

#### Features

- High-speed access times  
Com'l: 7, 8, 10, 12 and 15 ns  
Industrial: 8, 10, 12 and 15 ns
- Low power operation (typical)
  - PDM41257SA  
Active: 400 mW  
Standby: 150 mW
  - PDM41257LA  
Active: 350 mW  
Standby: 25 mW
- Single +5V ( $\pm 10\%$ ) power supply
- TTL compatible inputs and outputs
- Packages  
Plastic SOJ (300 mil) - SO

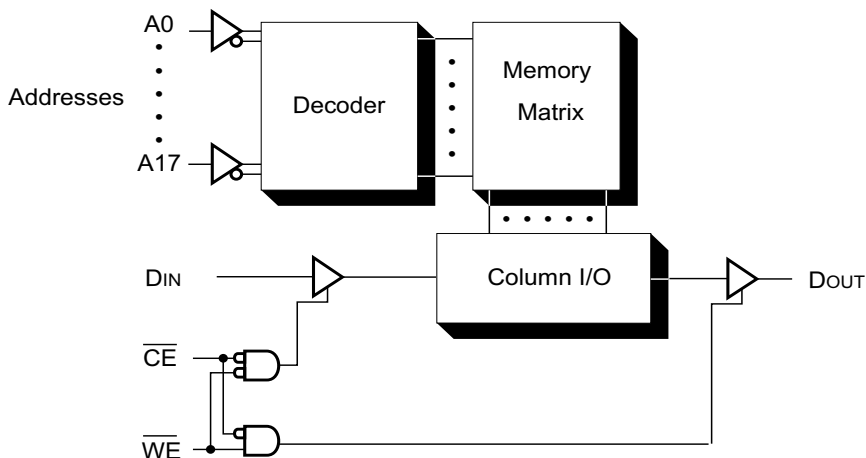
#### Description

The PDM41257 is a high-performance CMOS static RAM organized as 262,144 x 1 bit. Writing to this device is accomplished when the write enable ( $\overline{WE}$ ) and the chip enable ( $\overline{CE}$ ) inputs are both LOW. Reading is accomplished when  $\overline{WE}$  remains HIGH and  $\overline{CE}$  goes LOW.

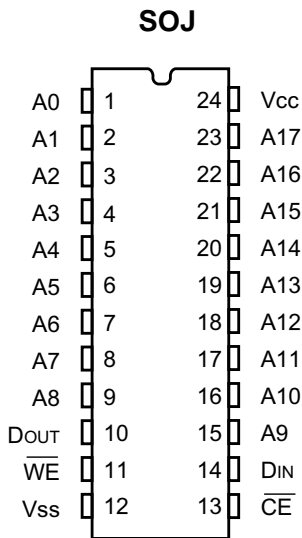
The PDM41257 operates from a single +5V power supply and all the inputs and outputs are fully TTL-compatible. The PDM41257 comes in two versions, the standard power version PDM41257SA and a low power version the PDM41257LA. The two versions are functionally the same and only differ in their power consumption.

The PDM41257 is available in a 24-pin 300-mil plastic SOJ for surface mount applications.

#### Functional Block Diagram



Pin Configuration



Pin Description

Name	Description
A17-A0	Address Inputs
DIN	Data Input
DOUT	Data Output
$\overline{WE}$	Write Enable Input
$\overline{CE}$	Chip Enable Input
V <sub>CC</sub>	Power (+5V)
V <sub>SS</sub>	Ground

Truth Table

WE	CE	DOUT	MODE
X	H	Hi-Z	Standby
H	L	D <sub>OUT</sub>	Read
L	L	Hi-Z	Write

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

Absolute Maximum Ratings (1)

Symbol	Rating	Com'l.	Ind.	Unit
T <sub>TERM</sub>	Terminal Voltage with Respect to V <sub>SS</sub>	-0.5 to +7.0	-0.5 to +7.0	°C
T <sub>BIAS</sub>	Temperature Under Bias	-55 to +125	-65 to +135	°C
T <sub>STG</sub>	Storage Temperature	-55 to +125	-65 to +150	°C
P <sub>T</sub>	Power Dissipation	1.0	1.0	W
I <sub>OUT</sub>	DC Output Current	50	50	mA
T <sub>j</sub>	Maximum Junction Temperature (2)	125	145	°C

