

DESCRIPTION:

The DPS512S8P/PL/PLL is a 512K X 8 high-density, low-power static RAM module comprised of four 128K X 8 monolithic SRAM's, an advanced high-speed CMOS decoder and decoupling capacitors surface mounted on a co-fired ceramic substrate having side-brazed leads.

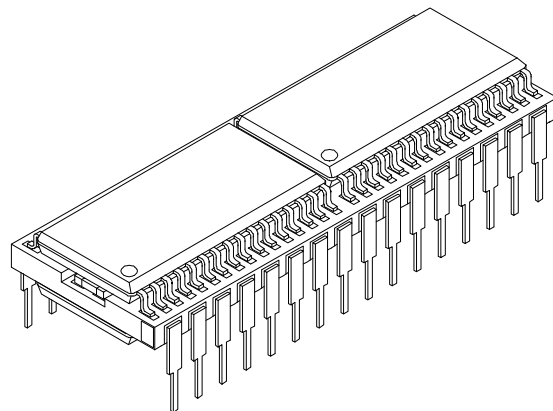
The DPS512S8P/PL/PLL is available in a 600-mil-wide, 32-pin dual-in-line package that conforms to the same JEDEC standard pin configuration as the future four megabit monolithics.

The DPS512S8P/PL/PLL operates from a single +5V supply and all input and output pins are completely TTL-compatible. The low standby power of the DPS512S8P/PL/PLL makes it ideal for battery-backed applications.

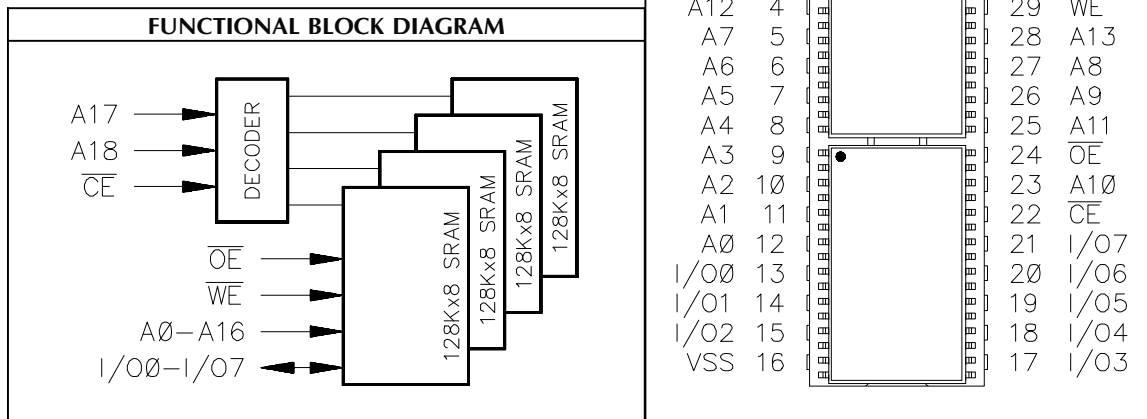
FEATURES:

- 524, 288 by 8 Bit Configuration
- Access Times: 70*, 85, 100, 120, 150ns
- Low Power Dissipation:
 - 25 μ W (typ.) Standby (DPS512S8PL/DPS512S8PLL)
 - 40 μ W (typ.) Standby (DPS512S8P)
 - 375 mW (typ.) Operating
- 2-Volt Data Retention
- Fully Static Operation - No Clock or Refresh Required
- All inputs and Outputs are TTL-Compatible
- 600 mil, 32-pin JEDEC Standard DIP Pinout

* Available in Commercial only.



