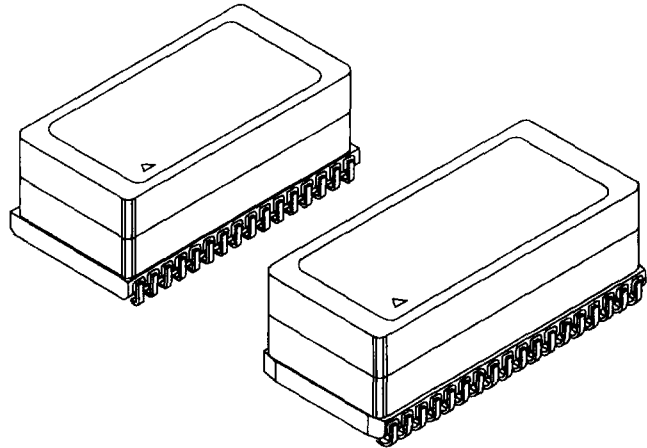


DESCRIPTION:

The DPS1MS8EJ4/EL4/RJ4/RL4 surface mount SRAM modules are a revolutionary memory subsystems using Dense-Pac Microsystems' new 2nd Generation Stacking Technology. The module combines eight Stackable Chip Carriers (SCC), each containing a 128Kx8 SRAM die, integrated into an encapsulated leaded substrate with decoder logic. The complete module assembly is fully upward compatible with the JEDEC Standard fast 512Kx8 SRAM monolithics in 32 pin or 36 pin, 400-mil wide surface mount packages. By using SCCs, the 2nd Generation Stack family of modules offers a higher board density of memory than available with conventional through-hole, surface mount, module, or hybrid techniques.



APPLICATION NOTE:

This device has internal solder connections that will reflow at temperatures above 231°C. This temperature should not be exceeded during initial soldering to the PCB, or during any removal process from the PCB.

FEATURES:

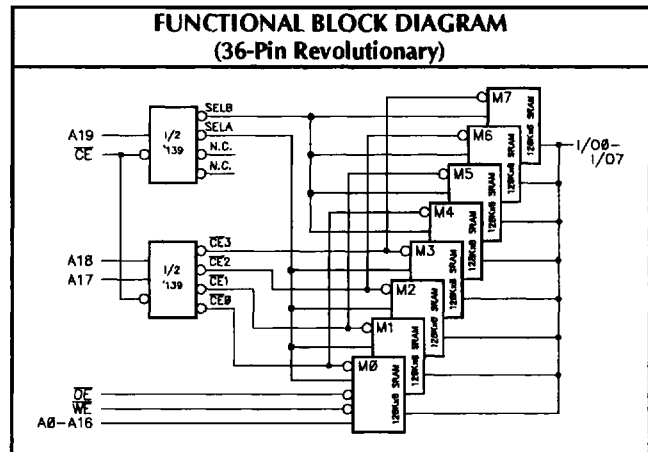
- Organization 1 Meg by 8 bit configuration
- Fast Access Times: 20*, 25, 30, 35, 45ns (max.)
- TTL Compatible Inputs and Outputs
- Common I/O with Three State Outputs
- Fully Static Operation - No Clock or Refresh
- Fully Compatible with 512Kx8 SRAM Monolithics
- 400 mil Surface Mount Packages
- Available Packages:
 - Evolutionary 32-Pin:
 - "J" Leaded Stack
 - "L" Leaded Stack
 - Revolutionary 36-Pin:
 - "J" Leaded Stack
 - "L" Leaded Stack

* Available in commercial temperature only.

