



## 64K × 64 BURST PIPELINED HIGH-SPEED CMOS STATIC RAM

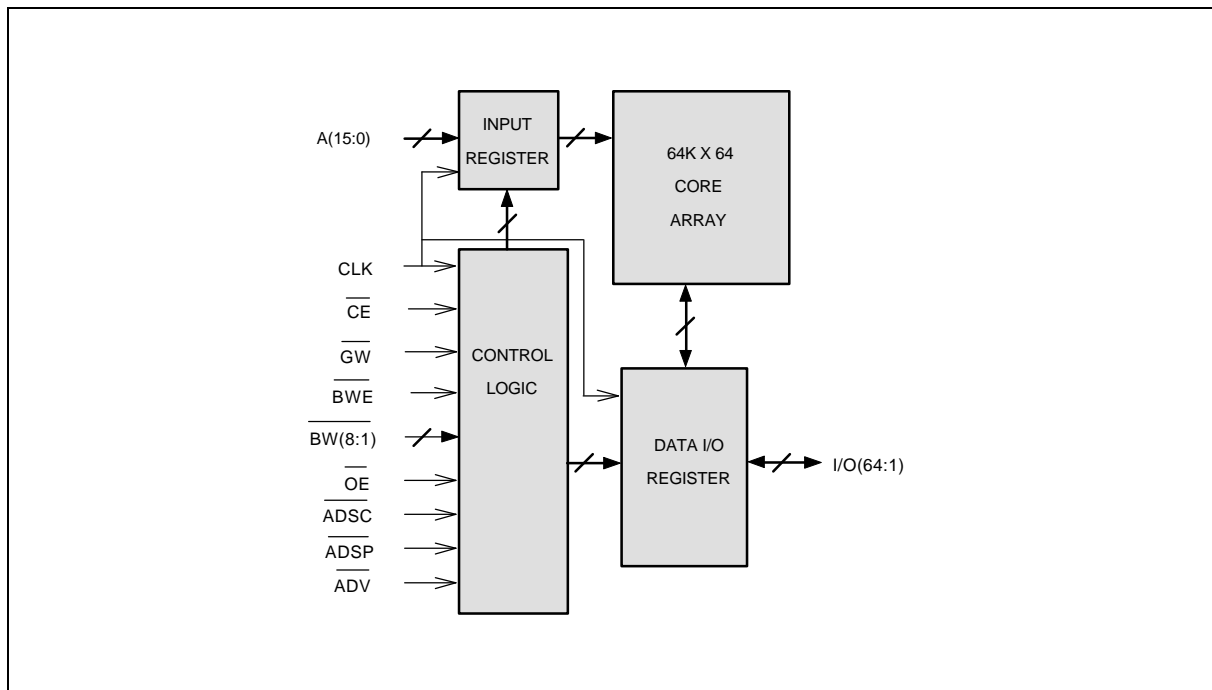
### GENERAL DESCRIPTION

The W25P240A is a high-speed, low-power, synchronous-burst pipelined CMOS static RAM organized as 65,536 × 64 bits that operates on a single 3.3-volt power supply. A built-in two-bit burst address counter supports Pentium™ burst mode.

