PARADIGM®

PDM4M4050

256K x 32 BiCMOS/CMOS Static RAM Module

Features

- ☐ High-density 8 megabit Static RAM module
- ☐ Low profile 64-pin ZIP, 64 -pin SIMM (Single In-line Memory Module) or Angled SIMM.
- ☐ Ultra fast access time: 10 ns (max.)
- ☐ Surface mounted plastic components on an epoxy laminate (FR-4) substrate
- ☐ Single 5V (±10%) power supply
- ☐ Multiple V_{SS} pins and decoupling capacitors for maximum noise immunity
- ☐ Inputs/outputs directly TTL-compatible

Description

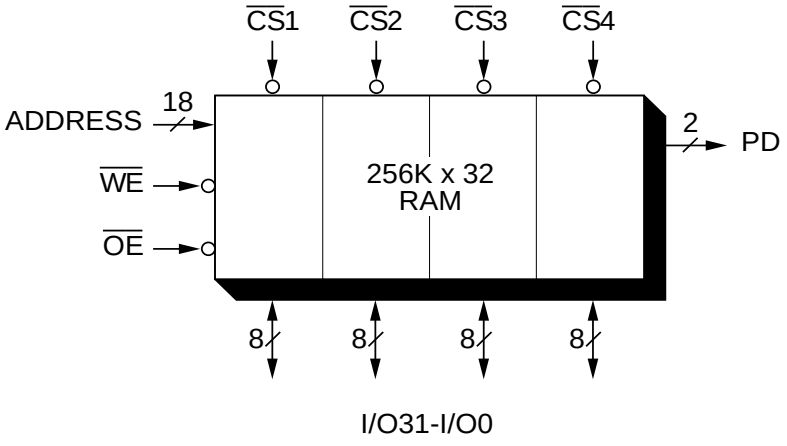
The PDM4M4050 is a 256K x 32 static RAM module constructed on an epoxy laminate (FR-4) substrate using eight 256K x 4 static RAMs in plastic SOJ packages. Availability of four chips select lines (one for each group of two RAMs) provides byte access. Extremely fast speeds can be achieved due to the use of 1 megabit static RAMs fabricated in Paradigm's high-performance, high-reliability technology. The PDM4M4050 is available with access time as fast as 10 ns with minimal power consumption.

The PDM4M4050 is packaged in a 64-pin FR-4 ZIP (Zig-zag In-line vertical Package) or a 64-pin SIMM (Single In-line Memory Module). The Angled SIMM configuration allows 64 pins to be placed on a package 3.50″ long and 0.35″ wide and 0.68″ high. The SIMM configuration also allows use of edge mounted sockets to secure the module.

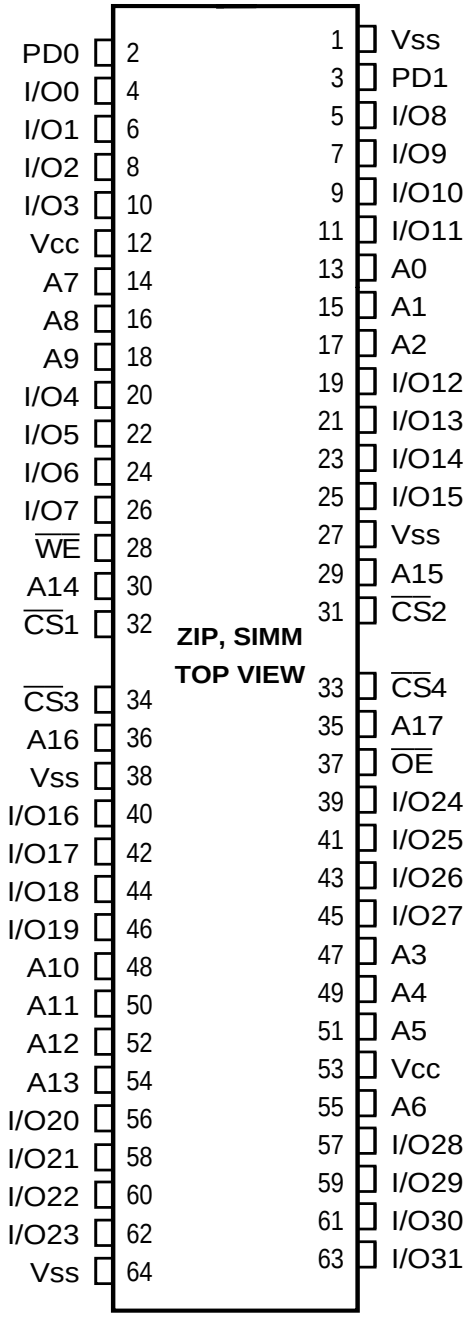
All inputs and outputs of the PDM4M4050 are TTL-compatible and operate from a single 5V supply. Full asynchronous circuitry requires no clocks or refresh for operation and provides equal access and cycle times for ease of use.