- 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.
2. Appropriate thermal calculations should be performed in all cases and specifically for those where the chosen package has a large thermal resistance (e.g., TSOP). The calculation should be of the form:  $T_j = T_a + P * \theta_{ja}$ , where  $T_a$  is the ambient temperature, P is average operating power and  $\theta_{ja}$  the thermal resistance of the package. For this product, use the following  $\theta_{ja}$  value:

SOJ: 83° C/W

### Recommended DC Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>CC</sub>	Supply Voltage	4.5	5.0	5.5	V
V <sub>SS</sub>	Supply Voltage	0	0	0	V
Commercial	Ambient Temperature	0	25	70	°C
Industrial	Ambient Temperature	-40	25	85	°C

### DC Electrical Characteristics (V<sub>CC</sub> = 5.0V ± 10%)

Symbol	Parameter	Test Conditions		PDM41257SA		PDM41257LA		Unit
				Min.	Max.	Min.	Max.	
I <sub>LI</sub>	Input Leakage Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = V <sub>SS</sub> to V <sub>CC</sub>	Com'l/ Ind.	-5	5	-5	5	µA
I <sub>LO</sub>	Output Leakage Current	V <sub>CC</sub> = MAX., CE = V <sub>IH</sub> , V <sub>OUT</sub> = V <sub>SS</sub> to V <sub>CC</sub>	Com'l/ Ind.	-5	5	-5	5	µA
V <sub>IL</sub>	Input Low Voltage			-0.5 <sup>(1)</sup>	0.8	-0.5 <sup>(1)</sup>	0.8	V
V <sub>IH</sub>	Input High Voltage			2.2	6.0	2.2	6.0	V
V <sub>OL</sub>	Output Low Voltage	I <sub>OL</sub> = 8 mA, V <sub>CC</sub> = Min. I <sub>OL</sub> = 10 mA, V <sub>CC</sub> = Min.		—	0.4	—	0.4	V
				—	0.5	—	0.5	V
V <sub>OH</sub>	Output High Voltage	I <sub>OH</sub> = -4 mA, V <sub>CC</sub> = Min.		2.4	—	2.4	—	V

NOTE: 1. V<sub>IL</sub>(min) = -3.0V for pulse width less than 20 ns.

### Power Supply Characteristics

Symbol	Parameter	Power	-7	-8		-10		-12		-15		Units
			Com'l.	Com'l.	Ind.	Com'l.	Ind.	Com'l.	Ind.	Com'l.	Ind.	
I <sub>CC</sub>	Operating Current CE = V <sub>IL</sub>	SA	210	200	210	190	200	180	190	170	180	mA
	f = f <sub>MAX</sub> = 1/t <sub>RC</sub> V <sub>CC</sub> = Max I <sub>OUT</sub> = 0 mA	LA	190	180	190	170	180	160	170	150	160	mA
I <sub>SB</sub>	Standby Current CE = V <sub>IH</sub>	SA	90	80	80	70	70	60	60	50	50	mA
	f = f <sub>MAX</sub> = 1/t <sub>RC</sub> V <sub>CC</sub> = Max	LA	90	80	80	70	70	60	60	50	50	mA
I <sub>SB1</sub>	Full Standby Current CE ≥ V <sub>CC</sub> - 0.2V	SA	20	20	20	20	20	20	20	20	20	mA
	f = 0 V <sub>CC</sub> = Max V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.2V or ≤ 0.2V	LA	5	5	5	5	5	5	5	5	5	mA

SHADED AREA = PRELIMINARY DATA

NOTE: All values are maximum guaranteed values.

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

Symbol	Parameter	Conditions	Max.	Unit
$C_{IN}$	Input Capacitance	$V_{IN} = 0\text{V}$	8	pF
$C_{OUT}$	Output Capacitance	$V_{OUT} = 0\text{V}$	8	pF