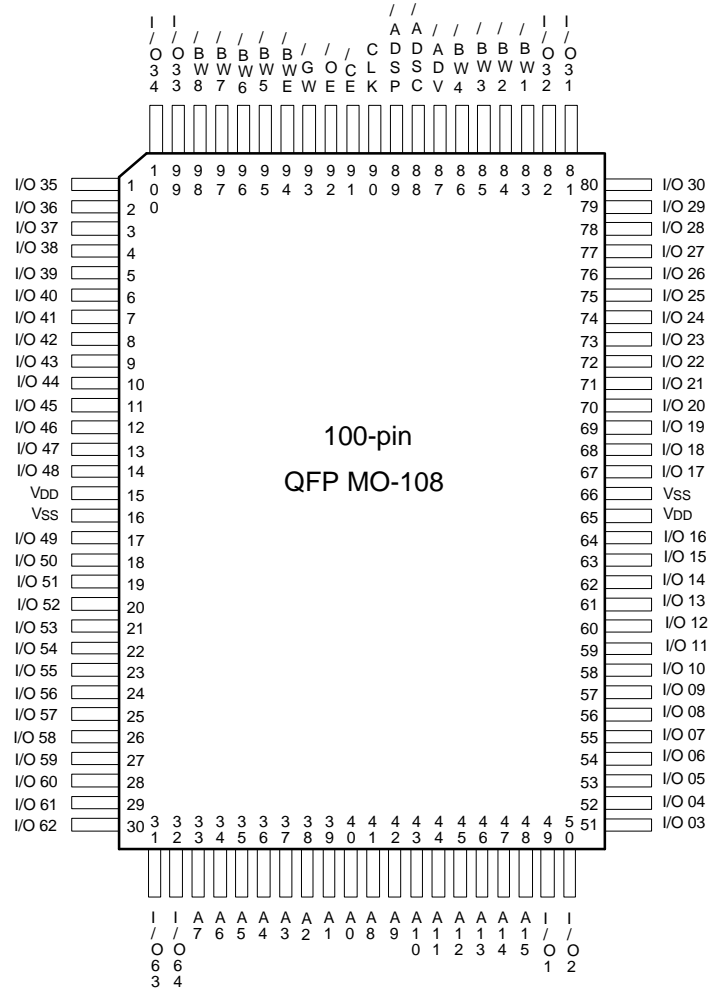
### FEATURES

- Synchronous operation
- Support 66/75 MHz bus speed
- Single +3.3V power supply
- Individual byte write capability
- 3.3V LVTTTL compatible I/O
- Clock-controlled and registered input
- Asynchronous output enable
- Internal burst counter supports Intel burst mode
- Packaged in 100-pin QFP

### BLOCK DIAGRAM



**PIN CONFIGURATION**





## PIN DESCRIPTION

SYMBOL	TYPE	DESCRIPTION
A0–A15	Input, Synchronous	Host Address
I/O1–I/O64	I/O, Synchronous	Data Inputs/Outputs
CLK	Input, Clock	Processor Host Bus Clock
$\overline{\text{CE}}$	Input, Synchronous	Chip Enables
$\overline{\text{GW}}$	Input, Synchronous	Global Write
$\overline{\text{BWE}}$	Input, Synchronous	Byte Write Enable from Cache Controller
$\overline{\text{BW1}} - \overline{\text{BW8}}$	Input, Synchronous	Host Bus Byte Enables used with $\overline{\text{BWE}}$
$\overline{\text{OE}}$	Input, Asynchronous	Output Enable Input
$\overline{\text{ADV}}$	Input, Synchronous	Internal Burst Address Counter Advance
$\overline{\text{ADSC}}$	Input, Synchronous	Address Status from chip set
$\overline{\text{ADSP}}$	Input, Synchronous	Address Status from CPU
VDD		Power Supply
VSS		Ground

## FUNCTIONAL DESCRIPTION

The W25P240A is a synchronous-burst pipelined SRAM designed for use in high-end personal computers. It supports only one burst address sequence for Intel™ systems. The burst cycles are initiated by  $\overline{\text{ADSP}}$  or  $\overline{\text{ADSC}}$  and the burst counter is incremented whenever  $\overline{\text{ADV}}$  is sampled low.

### Burst Address Sequence

	A[1:0]	A[1:0]	A[1:0]	A[1:0]
External Start Address	00	01	10	11
Second Address	01	00	11	10
Third Address	10	11	00	01
Fourth Address	11	10	01	00

The device supports several types of write mode operations.  $\overline{\text{BWE}}$  and  $\overline{\text{BW}} [8:1]$  support individual byte writes. The  $\overline{\text{BE}} [7:0]$  signals can be directly connected to the SRAM  $\overline{\text{BW}} [8:1]$ . The  $\overline{\text{GW}}$  signal is used to override the byte enable signals and allows the cache controller to write all bytes to the SRAM, no matter what the byte write enable signals are. The various write modes are indicated in the Write Table below. Note that in pipelined mode, the byte write enable signals are not latched by the SRAM with addresses but with data. In pipelined mode, the cache controller must ensure the SRAM latches both data and valid byte enable signals from the processor.

## TRUTH TABLE

CYCLE	ADDRESS USED	$\overline{\text{CE}}$	$\overline{\text{ADSP}}$	$\overline{\text{ADSC}}$	$\overline{\text{ADV}}$	$\overline{\text{OE}}$	DATA	WRITE*
Unselected	No	1	X	0	X	X	Hi-Z	X
Begin Read	External	0	0	X	X	X	Hi-Z	X
Begin Read	External	0	1	0	X	X	Hi-Z	Read
Continue Read	Next	X	1	1	0	1	Hi-Z	Read
Continue Read	Next	X	1	1	0	0	D-Out	Read
Continue Read	Next	1	X	1	0	1	Hi-Z	Read
Continue Read	Next	1	X	1	0	0	D-Out	Read
Suspend Read	Current	X	1	1	1	1	Hi-Z	Read
Suspend Read	Current	X	1	1	1	0	D-Out	Read
Suspend Read	Current	1	X	1	1	1	Hi-Z	Read
Suspend Read	Current	1	X	1	1	0	D-Out	Read
Begin Write	Current	X	1	1	1	X	Hi-Z	Write
Begin Write	Current	1	X	1	1	X	Hi-Z	Write
Begin Write	External	0	1	0	X	X	Hi-Z	Write
Continue Write	Next	X	1	1	0	X	Hi-Z	Write
Continue Write	Next	1	X	1	0	X	Hi-Z	Write
Suspend Write	Current	X	1	1	1	X	Hi-Z	Write
Suspend Write	Current	1	X	1	1	X	Hi-Z	Write

Notes:

- For a detailed definition of read/write, see the Write Table below.
- An "X" means don't care, "1" means logic high, and "0" means logic low.
- The  $\overline{\text{OE}}$  pin enables the data output but is not synchronous with the clock. All signals of the SRAM are sampled synchronous to the bus clock except for the  $\overline{\text{OE}}$  pin.
- On a write cycle that follows a read cycle,  $\overline{\text{OE}}$  must be inactive prior to the start of the write cycle to allow write data to set up the SRAM.  $\overline{\text{OE}}$  must also disable the output buffer prior to the end of a write cycle to ensure the SRAM data hold timings are met.