Two identification pins (PD0 and PD1) are provided for applications in which different density versions of the module are used. In this way, the target system can read the respective levels of PD0 and PD1 to determine a 256K depth.

Functional Block Diagram



Pin Configuration(1)



NOTE: 1. Pins 2 and 3 (PD0 and PD1) are read by the user to determine the density of the module. If PD0 reads V_{SS} and PD1 reads V_{SS} then the module has a 256K depth.

Pin Assignment

Pin	Signal
I/O31-I/O0	Data Inputs/Outputs
A17-A0	Addresses
$\overline{CS}$4-$\overline{CS}$1	Chip Selects
$\overline{WE}$	Write Enable
$\overline{OE}$	Output Enable
PD1-PD0	Depth Identification
V_{CC}	Power
V_{SS}	Ground

Truth Table

Mode	$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	Output	Power
Deselect/ Power-down	H	X	X	High-Z	Standby
Read	L	L	H	$DATA_{OUT}$	Active
Write	L	X	L	$DATA_{IN}$	Active
Deselect	L	H	H	High-Z	Active

Absolute Maximum Ratings(1)

Symbol	Rating	Com'l.	Ind.	Unit
V_{TERM}	Terminal Voltage with Respect to V_{SS}	–0.5 to +7.0	–0.5 to +7.0	V
T_{BIAS}	Temperature Under Bias	–10 to +85	–10 to +85	°C
T_{STG}	Storage Temperature	–55 to +125	–65 to +150	°C
T_A	Operating Temperature	0 to +70	0 to +70	°C
P_T	Power Dissipation	1.0	1.0	W
I_{OUT}	DC Output Current	50	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_{CC}	Supply Voltage	4.75	5.0	5.25	V
V_{SS}	Supply Voltage	0	0	0	V
Commercial	Ambient Temperature	0	25	70	°C

DC Electrical Characteristics (V_{CC} = 5.0V ± 5%, T_A = 0°C to 70°C)

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
I_{LI}	Input Leakage Current (Address)	V_{CC} = Max.,V_{IN} = V_{SS} to V_{CC}	—	80	µA
I_{LI}	Input Leakage Current (Data)	V_{CC} = Max., V_{IN} = V_{SS} to V_{CC}	—	10	µA
I_{LO}	Output Leakage Current	V_{OUT} = V_{SS} to V_{CC}, V_{CC} = Max., $\overline{CS}$ = V_{IH}	—	10	µA
V_{OL}	Output Low Voltage	I_{OL} = 8 mA, V_{CC} = Min.	—	0.4	V
V_{OH}	Output High Voltage	I_{OL} = –4 mA, V_{CC} = Min.	2.4	—	V
V_{IH}	Input High Voltage		2.2	6.0	V
V_{IL}	Input Low Voltage		–0.5[1]	0.8	V

NOTE 1. V_{IL} = –1.5V for pulse widths less than 10 ns, once per cycle.

Power Supply Characteristics

Symbol	Parameter	10 ns - 15 ns[1] Max	20 ns - 25 ns[1] Max	Unit
I_{CC}	Operating Current $\overline{CS}$ = V_{IL}, V_{CC} = Max., f = f_{MAX}, Outputs Open	1600	1360	mA
I_{SB}	Standby Current $\overline{CS}$ ≥ V_{IH}, V_{CC} = Max., f = f_{MAX}, Outputs Open	480	480	mA
I_{SB1}	Full Standby Current $\overline{CS}$ ≥ V_{CC} – 0.2V, f = 0, V_{IN} > V_{CC} – 0.2V or < 0.2V, Outputs Open	320	120	mA

NOTE 1. Preliminary specification only.

