measured ±200 mV from steady state voltage.
3. At any given temperature and voltage condition, t<sub>HZCE</sub> is less than t<sub>LZCE</sub>.
4. This parameter is sampled.
5. t<sub>RC</sub> = Read cycle time.
6. WE is high for a READ cycle.
7. The device is continuously selected. All the Chip Enables are held in their active state.
8. V<sub>CC</sub> = 5V ± 5%.

Ordering Information



Chip	Package Type
PDM41096	36-pin SOJ 400 Mil
	36-pin Flatpack 500 Mil