## WRITE TABLE

READ/WRITE FUNCTION	$\overline{\text{GW}}$	$\overline{\text{BWE}}$	$\overline{\text{BW8}}$	$\overline{\text{BW7}}$	$\overline{\text{BW6}}$	$\overline{\text{BW5}}$	$\overline{\text{BW4}}$	$\overline{\text{BW3}}$	$\overline{\text{BW2}}$	$\overline{\text{BW1}}$
Read	1	1	X	X	X	X	X	X	X	X
Read	1	0	1	1	1	1	1	1	1	1
Write byte 1 I/O1–I/O8	1	0	1	1	1	1	1	1	1	0
Write byte 2 I/O9–I/O16	1	0	1	1	1	1	1	1	0	1
Write byte 2, byte 1	1	0	1	1	1	1	1	1	0	0



Write Table, continued

READ/WRITE FUNCTION	GW	BWE	BW8	BW7	BW6	BW5	BW4	BW3	BW2	BW1
Write byte 3 I/O17–I/O24	1	0	1	1	1	1	1	0	1	1
Write byte 3, byte 1	1	0	1	1	1	1	1	0	1	0
Write byte 3, byte 2	1	0	1	1	1	1	1	0	0	1
Write byte 3, byte 2, byte 1	1	0	1	1	1	1	1	0	0	0
Write byte 4, I/O25–I/O32	1	0	1	1	1	1	0	1	1	1
Write byte 4, byte 1	1	0	1	1	1	1	0	1	1	0
Write byte 4, byte 2	1	0	1	1	1	1	0	1	0	1
Write byte 4, byte 2, byte 1	1	0	1	1	1	1	0	1	0	0
Write byte 4, byte 3	1	0	1	1	1	1	0	0	1	1
Write byte 4, byte 3, byte 1	1	0	1	1	1	1	0	0	1	0
Write byte 4, byte 3, byte 2	1	0	1	1	1	1	0	0	0	1
Write byte 4, byte 3, byte 2, byte 1	1	0	1	1	1	1	0	0	0	0
Write byte 5, I/O33–I/O40	1	0	1	1	1	0	1	1	1	1
Write byte 5, byte 1	1	0	1	1	1	0	1	1	1	0
Write byte 5, byte 2	1	0	1	1	1	0	1	1	0	1
Write byte 5, byte 2, byte 1	1	0	1	1	1	0	1	1	0	0
Write byte 5, byte 3	1	0	1	1	1	0	1	0	1	1
Write byte 5, byte 3, byte 1	1	0	1	1	1	0	1	0	1	0
Write byte 5, byte 3, byte 2	1	0	1	1	1	0	1	0	0	1
Write byte 5, byte 3, byte 2, byte 1	1	0	1	1	1	0	1	0	0	0
Write byte 5, byte 4	1	0	1	1	1	0	0	1	1	1
Write byte 5, byte 4, byte 1	1	0	1	1	1	0	0	1	1	0
Write byte 5, byte 4, byte 2	1	0	1	1	1	0	0	1	0	1
Write byte 5, byte 4, byte 2, byte 1	1	0	1	1	1	0	0	1	0	0
Write byte 5, byte 4, byte 3	1	0	1	1	1	0	0	0	1	1
Write byte 5, byte 4, byte 3, byte1	1	0	1	1	1	0	0	0	1	0
Write byte 5, byte 4, byte 3, byte2	1	0	1	1	1	0	0	0	0	1
Write byte 5, byte 4, byte 3, byte 2, byte 1	1	0	1	1	1	0	0	0	0	0
Write byte 6	1	0	1	1	0	1	1	1	1	1
Write byte 6, byte1	1	0	1	1	0	1	1	1	1	0
Write byte 6, byte2	1	0	1	1	0	1	1	1	0	1
Write byte 6, byte2, byte1	1	0	1	1	0	1	1	1	0	0
..... and so on .....	...	...	...	...	...	...	...	...	...	...
Write byte 8, byte 7, byte 6, byte 5, byte 4, byte 2, byte 1	1	0	0	0	0	0	0	1	0	0