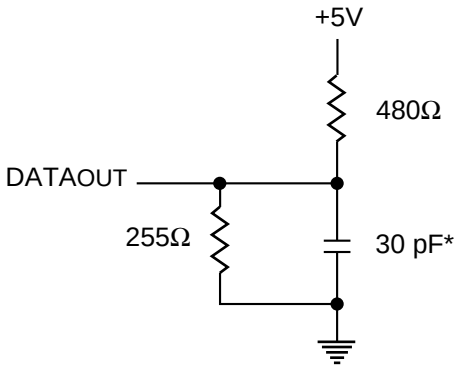
Capacitance[1] (T_A = +25°C, f = 1.0 MHz)

Symbol	Parameter	Max.	Unit
$C_{IN(C)}$	Input Capacitance, ($\overline{CS}$) V_{IN} = 0V	20	pF
$C_{IN(A)}$	Input Capacitance, (Address and Control) V_{IN} = 0V	70	pF
$C_{I/O}$	I/O Capacitance V_{OUT} = 0V	12	pF

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

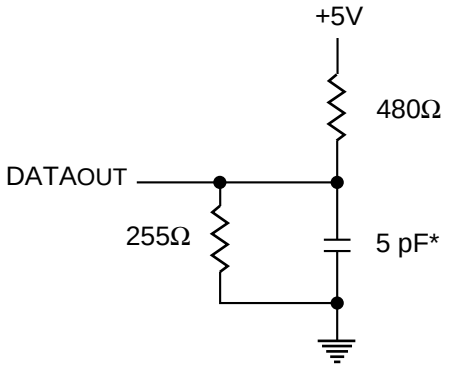
AC Test Conditions

Input Pulse Levels	V_{SS} to 3.0V
Input Rise/Fall Times	5 ns
Input Timing Reference Levels	1.5V
Output Reference Levels	1.5V
Output Load	See Figures 1 - 4



* Including scope and jig capacitances

Figure 1. Output Load



* Including scope and jig capacitances

Figure 2. Output Load
(for t_{OHZ}, t_{CHZ}, t_{OLZ}, and t_{CLZ})

