

MSM51257LRS/JS

32,768-WORD x 8-BIT CMOS STATIC RAM

Preliminary

GENERAL DESCRIPTION

The MSM51257LRS/JS is a 32768-word by 8-bit CMOS static RAM featuring 5V power supply operation and direct TTL input/output compatibility. Since the circuitry is completely static, external clock and refreshing operations are unnecessary, making this device very easy to use. The MSM51257LRS/JS is also a CMOS silicon gate device which requires very low power during standby (standby current of 100 μ A) when there is no chip selection.

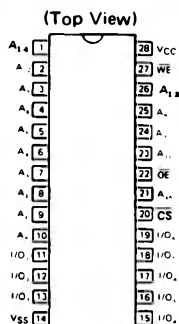
$\overline{CS}$ and $\overline{OE}$ signals enable OR ties with the output terminals of other chips, thereby facilitating simple memory expansion and bus line control etc.

FEATURES

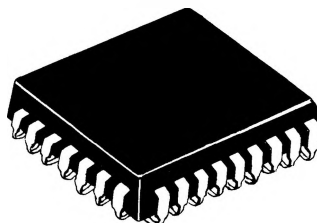
- Single 5V Supply
- 0 $^{\circ}$ C ~ 70 $^{\circ}$ C
- Low Power Dissipation
 - Standby: 0.55 mW MAX
 - Operation: 385 mW MAX
- High Speed (Equal Access and Cycle Time)
 - 85-120 ns MAX
- Direct TTL Compatible. (Input and Output)
- 3-State Output
- 28-pin DIP PKG
- 32-pin PLCC



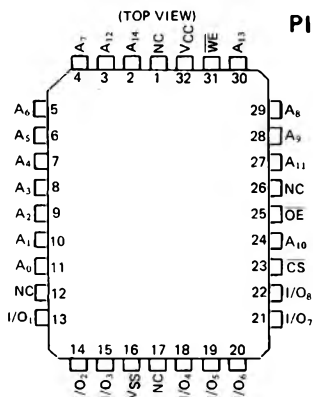
PIN CONFIGURATION



$A_0 \sim A_{14}$: Address INPUTS
 $I/O_1 \sim I/O_8$: Data INPUT/OUTPUT
 $\overline{CS}$: Chip Select
 $\overline{WE}$: Write Enable
 $\overline{OE}$: Output Enable
 V_{CC}, V_{SS} : Supply Voltage

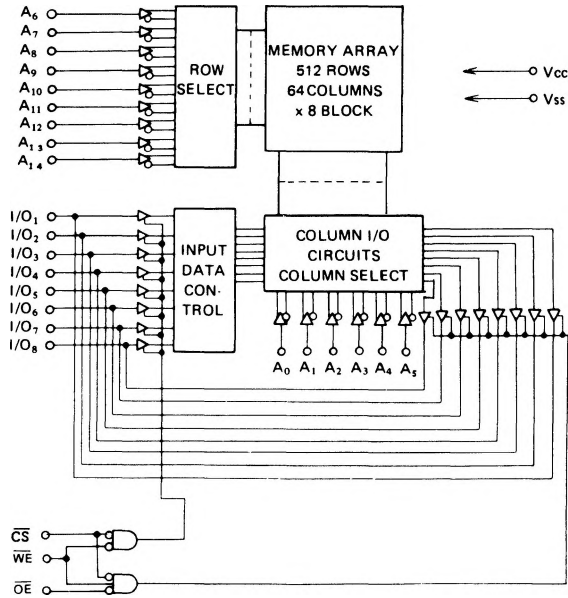


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FUNCTIONAL BLOCK DIAGRAM



TRUTH TABLE

Mode	CS	WE	OE	I/O Operation
Standby	H	X	X	High Z
Read	L	H	H	High Z
	L	H	L	D _{OUT}
Write	L	L	X	D _{IN}

X : H or L

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit	Conditions
Supply Voltage	V _{CC}	-0.3 to 7.0	V	Respect to GND
Input Voltage	V _{IN}	-0.3 to V _{CC} + 0.3	V	
Operating Temperature	T _{opr}	0 to 70	°C	
Storage Temperature	T _{stg}	-55 to 150	°C	
Power Dissipation	P _D	1.0	W	T _a = 25°C