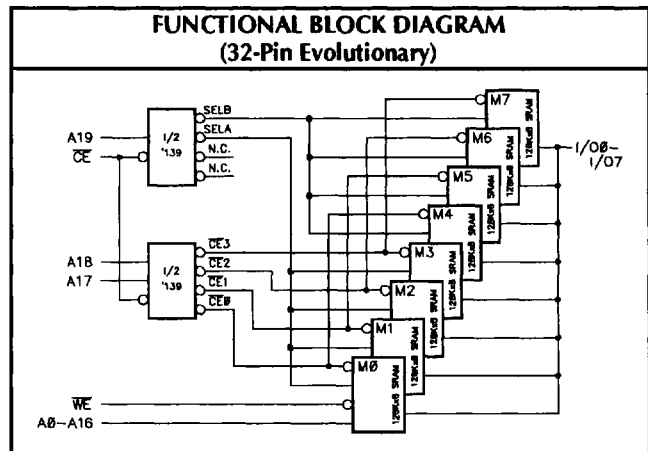
PIN NAMES	
AO - A19	Address Inputs
I/O0 - I/O7	Data Input/Output
CE	Chip Enable
WE	Write Enable
OE †	Output Enable
VDD	Power (+5V)
VSS	Ground
N.C.	No Connect

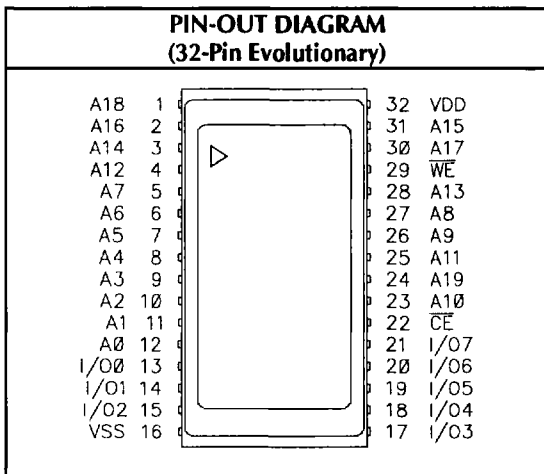
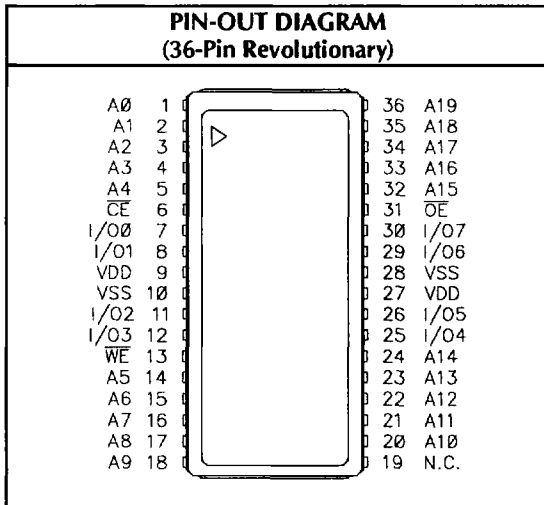
† DPS1MS8RJ4 and DPS1MS8RL4 only.

FUNCTIONAL BLOCK DIAGRAM (36-Pin Revolutionary)



FUNCTIONAL BLOCK DIAGRAM (32-Pin Evolutionary)





RECOMMENDED OPERATING RANGE¹

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
		CI	-40	+25	+85	

DC OUTPUT CHARACTERISTICS

Symbol	Parameter	Conditions	Min.	Max.	Unit
V _{IH}	HIGH Voltage	I _{OH} = -4.0mA	2.4	-	V
V _{IL}	LOW Voltage	I _{OL} = 8.0mA		0.4	V

ABSOLUTE MAXIMUM RATINGS³

Symbol	Parameter	Max.	Unit
T _{STC}	Storage Temperature	-65 to +150	°C
T _{BIAS}	Temperature Under Bias	-40 to +85	°C
V _{DD}	Supply Voltage ¹	-0.5 to +7.0	V
V _{ID}	Input/Output Voltage ¹	-0.5 to V _{DD} + 0.5	V

TRUTH TABLE

Mode	CE	WE	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

CAPACITANCE⁴: T_A = 25°C, F = 1.0MHz

Symbol	Parameter	Max.	Unit	Condition
C _{ADR}	Address Input	100	pF	V _{IN} = 0V
C _{CE}	Chip Enable	20		
C _{WE}	Write Enable	90		
C _{OE}	Output Enable	90		
C _{I/O}	Data Input/Output	100		