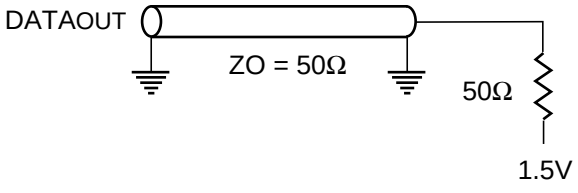


Figure 3. Alternate Output Load

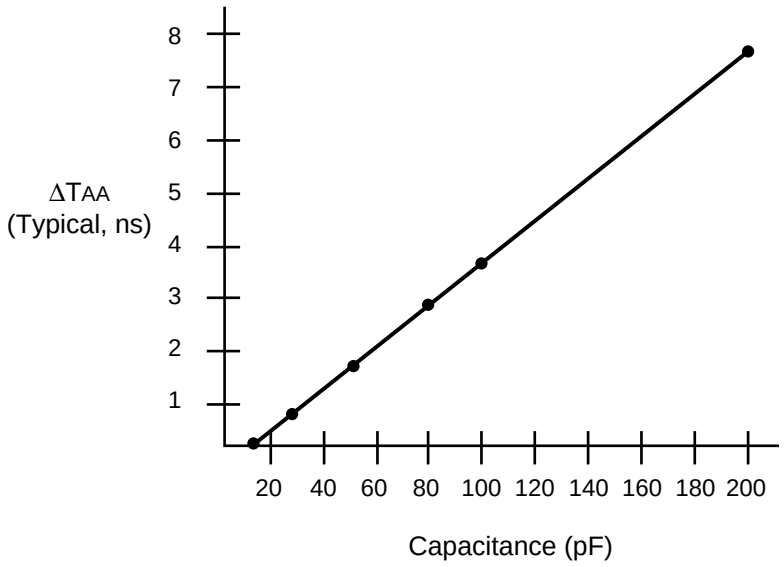


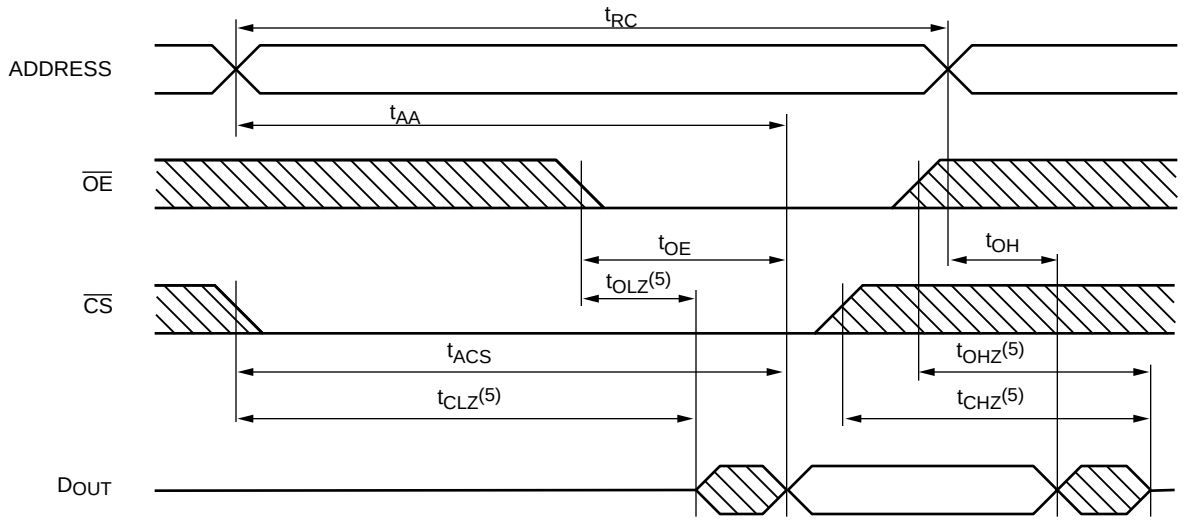
Figure 4. Alternate Lumped Capacative Load, Typical Derating

AC Electrical Characteristics (Vcc = 5V ± 5%, T_A = 0°C to +70°C)

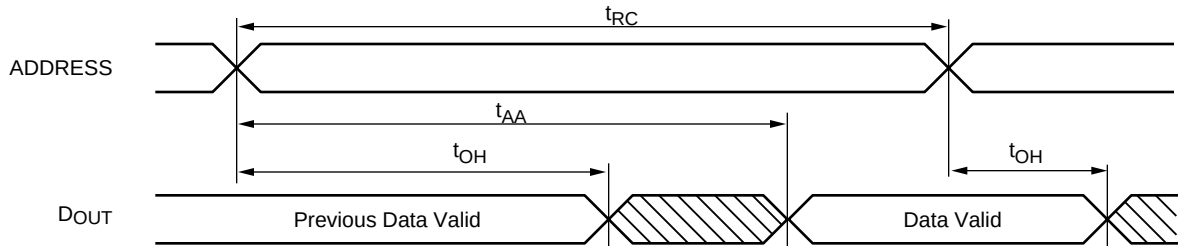
Symbol	Parameter	PDM4M4050SXXZ, PDM4M4050SXXM										Unit
		-10 ns(2)		-12 ns(2)		-15 ns(2)		-20 ns		-25 ns		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Read Cycle												
t_{RC}	Read Cycle Time	10	—	12	—	15	—	20	—	25	—	ns
t_{AA}	Address Access Time	—	10	—	12	—	15	—	20	—	25	ns
t_{ACS}	Chip Select Access Time	—	10	—	12	—	15	—	20	—	25	ns
t_{CLZ}(1)	Chip Select to Output in Low-Z	2	—	2	—	2	—	5	—	5	—	ns
t_{OE}	Output Enable to Output Valid	—	5	—	7	—	8	—	10	—	12	ns
t_{OLZ}(1)	Output Enable to Output in Low-Z	0	—	0	—	0	—	0	—	0	—	ns
t_{CHZ}(1)	Chip Deselect to Output in High-Z	—	6	—	7	—	8	—	10	—	12	ns
t_{OHZ}(1)	Output Disable to Output in High-Z	—	6	—	7	—	8	—	10	—	10	ns
t_{OH}	Output Hold from Address Change	3	—	3	—	3	—	3	—	3	—	ns
Write Cycle												
t_{WC}	Write Cycle Time	10	—	12	—	15	—	—	20	—	25	ns
t_{CW}	Chip Select to End of Write	8	—	10	—	12	—					ns
t_{AW}	Address Valid to End of Write	8	—	10	—	12	—	20	—	25	—	ns
t_{AS}	Address Setup Time	0	—	0	–	0	—	15	—	20	—	ns
t_{WP}	Write Pulse Width	8	—	10	—	12	—	15	—	20	—	ns
t_{WR}	Write Recovery Time	1	—	1	—	1	—	0	–	0	—	ns
t_{WHZ}(1)	Write Enable to Output in High-Z	—	5	—	6	—	7	15	—	20	—	ns
t_{DW}	Data to Write Time Overlap	6	—	7	—	8	—	0	—	0	—	ns
t_{DH}	Data Hold from Write Time	1	—	1	—	1	—	—	13	—	15	ns
t_{OW}(1)	Output Active from End of Write	1	—	1	—	1	—	12	—	15	—	ns