Write Table, continued

READ/WRITE FUNCTION	GW	BWE	BW8	BW7	BW6	BW5	BW4	BW3	BW2	BW1
Write byte 8, byte 7, byte 6, byte 5, byte 4, byte 3	1	0	0	0	0	0	0	0	1	1
Write byte 8, byte 7, byte 6, byte 5, byte 4, byte 3, byte 1	1	0	0	0	0	0	0	0	1	0
Write byte 8, byte 7, byte 6, byte 5, byte 4, byte 3, byte 2	1	0	0	0	0	0	0	0	0	1
Write all bytes	1	0	0	0	0	0	0	0	0	0
Write all bytes	0	x	x	x	x	x	x	x	x	x

## DC CHARACTERISTICS

### Absolute Maximum Ratings

PARAMETER	RATING	UNIT
Supply Voltage to Vss	-0.5 to 4.6	V
Input/Output to Vss Potential	Vss -0.5 to VDD +0.5	V
Allowable Power Dissipation	1.5	W
Storage Temperature	-65 to 150	°C
Operating Temperature	0 to +55	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

### Operating Characteristics

(VDD = 3.15V to 3.6V, VSS = 0V, TA = 0 to 55° C)

PARAMETER	SYM.	TEST CONDITIONS	MIN.	TYP	MAX.	UNIT
Input Low Voltage	VIL	-	-0.5	-	+0.8	V
Input High Voltage	VIH	-	+2.0	-	VDD +0.3	V
Input Leakage Current	ILI	VIN = VSS to VDD	-10	-	+10	μA
Output Leakage Current	ILO	VIO = VSS to VDD, and data I/O pins in high-Z state defined in truth table	-10	-	+ 10	μA
Output Low Voltage	VOL	IOL = +8.0 mA	-	-	0.4	V
Output High Voltage	VOH	IOH = -4.0 mA	2.4	-	-	V
Operating Current	IDD	TCYC ≥ min., I/O = 0 mA	-	-	350	mA
Standby Current	ISB	Unselected mode defined in truth table, VIN, VIO = VIH (min.) /VIL (max.) TCYC ≥ min.	-	-	80	mA

Note: Typical characteristics are measured at VDD = 3.3V, TA = 25° C.

## CAPACITANCE

( $V_{DD} = 3.3V$ ,  $T_A = 25^\circ C$ ,  $f = 1\text{ MHz}$ )

PARAMETER	SYM.	CONDITIONS	MAX.	UNIT
Input Capacitance	$C_{IN}$	$V_{IN} = 0V$	6	pF
Input/Output Capacitance	$C_{I/O}$	$V_{OUT} = 0V$	8	pF

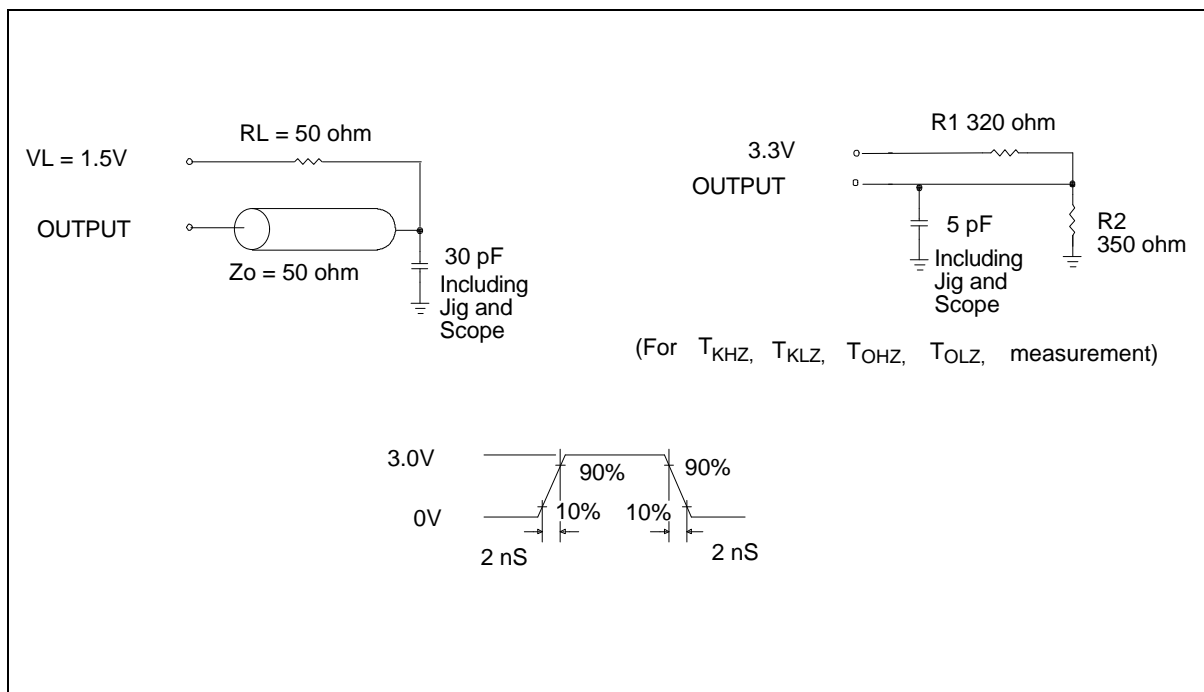
Note: These parameters are sampled but not 100% tested.

