DENSE-PAC
MICROSYSTEMS

4 Megabit CMOS SRAM

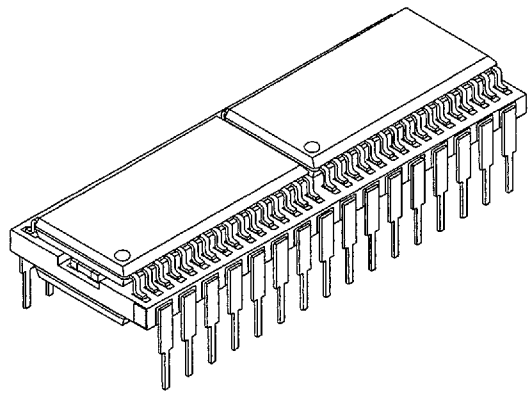
DPS512S8P/DPS512S8PL/DPS512S8PLL

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.



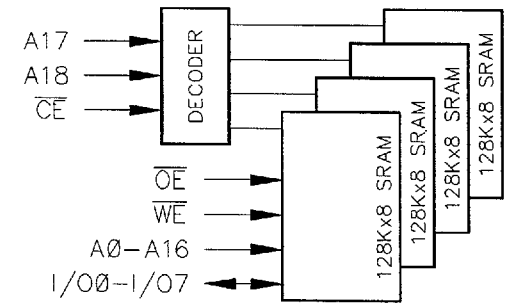
PIN NAMES	
A0 - A18	Address Inputs
I/O0 - I/O7	Data In/Out
$\overline{CE}$	Chip Enable
$\overline{WE}$	Write Enable
$\overline{OE}$	Output Enable
V_{DD}	Power (+5V)
V_{SS}	Ground

FEATURES:

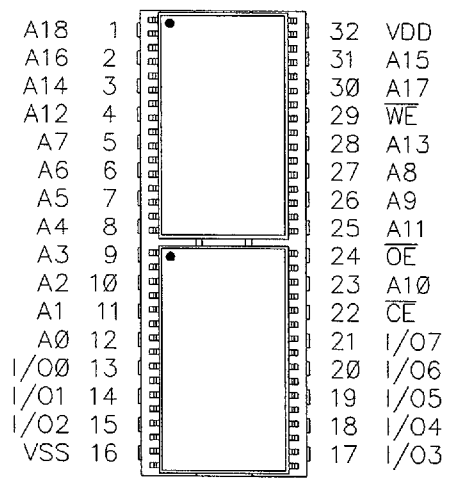
- 524, 288 by 8 Bit Configuration
- Access Times: 70*, 85, 100, 120, 150ns
- Low Power Dissipation:
  - 25 µW (typ.) Standby (DPS512S8PL/DPS512S8PLL)
  - 40 µW (typ.) Standby (DPS512S8P)
  - 375 mW (typ.) Operating
- 2-Volt Data Retention
- Fully Static Operation - No Clock or Refresh Required
- All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

* Available in Commercial only.

FUNCTIONAL BLOCK DIAGRAM



PIN-OUT DIAGRAM



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	+70	°C
		I	-40	+25	+85	

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	$V_{IN} \geq V_{DD}$ -0.2V or $V_{IN} \leq V_{SS}$ +0.2V, $\overline{CE} \geq V_{DD}$ -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.

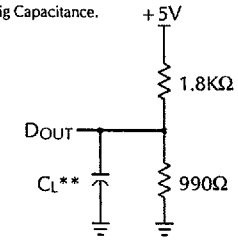
AC TEST CONDITIONS	
Input Pulse Levels	0V to 3.0V
Input Pulse Rise and Fall Times	5ns *
Input and Output Timing Reference Levels	1.5V

* 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.

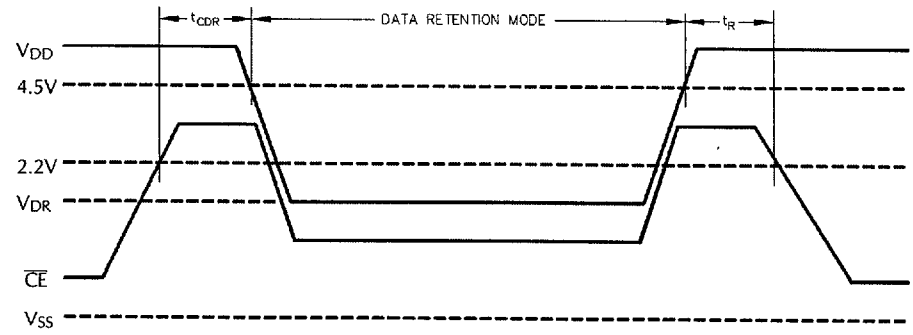


AC OPERATING CONDITIONS AND CHARACTERISTICS - READ CYCLE: Over operating ranges													
No.	Symbol	Parameter	70ns ††		85ns		100ns		120ns		150ns		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
1	t_{RC}	Read Cycle Time	70		85		100		120		150		ns
2	t_{AA}	Address Access Time		70		85		100		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