NOTES 1. This parameter is determined by device characteristics but is not production tested.
2. Preliminary specifications only.

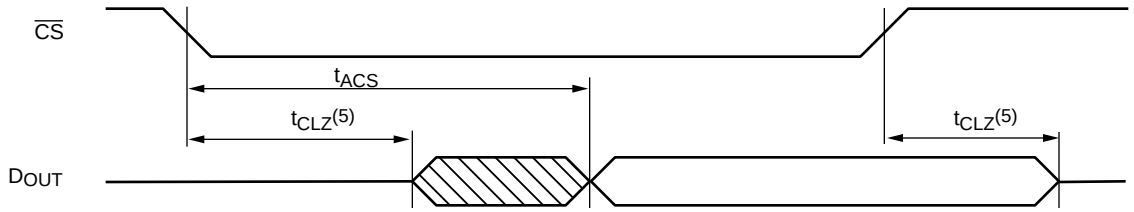
Timing Waveforms of Read Cycle No.1(1)



Timing Waveforms of Read Cycle No.2(1,2,4)

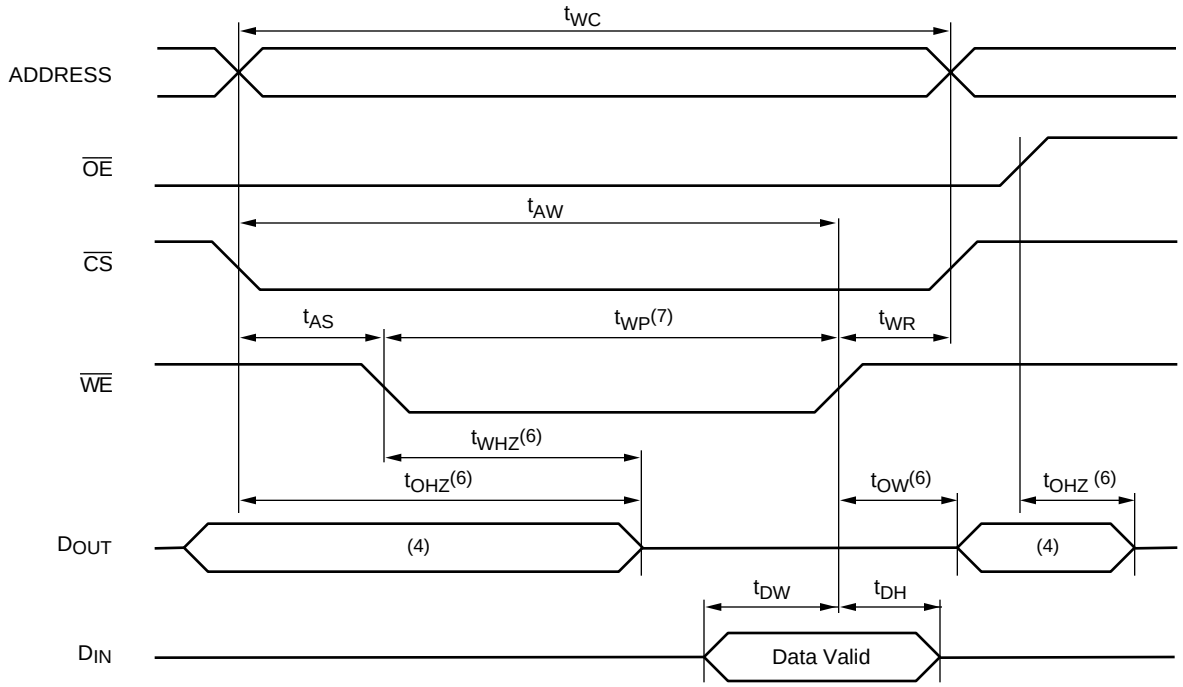


Timing Waveforms of Read Cycle No.3(1,3,4)