## AC CHARACTERISTICS

### AC Test Conditions

PARAMETER	CONDITIONS
Input Pulse Levels	0V to 3V
Input Rise and Fall Times	2 nS
Input and Output Timing Reference Level	1.5V
Output Load	$C_L = 30\text{ pF}$ , $I_{OH}/I_{OL} = -4\text{ mA}/8\text{ mA}$

### AC Test Loads and Waveform



## AC Timing Characteristics

(V<sub>DD</sub> = 3.15V to 3.6V, V<sub>SS</sub> = 0V, T<sub>A</sub> = 0 to 55° C)

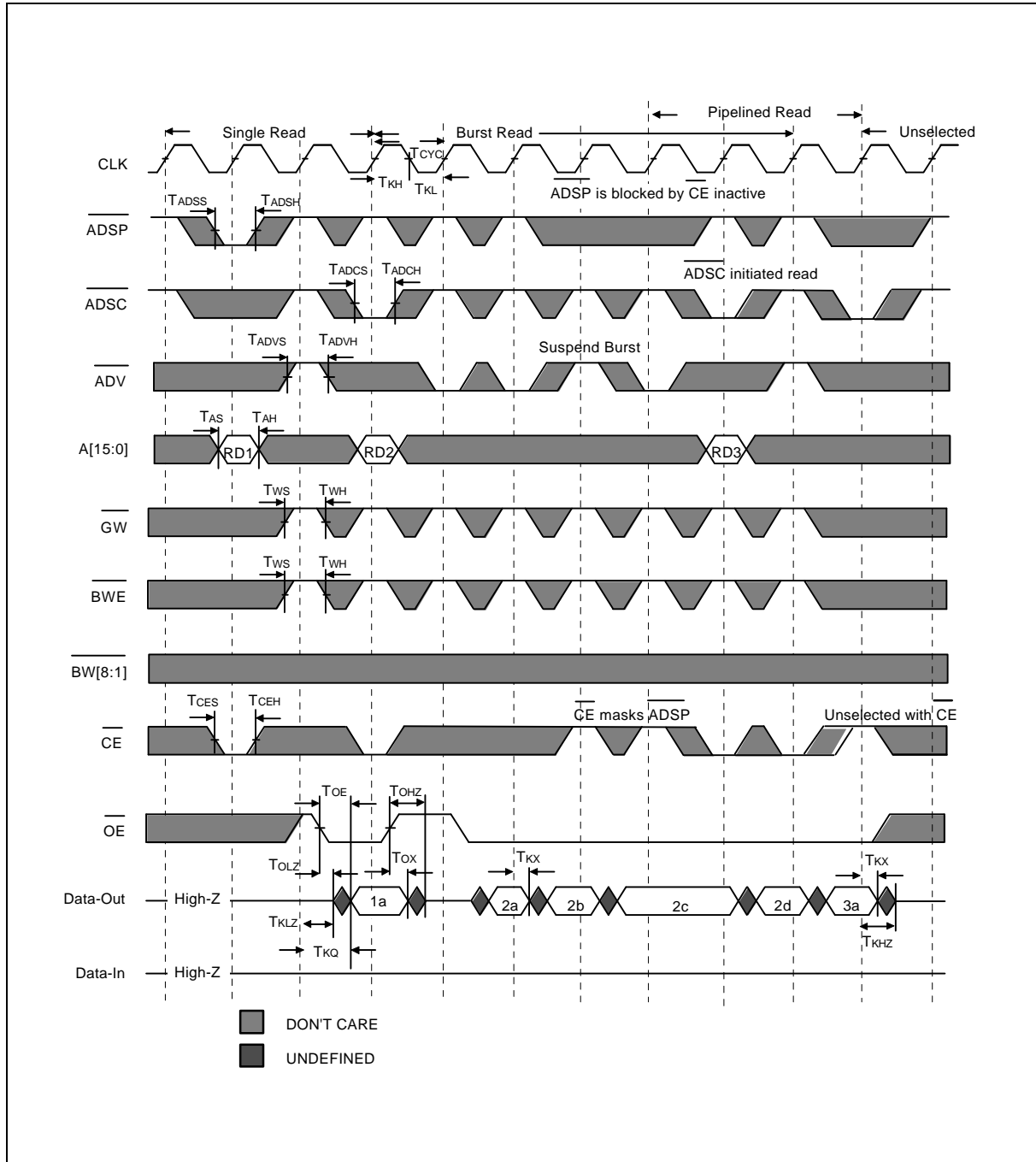
PARAMETER	SYMBOL	W25P240A-6		W25P240A-6A		UNIT	NOTE
		MIN.	MAX.	MIN.	MAX.		
Add. Setup Time	TAS	1.5	-	1.5	-	nS	
Add. Hold Time	TAH	1.5	-	1.5	-	nS	
Write Data Setup Time	TDS	2.5	-	2.5	-	nS	
Write Data Hold Time	TDH	0.5	-	0.5	-	nS	
$\overline{\text{ADV}}$ Setup Time	TADVS	2.5	-	2.5	-	nS	
$\overline{\text{ADV}}$ Hold Time	TADVH	0.5	-	0.5	-	nS	
$\overline{\text{ADSP}}$ Setup Time	TADSS	2.5	-	2.5	-	nS	
$\overline{\text{ADSP}}$ Hold Time	TADSH	0.5	-	0.5	-	nS	
$\overline{\text{ADSC}}$ Setup Time	TADCS	2.5	-	2.5	-	nS	
$\overline{\text{ADSC}}$ Hold Time	TADCH	0.5	-	0.5	-	nS	
$\overline{\text{CE}}$ , Setup Time	TCES	2.5	-	2.5	-	nS	
$\overline{\text{CE}}$ , Hold Time	TCEH	0.5	-	0.5	-	nS	
$\overline{\text{GW}}$ , $\overline{\text{BWE}}$ X Setup Time	TWS	2.0	-	2.0	-	nS	
$\overline{\text{GW}}$ , $\overline{\text{BWE}}$ X Hold Time	TWH	1.0	-	1.0	-	nS	
Clock Cycle Time	TCYC	13.3	-	15	-	nS	
Clock High Pulse Width	TKH	5	-	6	-	nS	
Clock Low Pulse Width	TKL	5	-	6	-	nS	
Clock to Output Valid	TKQ	-	6	-	7	nS	
Clock to Output High-Z	TKHZ	2	13.3	2	15	nS	Note
Clock to Output Low-Z	TKLZ	0	-	0	-	nS	Note
Clock to Output Invalid	TKX	2	-	2	-	nS	Note
Output Enable to Output Valid	TOE	-	6	-	7	nS	
Output Enable to Output High-Z	TOHZ	-	6	-	7	nS	Note
Output Enable to Output Low-Z	TOLZ	0	-	0	-	nS	Note
Output Enable to Output Invalid	TOX	0	-	0	-	nS	