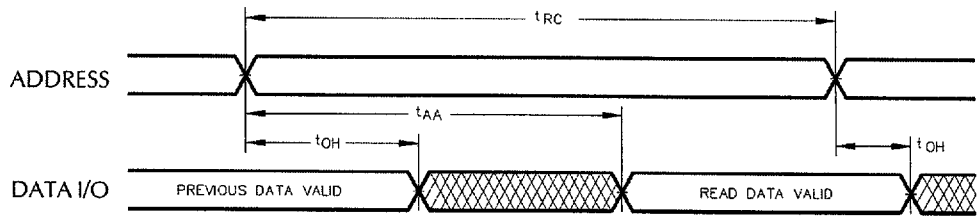
AC OPERATING CONDITIONS AND CHARACTERISTICS - WRITE CYCLE: Over operating ranges [7]													
No.	Symbol	Parameter	70ns ††		85ns		100ns		120ns		150ns		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
10	t_{WC}	Write Cycle Time	70		85		100		120		150		ns
11	t_{AW}	Address Valid to End of Write	65		80		90		105		115		ns
12	t_{CW}	Chip Enable to End of Write	65		80		90		105		115		ns
13	t_{DW}	Data to Write Time Overlap	35		35		35		40		50		ns
14	t_{DH}	Data Hold Time from Write Time	0		0		0		0		0		ns
15	t_{WP}	Write Pulse Width	55		55		65		75		85		ns
16	t_{AS}	Address Set-up Time ***	0		0		0		0		0		ns
17	t_{AH}	Address Hold Time	5		5		5		5		5		ns
18	t_{WHZ}	Write Enable to Output in HIGH-Z [4, 6]		30		30		30		35		40	ns
19	t_{WLZ}	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.

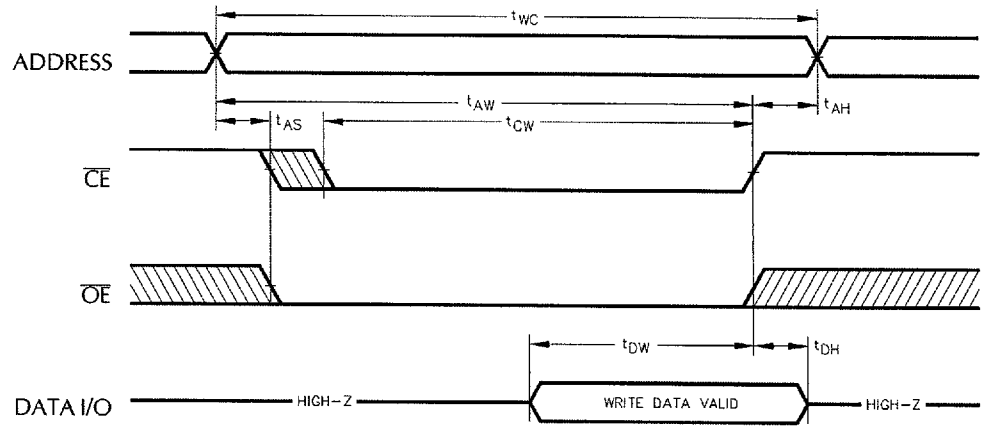
DATA RETENTION WAVEFORM



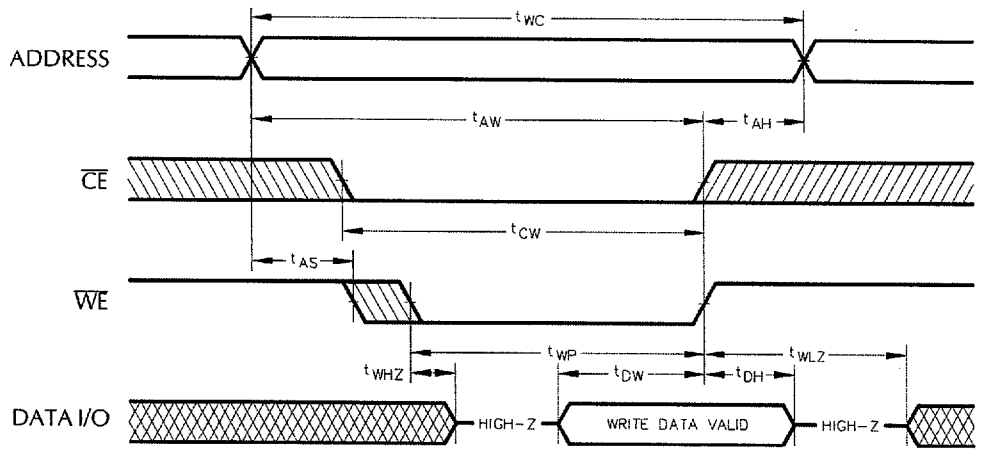
READ CYCLE 1: Address Controlled. $\overline{WE}$ is HIGH. $\overline{CE}$ and $\overline{OE}$ are LOW.