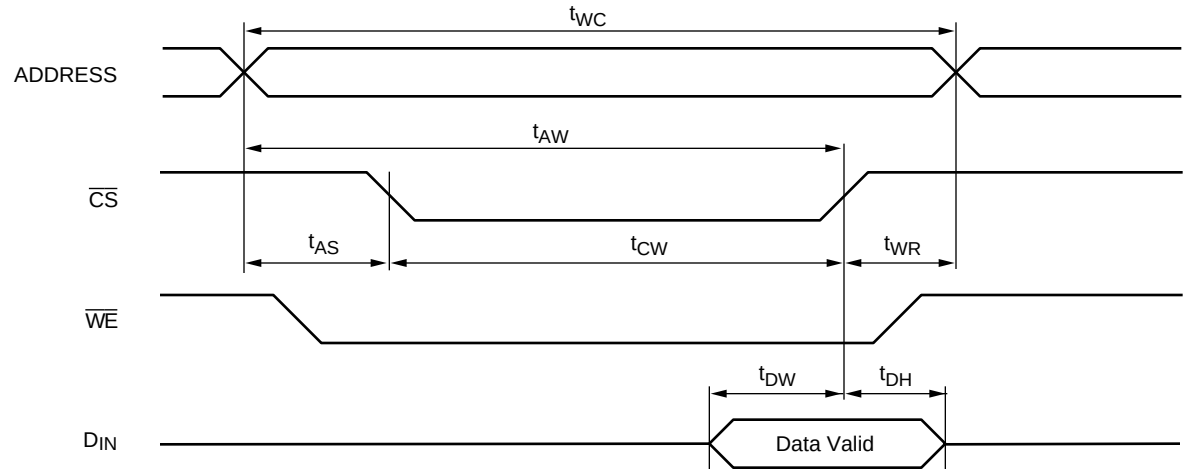


NOTES 1. $\overline{WE}$ is HIGH for Read Cycle.
2. Device is continuously selected. $\overline{CS} = V_{IL}$.
3. Address valid prior to or coincident with $\overline{CS}$ transition LOW.
4. $\overline{OE} = V_{IL}$.
5. Transition is measured ±200 mV for steady state. This parameter is determined by device characteristics but is not production tested.

Timing Waveforms of Write Cycle No.1 ($\overline{WE}$ Controlled)(1,2,3,7)