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}		-40	+40	-40	+40	µA
I _{OUT}	Output Leakage Current	V _{I/O} = 0V to V _{DD} , CE or OE + - V _{IH} , or WE = V _{IL}		-80	+80	-80	+80	µA
I _{CC}	Operating Supply Current	Cycle = min., Duty = 100%, I _{OUT} = 0mA	205		280		315	mA
I _{SB1}	Full Standby Supply Current	V _{IN} ≥ V _{DD} - 0.2V or V _{IN} ≤ V _{SS} + 0.2V, CE ≥ V _{DD} - 0.2, f = 0Hz	3.2		40		40	mA
I _{SB2}	Standby Current	CE = V _{IH} , V _{IN} = V _{IH} or V _{IN}	120		160		200	mA
V _{OL}	Output Low Voltage	I _{OUT} = 8.0mA			0.4		0.4	V
V _{OH}	Output High Voltage	I _{OUT} = -4.0mA		2.4		2.4		V

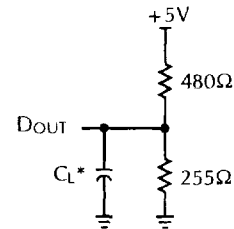
† Applicable to DPS1MS8RJ4 and DPS1MS8RL4 only.
‡ Not available in 20ns.

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.

Figure 1. Output Load

* Including Probe and Jig Capacitance.



Output Load		
Load	CL	Parameters Measured
1	100pF	except tLZ, tOLZ†, tHZ, tOHZ†, and tWHZ
2	5pF	tLZ, tOLZ†, tHZ, tOHZ†, and tWHZ

AC OPERATING CONDITIONS AND CHARACTERISTICS - READ CYCLE: Over operating ranges													
No.	Symbol	Parameter	20ns †		25ns		30ns		35ns		45ns		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
1	t _{RC}	Read Cycle Time	20		25		30		35		45		ns
2	t _{AA}	Address Access Time		20		25		30		35		45	ns
3	t _{CO}	Chip Enable to Output Valid		20		25		30		35		45	ns
4	t _{OE} †	Output Enable to Output Valid		5		6		8		10		12	ns
5	t _{LZ}	Chip Enable to Output in LOW-Z ^{4,5}	5		5		5		5		5		ns
6	t _{OLZ} †	Output Enable to Output in LOW-Z ^{4,5}	0		0		0		0		0		ns
7	t _{HZ}	Chip Enable to Output in HIGH-Z ^{4,5}		12		13		15		20		25	ns
8	t _{OHZ} †	Output Enable to Output in HIGH-Z ^{4,5}		5		6		10		12		12	ns
9	t _{OH}	Output Hold from Address Change	5		5		5		5		5		ns

† Applicable to DPS1MS8RJ4 and DPS1MS8RL4 only.