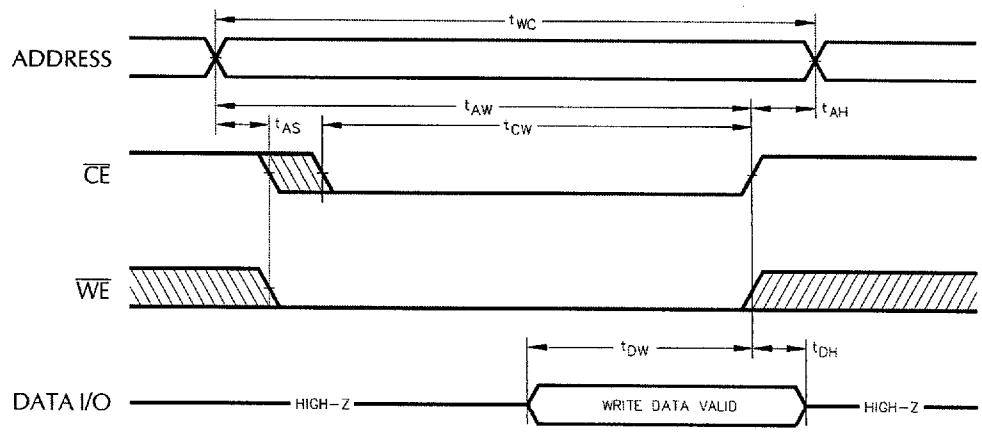
READ CYCLE 2: $\overline{CE}$ Controlled. $\overline{WE}$ is HIGH.



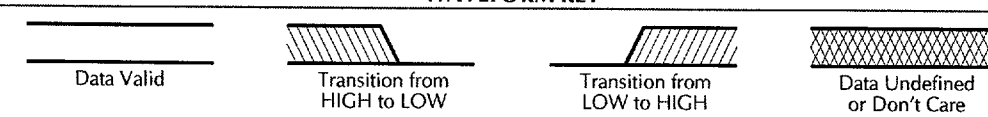
WRITE CYCLE 1: $\overline{WE}$ Controlled. $\overline{OE}$ is LOW.



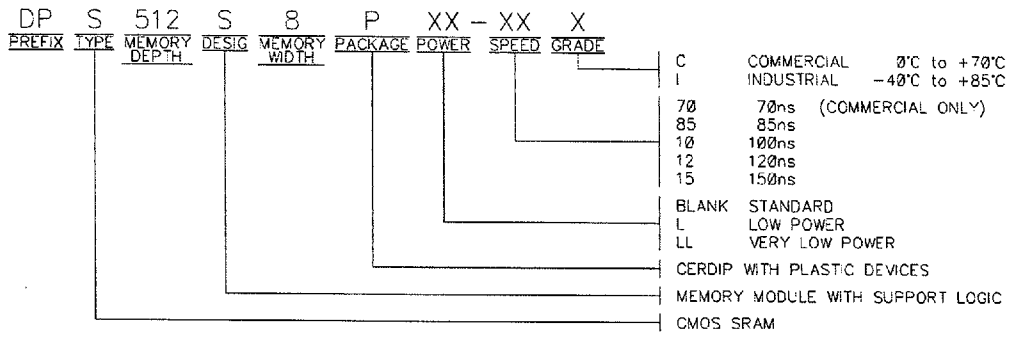
WRITE CYCLE 2: $\overline{CE}$ Controlled. $\overline{OE}$ is HIGH.



WAVEFORM KEY



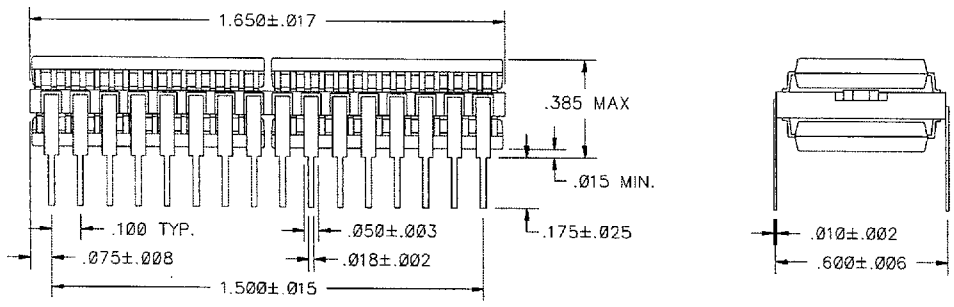
ORDERING INFORMATION



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 ±500mV from steady state voltage.
6. When $\overline{OE}$ and $\overline{CE}$ are LOW and $\overline{WE}$ 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 $\overline{WE}$ is LOW.

MECHANICAL DRAWING



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