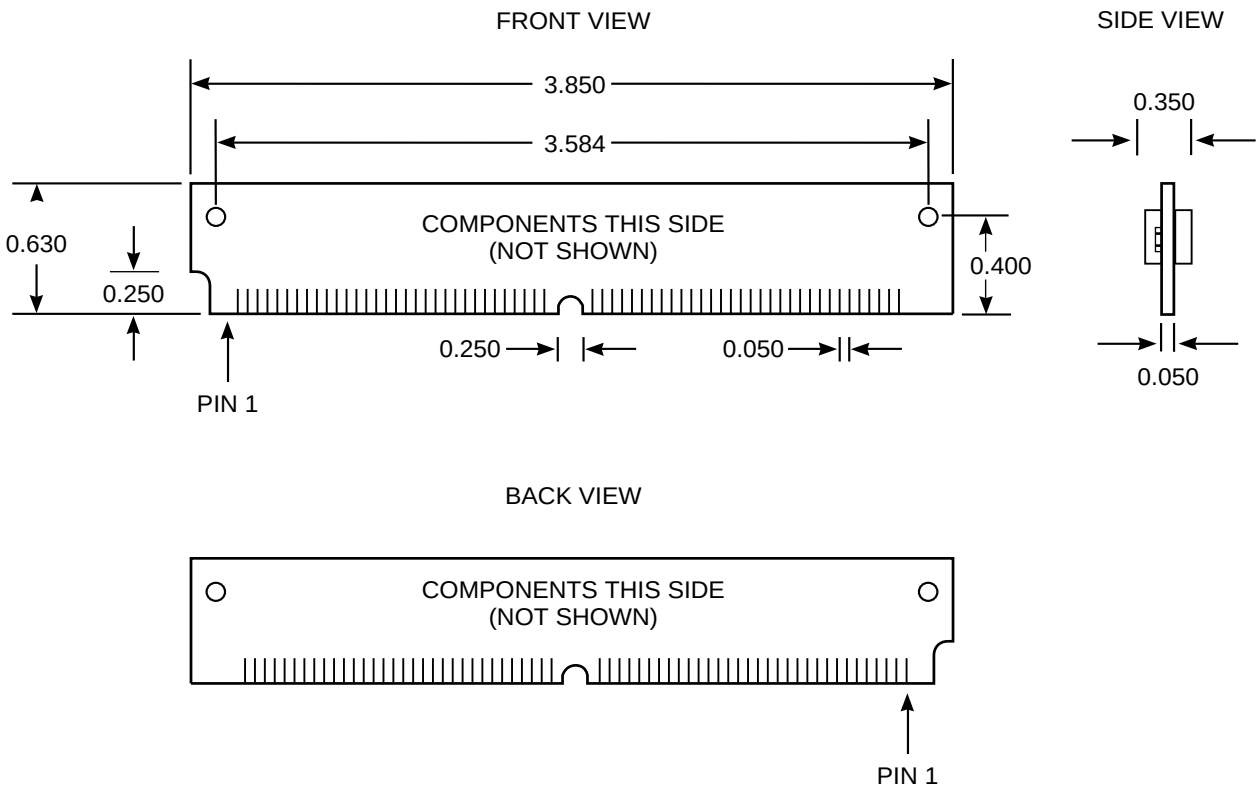
Timing Waveforms of Write Cycle No.2 ($\overline{CS}$ Controlled)(1,2,3,5)



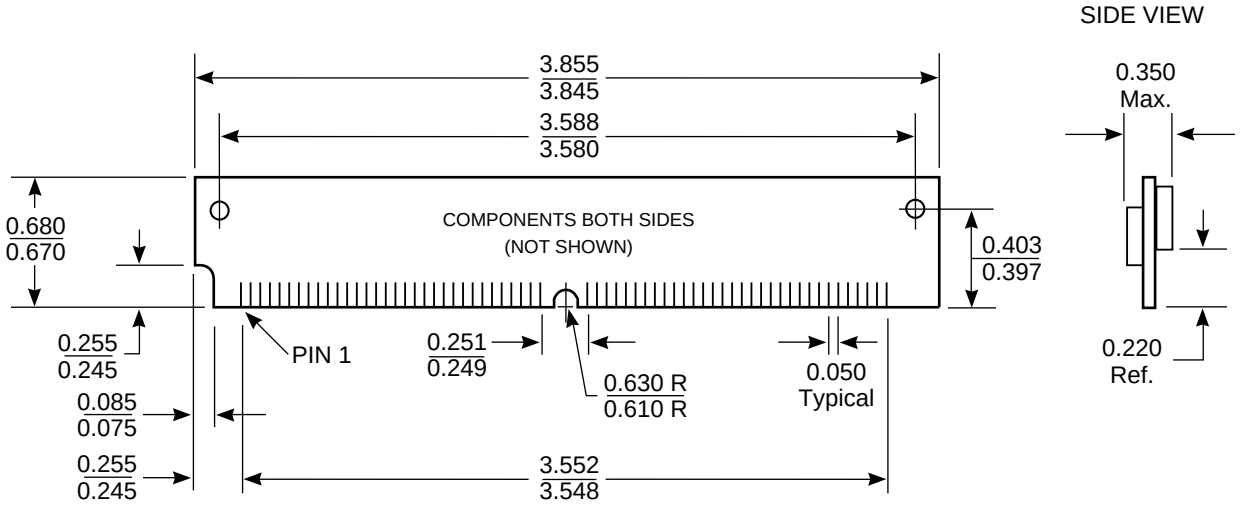
NOTES 1. $\overline{WE}$ or $\overline{CS}$ must be HIGH during all address transitions.
2. A write occurs during the overlap (t_{WP}) of a LOW $\overline{CS}$ and a LOW $\overline{WE}$.
3. t_{WR} is measured from the earlier of $\overline{CS}$ or $\overline{WE}$ going HIGH to end the write cycle.
4. During this period, I/O pins are in the output state, and input signals must be applied.
5. If the $\overline{CS}$ LOW transition occurs simultaneously with or after the $\overline{WE}$ LOW transition, the outputs remain in a high-impedance state.
6. Transition is measured ±200 mV for steady state with a 5 pF load (including scope and jig). This parameter is determined by device characteristics but is not production tested.
7. If $\overline{OE}$ is LOW during a $\overline{WE}$ controlled write cycle, the write pulse width must be the larger of t_{WP} or (t_{WHZ} + t_{DW}) to allow the I/O drivers to turn off and data to be placed on the bus for the required t_{DW}. If $\overline{OE}$ is HIGH during a $\overline{WE}$ controlled write cycle, this requirement does not apply and the write pulse width can be as short as the specified t_{WP}.