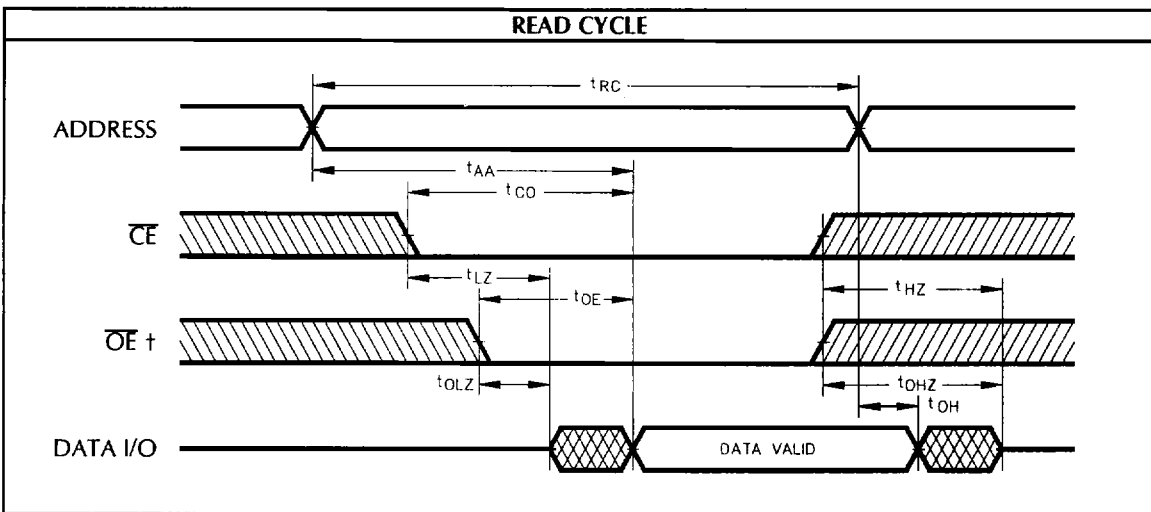
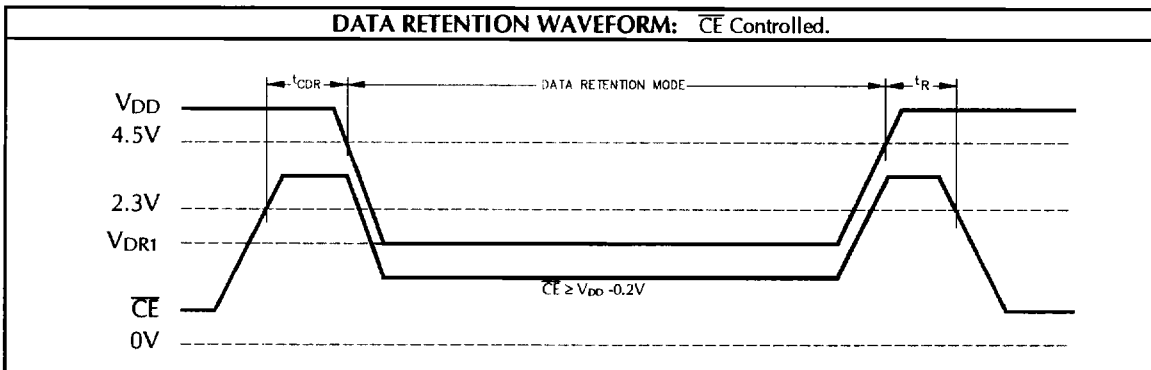
AC OPERATING CONDITIONS AND CHARACTERISTICS - WRITE CYCLE: Over operating ranges ^{6,7}													
No.	Symbol	Parameter	20ns †		25ns		30ns		35ns		45ns		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
10	t _{WC}	Write Cycle Time	20		25		30		35		45		ns
11	t _{AW}	Address Valid to End of Write	17		20		20		25		30		ns
12	t _{CW}	Chip Enable to End of Write	17		20		20		25		30		ns
13	t _{AS}	Address Set-up Time ***	0		0		0		0		0		ns
14	t _{WP}	Write Pulse Width	15		15		20		20		25		ns
15	t _{WR}	Write Recovery Time	5		5		5		5		5		ns
16	t _{WHZ}	Write Enable to Output in HIGH-Z ^{4,5}		7		8		10		12		15	ns
17	t _{DW}	Data to Write Time Overlap	7		8		10		12		15		ns
18	t _{DH}	Data Hold Time from Write Time	5		5		5		5		5		ns
19	t _{OW}	Output Active from End of Write	5		5		5		5		5		ns

† Available in commercial only.