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

**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

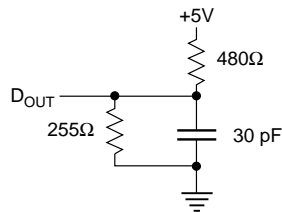


Figure 1. Output Load Equivalent

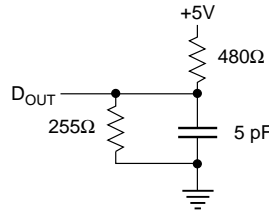
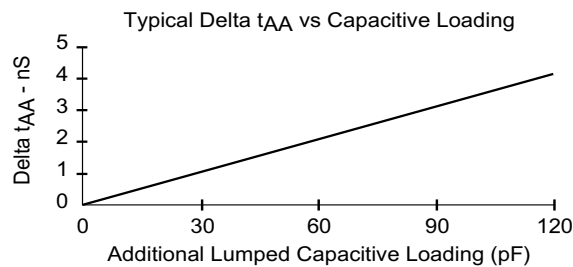
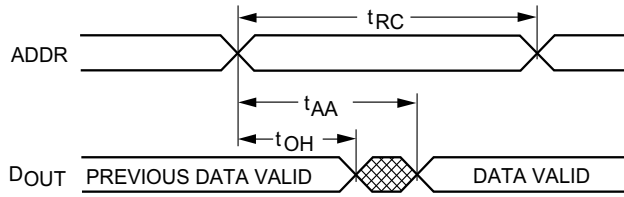


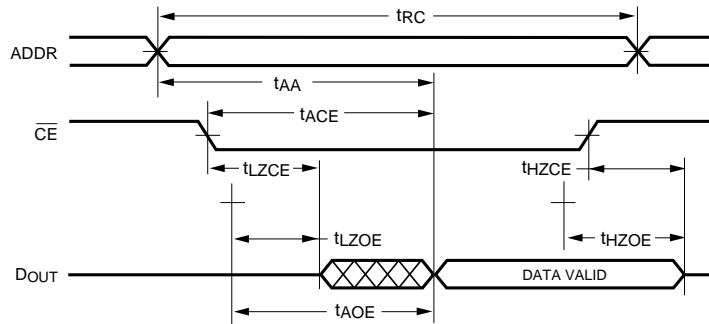
Figure 2. Output Load Equivalent  
(for  $t_{LZCE}$ ,  $t_{HZCE}$ ,  $t_{LZWE}$ ,  $t_{HZWE}$ )



Read Cycle No. 1<sup>(1)</sup>



Read Cycle No. 2<sup>(2)</sup>



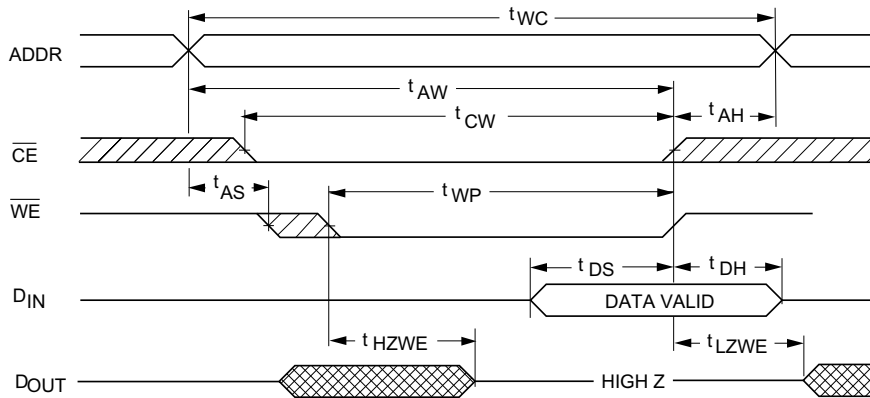
AC Electrical Characteristics

Description	Sym	-7 <sup>(6)</sup>		-8 <sup>(6)</sup>		-10 <sup>(6)</sup>		-12		-15		Units
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
READ Cycle	$t_{RC}$	7		8		10		12		15		ns
Address access time	$t_{AA}$		7		8		10		12		15	ns
Chip enable access time	$t_{ACE}$		7		8		10		12		15	ns
Output hold from address change	$t_{OH}$	3		3		3		3		3		ns
Chip enable to output in low Z <sup>(3, 4, 5)</sup>	$t_{LZCE}$	5		5		5		5		5		ns
Chip disable to output in high Z <sup>(3, 4, 5)</sup>	$t_{HZCE}$		5		5		10		10		10	ns
Chip enable to power up time <sup>(4)</sup>	$t_{PU}$	0		0		0		0		0		ns
Chip disable to power down time <sup>(4)</sup>	$t_{PD}$		7		8		10		12		15	ns