Note: These parameters are sampled but not 100% tested.



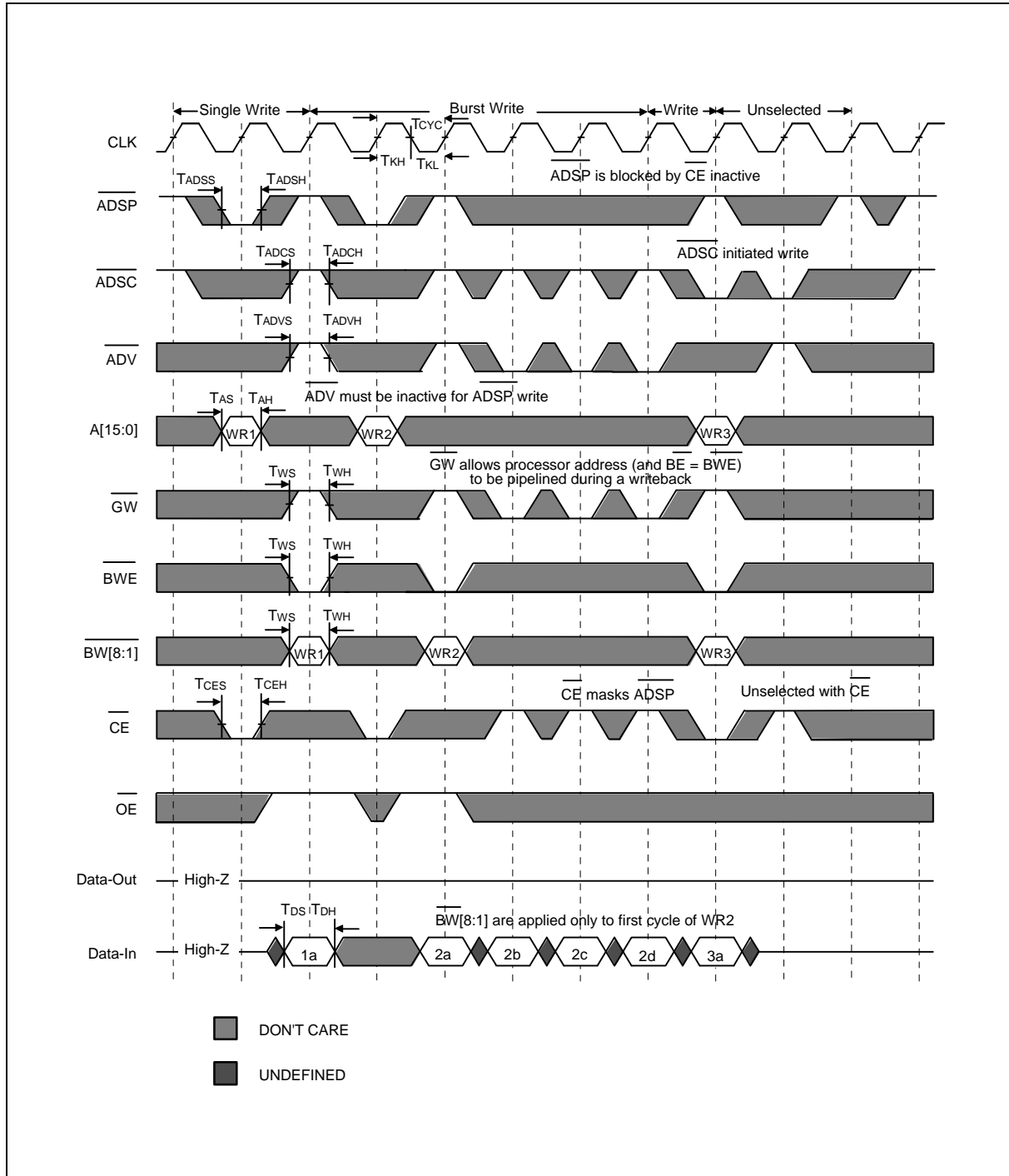
## TIMING WAVEFORMS

### Read Cycle Timing



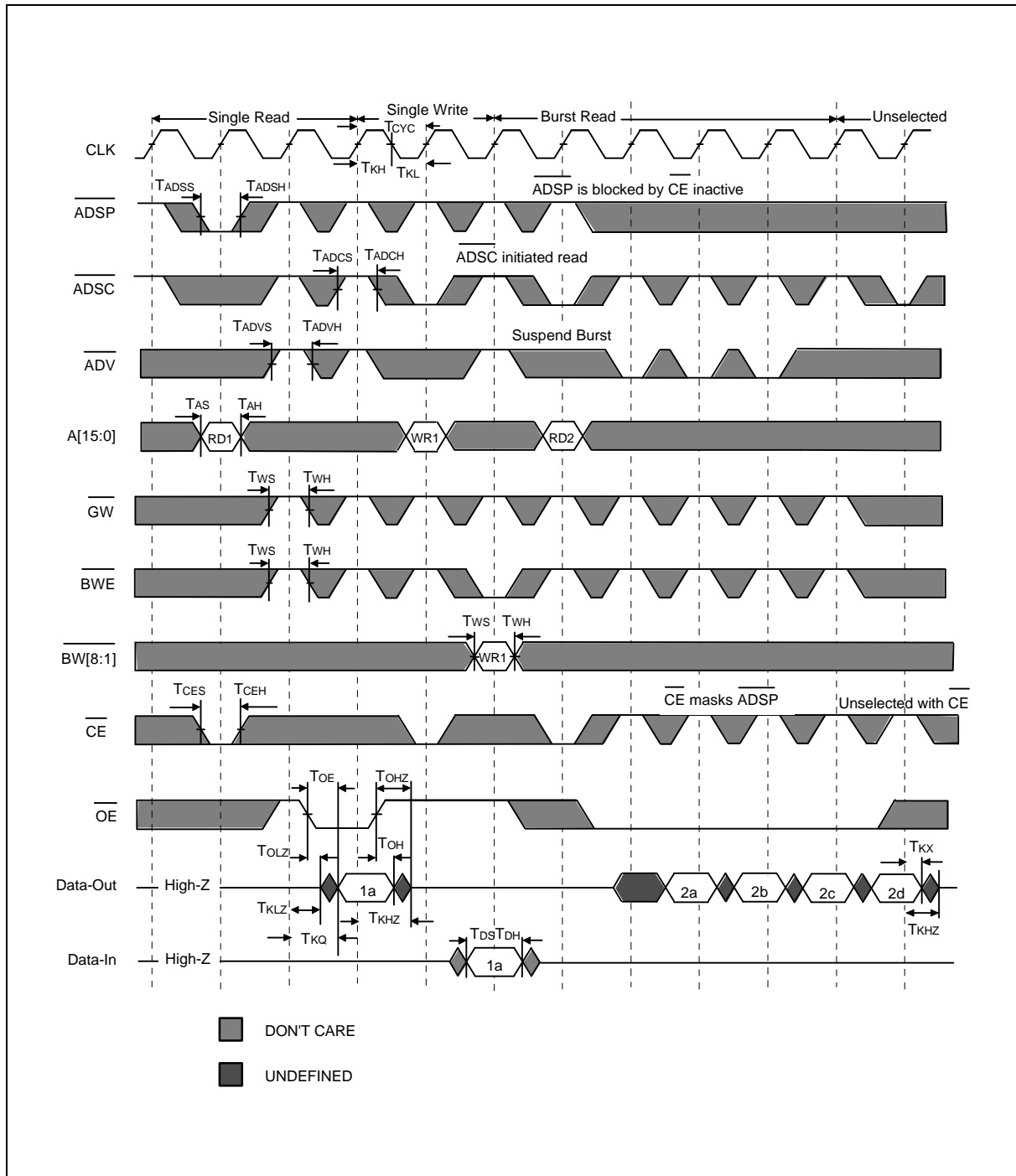
Timing Waveforms, continued

## Write Cycle Timing



Timing Waveforms, continued

## Read/Write Cycle Timing



# W25P240A



## ORDERING INFORMATION

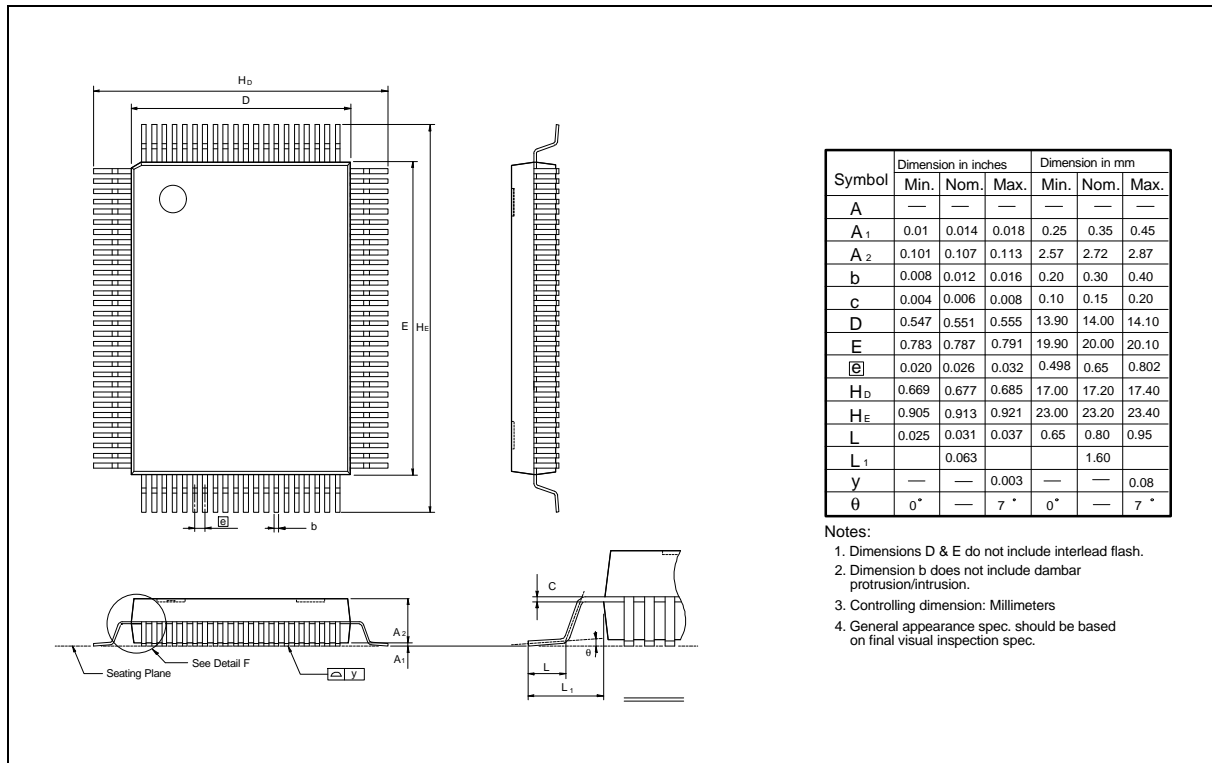
PART NO.	SUPPORTABLE BUS SPEED (MHz)	OPERATING CURRENT MAX. (mA)	STANDBY CURRENT MAX. (mA)	PACKAGE
W25P240AF-6	75	350	80	100-pin QFP
W25P240AF-6A	66	350	80	100-pin QFP

### Notes:

1. Winbond reserves the right to make changes to its products without prior notice.
2. Purchasers are responsible for performing appropriate quality assurance testing on products intended for use in applications where personal injury might occur as a consequence of product failure.

## PACKAGE DIMENSIONS

### 100-pin QFP





## VERSION HISTORY

VERSION	DATE	PAGE	DESCRIPTION
A1	Dec. 1996		Initial Issued
A2	Mar. 1997	1, 8, 12	Change part no. from W25P240A-75/66 to W25P240A-6/7
A3	Aug. 1997	8	A.C. Timing Characteristics: TAS from 2.5 to 1.5 TAH from 0.5 to 1.5 Tws from 2.5 to 2.0 TWH from 0.5 to 1.0
		6, 8	Working temperature range from 70–0° C to 55–0° C
A4	Feb. 1998	8, 12	Part no. W25P240AX-"7" change to "6A"



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Note: All data and specifications are subject to change without notice.