PIN NAMES	
A0 - A18	Address Inputs
I/O0 - I/O7	Data In/Out
$\overline{CE}$	Chip Enable
$\overline{WE}$	Write Enable
$\overline{OE}$	Output Enable
V _{DD}	Power (+ 5V)
V _{SS}	Ground



RECOMMENDED OPERATING RANGE ¹					
Symbol	Characteristic	Min.	Typ.	Max.	Unit
V _{DD}	Supply Voltage	4.5	5.0	5.5	V
V _{IH}	Input HIGH Voltage	2.2		V _{DD} + 0.3	V
V _{IL}	Input LOW Voltage	-0.5 ²		0.8	V
T _A	Operating Temperature	C	0	+25	°C
		I	-40	+25	

TRUTH TABLE					
Mode	$\overline{CE}$	$\overline{WE}$	$\overline{OE}$	I/O Pin	Supply Current
Not Selected	H	X	X	HIGH-Z	Standby
D _{OUT} Disable	L	H	H	HIGH-Z	Active
Read	L	H	L	D _{OUT}	Active
Write	L	L	X	D _{IN}	Active

H = HIGH

L = LOW

X = Don't Care

DC OUTPUT CHARACTERISTICS					
Symbol	Parameter	Conditions	Min.	Max.	Unit
V _{OH}	HIGH Voltage	I _{OH} = -1.0mA	2.4	-	V
V _{OL}	LOW Voltage	I _{OL} = 2.1mA		0.4	V

ABSOLUTE MAXIMUM RATINGS ³			
Symbol	Parameter	Max.	Unit
T _{STC}	Storage Temperature	-55 to +125	°C
T _{BIAS}	Temperature Under Bias	-10 to +85	°C
V _{DD}	Supply Voltage ¹	-0.5 to +7.0	V
V _{I/O}	Input/Output Voltage ¹	-0.5 to V _{DD} + 0.5	V

CAPACITANCE ⁴ : T _A = 25°C, F = 1.0MHz				
Symbol	Parameter	Max.	Unit	Condition
C _{ADR}	Address Input	45	pF	V _{IN} = 0V
C _{CE}	Chip Enable	20		
C _{WE}	Write Enable	45		
C _{OE}	Output Enable	45		
C _{I/O}	Data Input/Output	50		

DC OPERATING CHARACTERISTICS: Over operating ranges								
Symbol	Characteristics	Test Conditions	TYP.	COMMERCIAL		INDUSTRIAL †		Unit
				Min.	Max.	Min.	Max.	
I _{IN}	Input Leakage Current	V _{IN} = 0V to V _{DD}	-	-10	+10	-10	+10	μA
I _{OUT}	Output Leakage Current	V _{I/O} = 0V to V _{DD} , $\overline{CE}$ or $\overline{OE}$ = V _{IH} , or $\overline{WE}$ = V _{IL}	-	-10	+10	-10	+10	μA
I _{CC1}	Active Supply Current	$\overline{CE}$ = V _{IL} , V _{IN} = V _{IH} or V _{IL} , I _{OUT} = 0mA	P	30	50		55	mA
			PL	30	50		55	
			PLL	30	40		45	
I _{CC2}	Operating Supply Current	Cycle = min., Duty = 100%, I _{OUT} = 0mA	P	75	110		110	mA
			PL	60	100		100	
			PLL	40	80		80	
I _{SB1}	Full Standby Supply Current	V _{IN} ≥ V _{DD} - 0.2V or V _{IN} ≤ V _{SS} + 0.2V, $\overline{CE}$ ≥ V _{DD} - 0.2V	P	8	400		600	μA
			PL	5	200		300	
			PLL	5	100		200	
I _{SB2}	Standby Current	$\overline{CE}$ = V _{IH} , V _{IN} = V _{IH} or V _{IN}	P	4	12		12	mA
			PL	4	8		10	
			PLL	4	6		8	
V _{OL}	Output Low Voltage	I _{OUT} = 2.1mA	-		0.4		0.4	V
V _{OH}	Output High Voltage	I _{OUT} = -1.0mA	-	2.4		2.4		V

† Not available in 70ns.