Package Dimensions

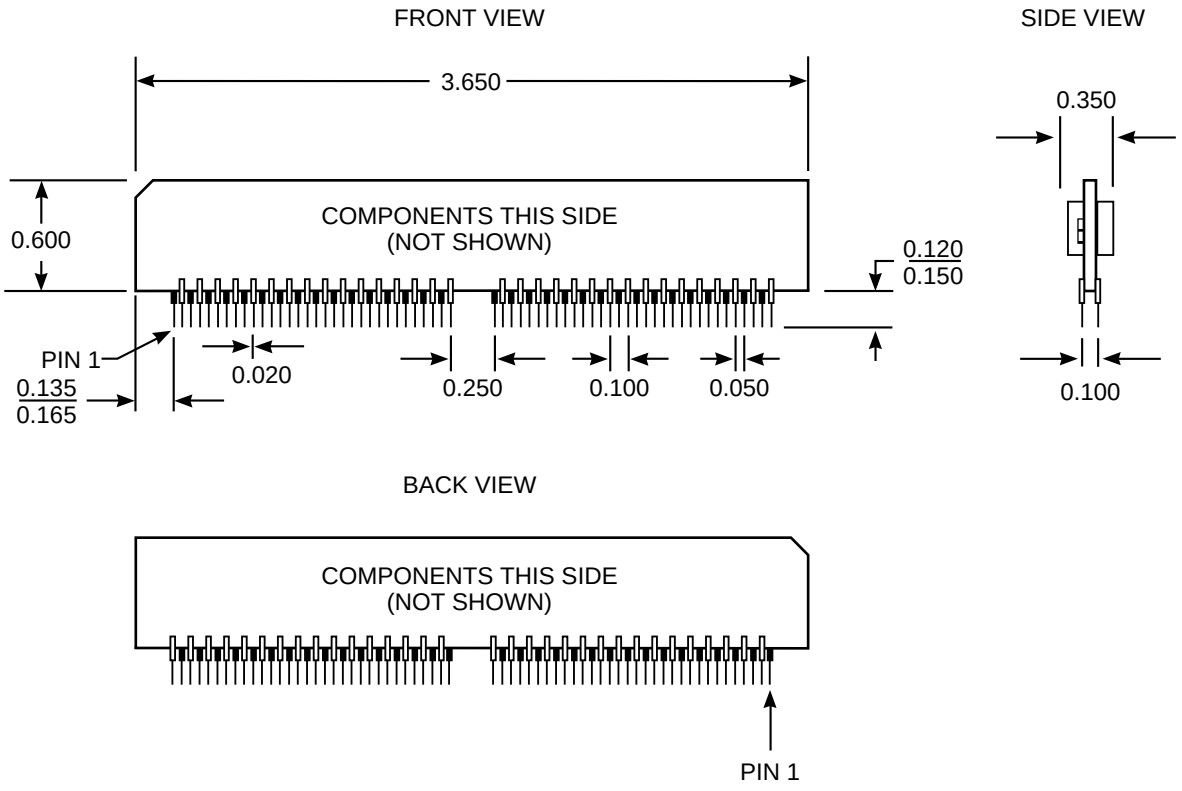
SIMM Version



Angled SIMM Version



ZIP Version



Ordering Information

PDM4M XXXXX S XX X X

Device | Power | Speed | Package | Temp

Blank	Commercial (0 to 70°C)
AM	64-pin Angled SIMM
M	64-pin SIMM
Z	64-pin ZIP
10	Commercial
12	
15	
20	
25	
S	Standard Power
4050	256K x 32