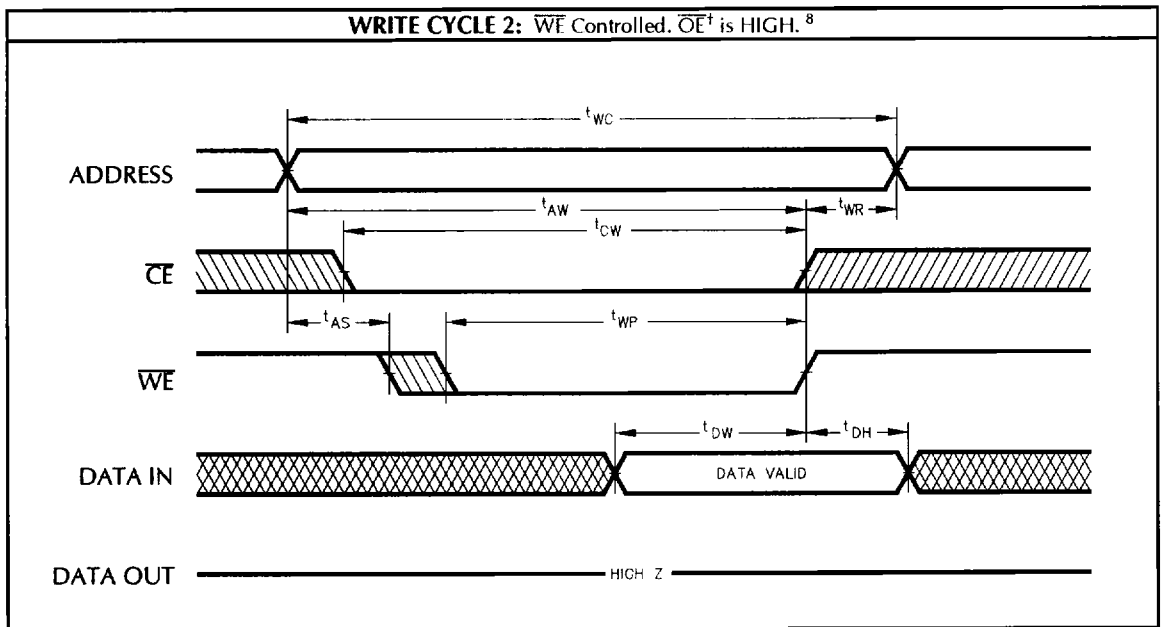
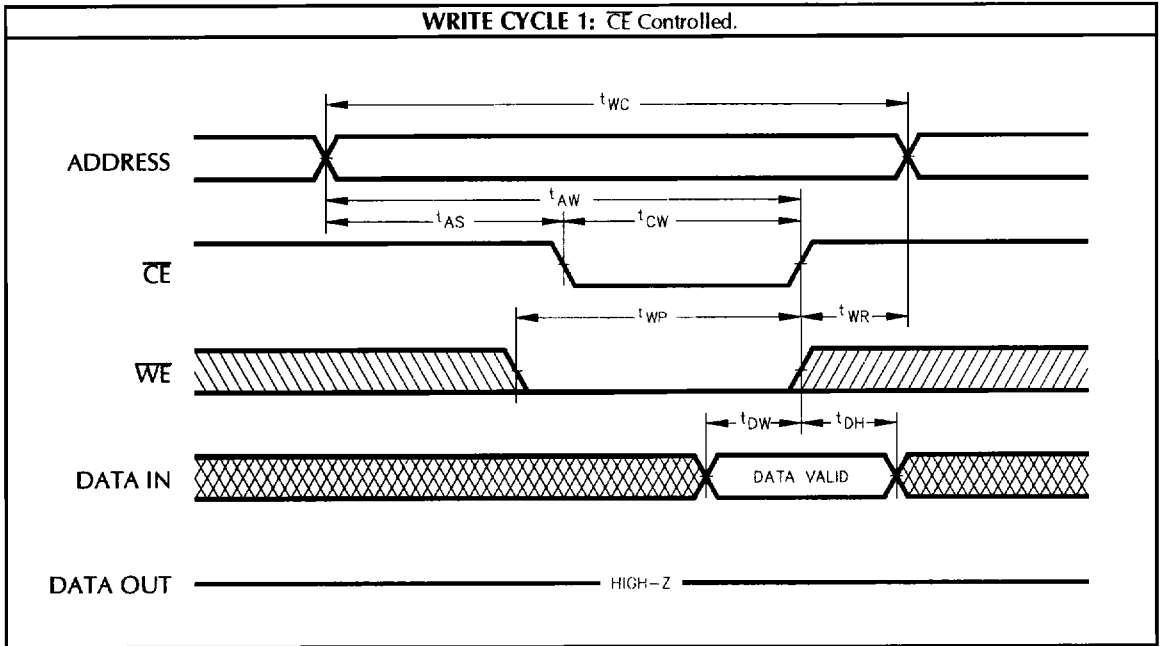
*** Valid for both Read and Write Cycles.