DATA RETENTION CHARACTERISTICS								
Symbol	Parameter	Test Conditions	Typ.	COMMERCIAL		INDUSTRIAL †		Unit
				Min.	Max.	Min.	Max.	
V _{DR}	Data Retention Voltage	$\overline{CE} \geq V_{DR} - 0.2V$	-	2.0	5.5	2.0	5.5	V
I _{CCDR2}	Data Retention Supply Current	V _{DR} = 2.0V	P	4	180		270	μA
			PL	4	80		120	
			PLL	1	40		60	
I _{CCDR3}	Data Retention Supply Current	V _{DR} = 3.0V	P	4	200		300	μA
			PL	4	100		150	
			PLL	1	50		75	
t _{CDR}	Chip Disable to Data Retention Time		-	0		0		ns
t _R	Recovery Time	t _{RC} = Read Cycle Timing		5		5		ms

† Not Available in 70ns.

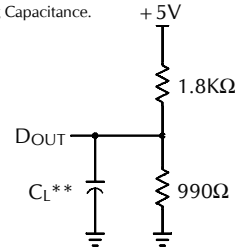
AC TEST CONDITIONS	
Input Pulse Levels	0V to 3.0V
Input Pulse Rise and Fall Times	5ns *
Input and Output Timing Reference Levels	1.5V

* Transition measured between 0.8V and 2.2V.

Output Load		
Load	C _L	Parameters Measured
1	100pF	except t _{CLZ} , t _{OLZ} , t _{CHZ} , t _{OHZ} , t _{WHZ} , and t _{WLZ}
2	5pF	t _{CLZ} , t _{OLZ} , t _{CHZ} , t _{OHZ} , t _{WHZ} , and t _{WLZ}

Figure 1. Output Load

** Including Probe and Jig Capacitance.



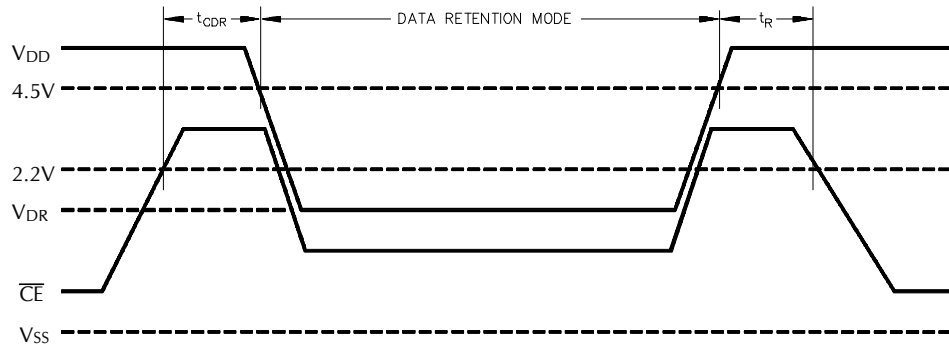
AC OPERATING CONDITIONS AND CHARACTERISTICS - READ CYCLE: Over operating ranges													
No.	Symbol	Parameter	70ns ††		85ns		100ns		120ns		150ns		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
1	t _{RC}	Read Cycle Time	70		85		100		120		150		ns
2	t _{AA}	Address Access Time		70		85		100		120		150	ns
3	t _{CO}	Chip Enable to Output Valid		70		85		100		120		150	ns
4	t _{OV}	Output Enable to Output Valid		45		45		45		50		60	ns
5	t _{OH}	Output Hold from Address Change	10		10		10		10		10		ns
6	t _{CLZ}	Chip Enable to Output in LOW-Z ^{4, 6}	5		5		5		5		5		ns
7	t _{OLZ}	Output Enable to Output in LOW-Z ^{4, 6}	0		0		0		0		0		ns
8	t _{CHZ}	Chip Enable to Output in HIGH-Z ^{4, 6}		35		45		45		50		60	ns
9	t _{OHZ}	Output Enable to Output in HIGH-Z ^{4, 6}		30		30		30		35		45	ns