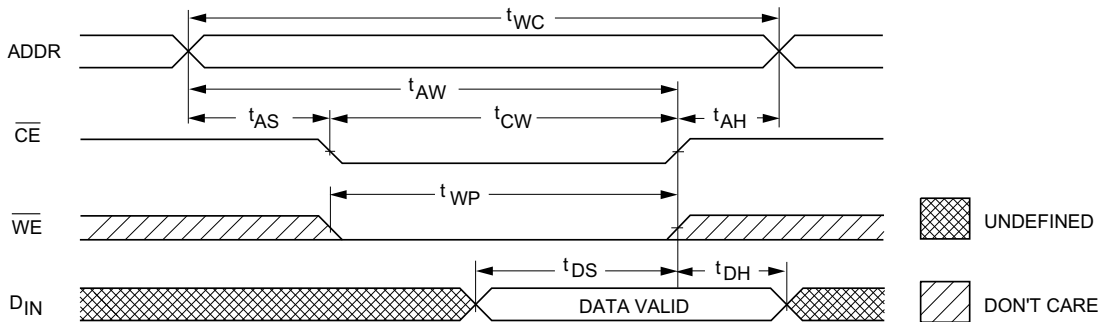
SHADED AREA = PRELIMINARY DATA.

Notes referenced are after Data Retention Table.

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



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

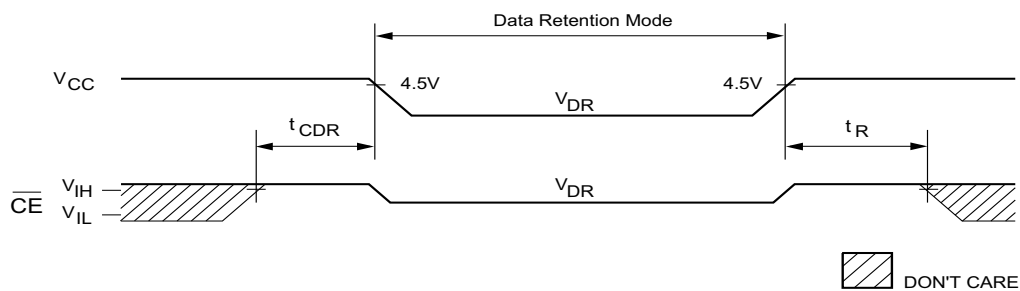


**AC Electrical Characteristics**

Description	Sym	-7 <sup>(6)</sup>		-8 <sup>(6)</sup>		-10 <sup>(6)</sup>		-12		-15		Units
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
WRITE cycle time	t <sub>WC</sub>	7		8		10		12		15		ns
Chip enable to end of write	t <sub>CW</sub>	7		8		10		10		12		ns
Address valid to end of write	t <sub>AW</sub>	7		8		10		10		12		ns
Address setup time	t <sub>AS</sub>	0		0		0		0		0		ns
Address hold from end of write	t <sub>AH</sub>	0		0		0		0		0		ns
Write pulse width	t <sub>WP</sub>	7		8		10		10		11		ns
Data setup time	t <sub>DS</sub>	6		7		7		7		8		ns
Data hold time	t <sub>DH</sub>	0		0		0		0		0		ns
Write disable to output in low Z <sup>(4,5)</sup>	t <sub>LZWE</sub>	0		0		0		0		0		ns
Write enable to output in high Z <sup>(4,5)</sup>	t <sub>HZWE</sub>		3		3		3		3		3	ns

SHADED AREA = PRELIMINARY DATA

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



### Data Retention Electrical Characteristics (LA 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	$\overline{CE} \geq V_{CC} - 0.2V$ $V_{IN} \geq V_{CC} - 0.2V$ or $\leq 0.2V$				
		V <sub>CC</sub> = 2V	—	95	500	μA
		V <sub>CC</sub> = 3V	—	350	750	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>	—	—	ns

NOTES: (For three previous Electrical Characteristics tables)

1. The device is continuously selected. Chip Enable is held in its active state.
2. The address is valid prior to or coincident with the latest occurring Chip Enable.
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. The parameter is tested with CL = 5 pF as shown in Figure 2. Transition is measured ±200 mV from steady state voltage.
6. V<sub>CC</sub> = 5V ± 5%.

### Ordering Information