DATA RETENTION CHARACTERISTICS								
Symbol	Parameter	Test Condition	Typ.	Commercial		Industrial †		Unit
				Min.	Max.	Min.	Max.	
V _{DR}	Data Retention Voltage	CE ≥ V _{DR} - 0.2V, V _{IN} ≥ V _{DR} - 0.2V or V _{IN} ≤ +0.2V		2.0	5.5	2.0	5.5	V
I _{CCDR2}	Data Retention Supply Current	V _{DR} = 2.0V	0.28		2.0		3.2	mA
I _{CCDR3}	Data Retention Supply Current	V _{DR} = 3.0V	0.56		3.6		4.8	mA
t _{CDR}	Chip Disable to Data Retention Time			0		0		ns
t _R	Recovery Time	t _{RC} = Read Cycle Timing		5		5		ms

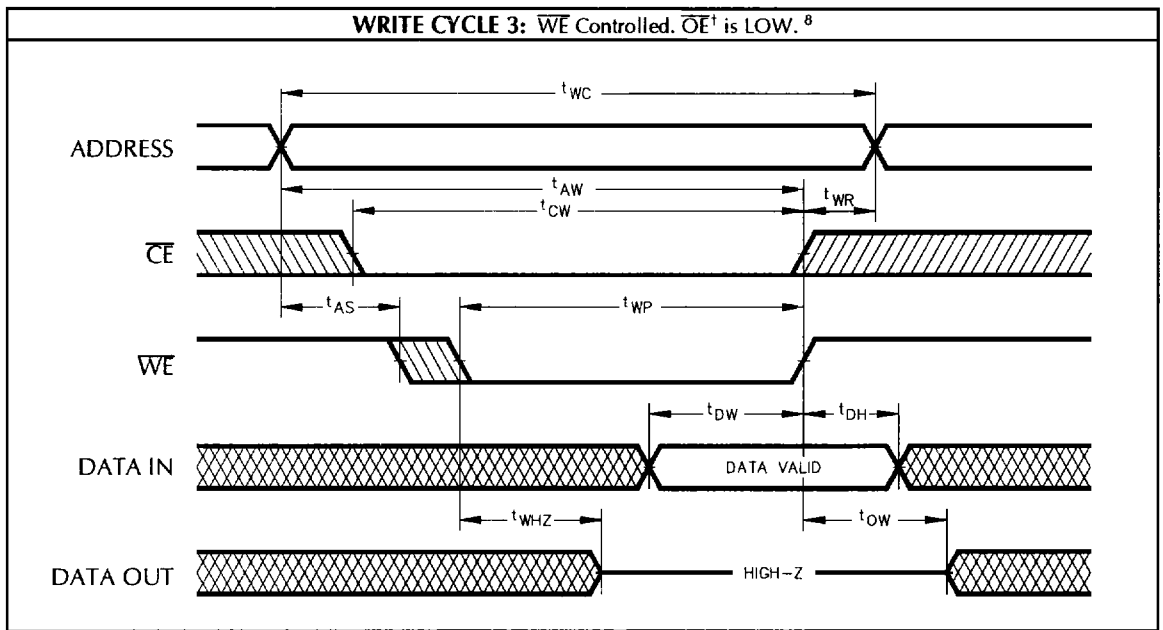
† Not available in 20ns.



† DPS1MS8RJ4 and DPS1MS8RL4 only.



[†] DPS1MS8RJ4 and DPS1MS8RL4 only.



[†] \overline{OE} is internally tied LOW on DPS1MS8RJ4 and DPS1MS8RL4.