AC OPERATING CONDITIONS AND CHARACTERISTICS - WRITE CYCLE: Over operating ranges ⁷													
No.	Symbol	Parameter	70ns ++		85ns		100ns		120ns		150ns		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
10	tWC	Write Cycle Time	70		85		100		120		150		ns
11	tAW	Address Valid to End of Write	65		80		90		105		115		ns
12	tCW	Chip Enable to End of Write	65		80		90		105		115		ns
13	tDW	Data to Write Time Overlap	35		35		35		40		50		ns
14	tDH	Data Hold Time from Write Time	0		0		0		0		0		ns
15	tWP	Write Pulse Width	55		55		65		75		85		ns
16	tAS	Address Set-up Time ***	0		0		0		0		0		ns
17	tAH	Address Hold Time	5		5		5		5		5		ns
18	tWHZ	Write Enable to Output in HIGH-Z ^{4, 6}		30		30		30		35		40	ns
19	tWLZ	Write Enable to Output in LOW-Z ^{4, 6}	5		5		5		5		5		ns

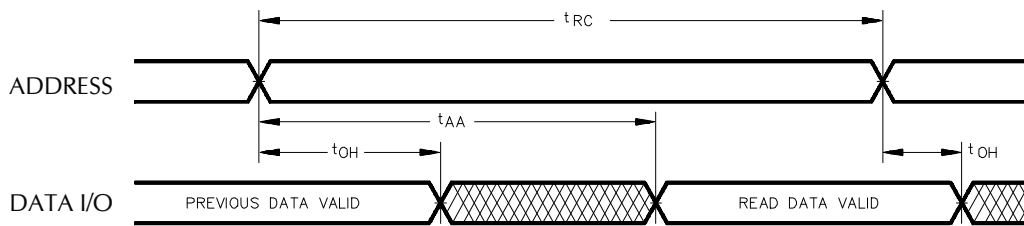
*** Valid for both Read and Write Cycles.

†† Available in commercial only.

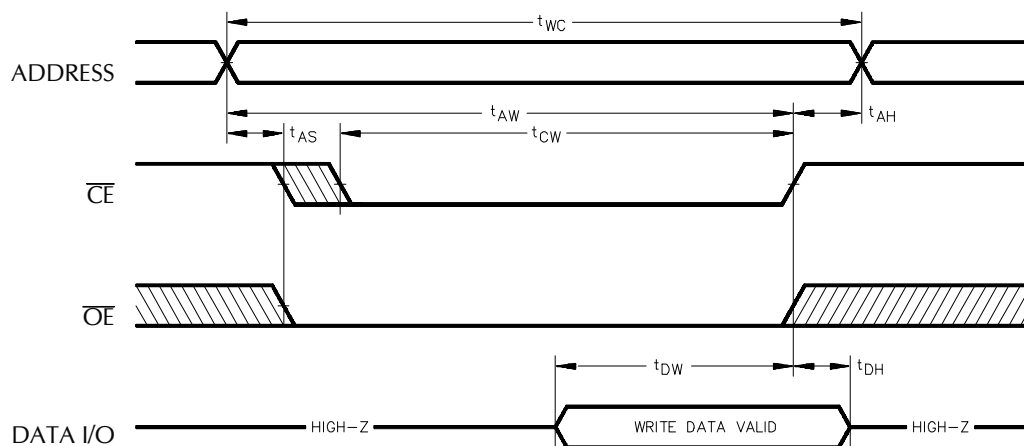
DATA RETENTION WAVEFORM

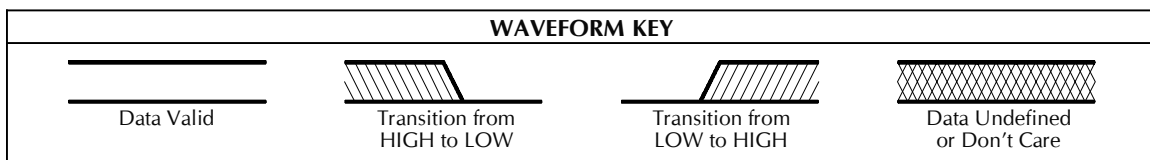
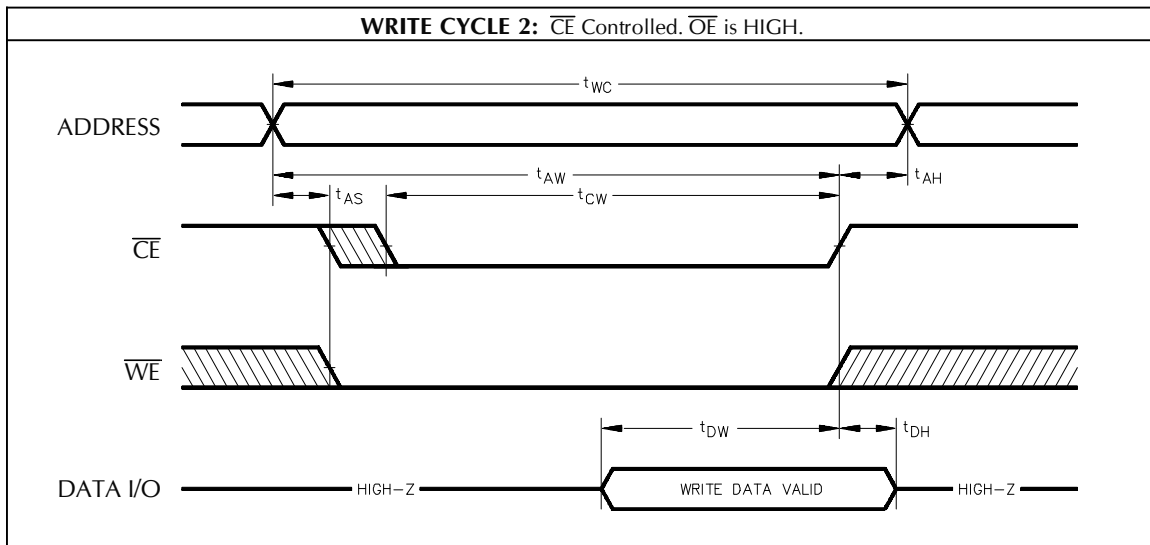
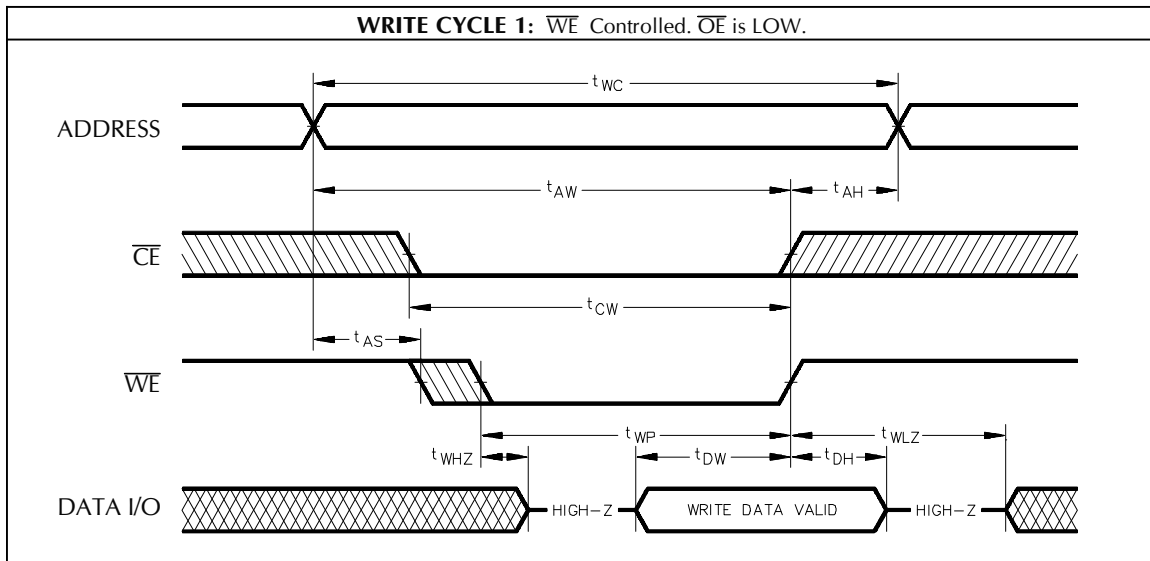


READ CYCLE 1: Address Controlled. $\overline{\text{WE}}$ is HIGH. $\overline{\text{CE}}$ and $\overline{\text{OE}}$ are LOW.