NOTES:

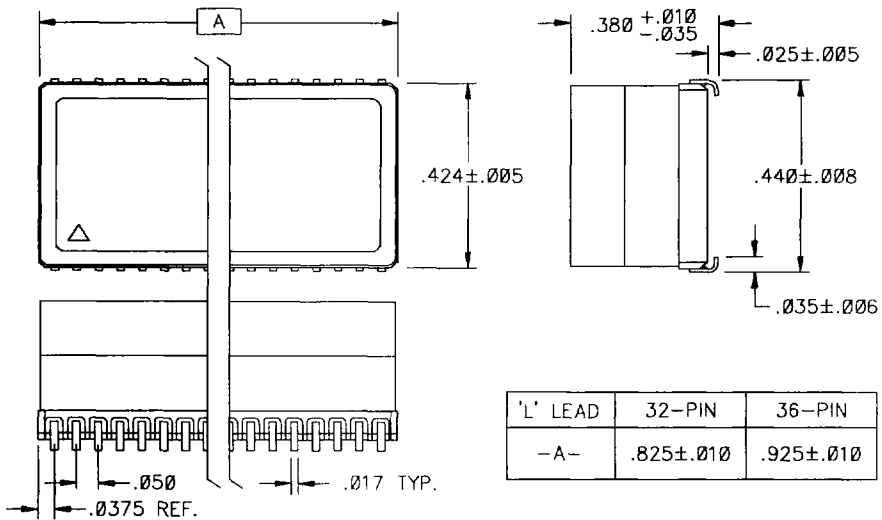
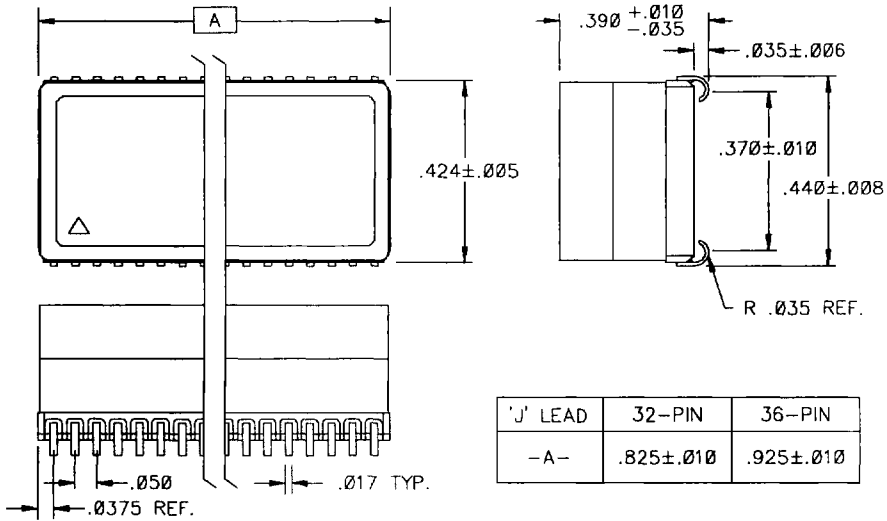
1. All voltages are with respect to V_{SS} .
2. -2.0V min. for pulse width less than 20ns (V_{IL} min. = -0.5V at DC level).
3. Stresses greater than those under **ABSOLUTE MAXIMUM RATINGS** may cause permanent damage to the device. This is a stress rating only and functional operation of the device 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 $\pm 500mV$ 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.
8. Chip Enable and Write Enable can initiate and terminate WRITE Cycle.

ORDERING INFORMATION

DP S 1M S 8 X X4 -- XX XX
 PREFIX TYPE MEMORY DEPTH DESIG MEMORY WIDTH DESIG. PACKAGE SPEED GRADE

- CI COMMERCIAL PROCESSED at INDUSTRIAL TEMP. -40°C to +85°C
- C COMMERCIAL 0°C to +70°C
- 20 20ns (COMMERCIAL ONLY)
- 25 25ns
- 30 30ns
- 35 35ns
- 45 45ns
- J4 'J' LEADED/2nd GENERATION STACK
- L4 'L' LEADED/2nd GENERATION STACK
- E 32-PIN EVOLUTIONARY PIN-OUT
- R 36-PIN REVOLUTIONARY PIN-OUT
- S MODULE WITH SUPPORT LOGIC
- CMOS SRAM

MECHANICAL DRAWING



Dense-Pac Microsystems, Inc.

7321 Lincoln Way ♦ Garden Grove, California 92641-1428
 (714) 898-0007 ♦ (800) 642-4477 (Outside CA) ♦ FAX: (714) 897-1772