READ CYCLE 2: $\overline{\text{CE}}$ Controlled. $\overline{\text{WE}}$ is HIGH.

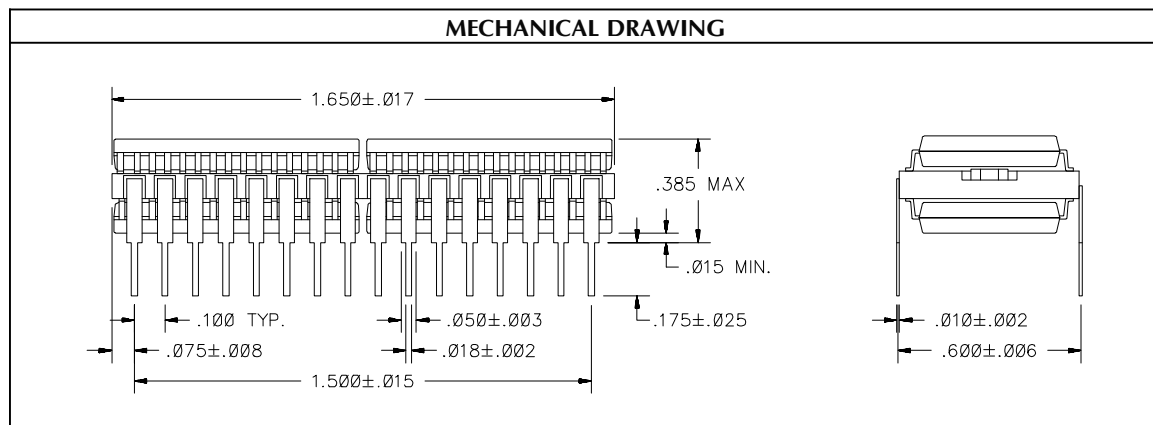




ORDERING INFORMATION									
DP	S	512	S	8	P	XX - XX	X		
PREFIX	TYPE	MEMORY DEPTH	DESIG	MEMORY WIDTH	PACKAGE	POWER	SPEED	GRADE	
									C COMMERCIAL 0°C to +70°C
									I INDUSTRIAL -40°C to +85°C
							70		70ns (COMMERCIAL ONLY)
							85		85ns
							10		100ns
							12		120ns
							15		150ns
								BLANK	STANDARD
								L	LOW POWER
								LL	VERY LOW POWER
									CERDIP WITH PLASTIC DEVICES
									MEMORY MODULE WITH SUPPORT LOGIC
									CMOS SRAM

NOTES:

1. All voltages are with respect to V_{SS}.
2. -2.0V min. for pulse width less than 20ns (V_{IL} min. = -0.5V at DC level).
3. Stresses greater than those 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.
4. This parameter is guaranteed and not 100% tested.
5. Transition is measured at the point of $\pm 500\text{mV}$ from steady state voltage.
6. When $\overline{\text{OE}}$ and $\overline{\text{CE}}$ are LOW and $\overline{\text{WE}}$ is HIGH, I/O pins are in the output state, and input signals of opposite phase to the outputs must not be applied.
7. The outputs are in a high impedance state when $\overline{\text{WE}}$ is LOW.

**Dense-Pac Microsystems, Inc.**

7321 Lincoln Way ♦ Garden Grove, California 92841-1428
 (714) 898-0007 ♦ (800) 642-4477 (Outside CA) ♦ FAX: (714) 897-1772 ♦ <http://www.dense-pac.com>