RECOMMENDED OPERATING CONDITION

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply Voltage	V _{CC}	4.5	5	5.5	V	5V ± 10%
	V _{SS}		0		V	
Data Retention Voltage	V _{ccH}	2	5	5.5	V	
Input Voltage	V _{IH}	2.2		V _{CC} + 0.3	V	5V ± 10%
	V _{IL}	-0.3		0.8	V	
Output Load	C _L			100	pF	
	TTL			1		

DC CHARACTERISTICS

($V_{CC} = 5V \pm 10\%$, $T_a = 0^\circ C$ to $+70^\circ C$)

Parameter	Symbol	MSM51257			Unit	Test Condition
		Min.	Typ.	Max.		
Input Leakage Current	I_{LI}	-1		1	μA	$V_{IN} = 0$ to V_{CC}
Output Leakage Current	I_{LO}	-1		1	μA	$\overline{CS} = V_{IH}$ or $\overline{OE} = V_{IH}$ $V_{I/O} = 0$ to V_{CC}
Output Voltage	V_{OH}	2.4			V	$I_{OH} = -1$ mA
	V_{OL}			0.4	V	$I_{OL} = 2.1$ mA
Standby Supply Current	I_{CCS}		2	100	μA	$\overline{CS} \geq V_{CC} - 0.2V$ $V_{IN} = 0$ to V_{CC}
	I_{CCS1}			3	mA	$\overline{CS} = V_{IH}$
Operating Supply Current	I_{CCA}			70	mA	MIN CYCLE

AC CHARACTERISTICS

Test Condition

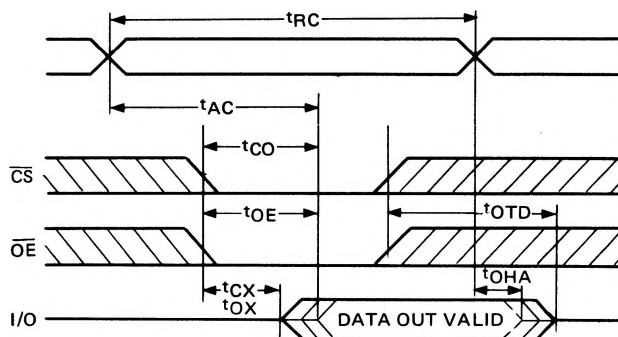
Parameter	Conditions
Input Pulse Level	$V_{IH} = 2.4V$, $V_{IL} = 0.6V$
Input Rise and Fall Times	5ns
Input and Output Timing Reference Level	1.5V
Output Load	$C_L = 100$ pF, 1 TTL Gate

READ CYCLE

($V_{CC} = 5V \pm 10\%$, $T_a = 0^\circ C$ to $70^\circ C$)

Parameter	Symbol	MSM51257L-85		MSM51257L-10		MSM51257L-12		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Read Cycle Time	t_{RC}	85		100		120		ns
Address Access Time	t_{AC}		85		100		120	ns
Chip Enable Access Time	t_{CO}		85		100		120	ns
Output Enable to Output Valid	t_{OE}		45		50		60	ns
Chip Selection to Output Active	t_{CX}	10		10		10		ns
Output Hold Time From Address Change	t_{OHA}	5		10		10		ns
Output 3-state from Deselection	t_{OTD}	0	30	0	35	0	40	ns
Output Enable to Output Active	t_{OX}	5		5		5		ns

READ CYCLE



- Notes:**
1. A Read occurs during the overlap of a low $\overline{CS}$, a low $\overline{OE}$ and a high $\overline{WE}$.
 2. t_{CX} is specified from $\overline{CS}$ or $\overline{OE}$, whichever occurs last.
 3. t_{ODT} is specified from $\overline{CS}$ or $\overline{OE}$, whichever occurs first.
 4. t_{OHA} and t_{OTD} are specified by the time when DATA OUT is floating.

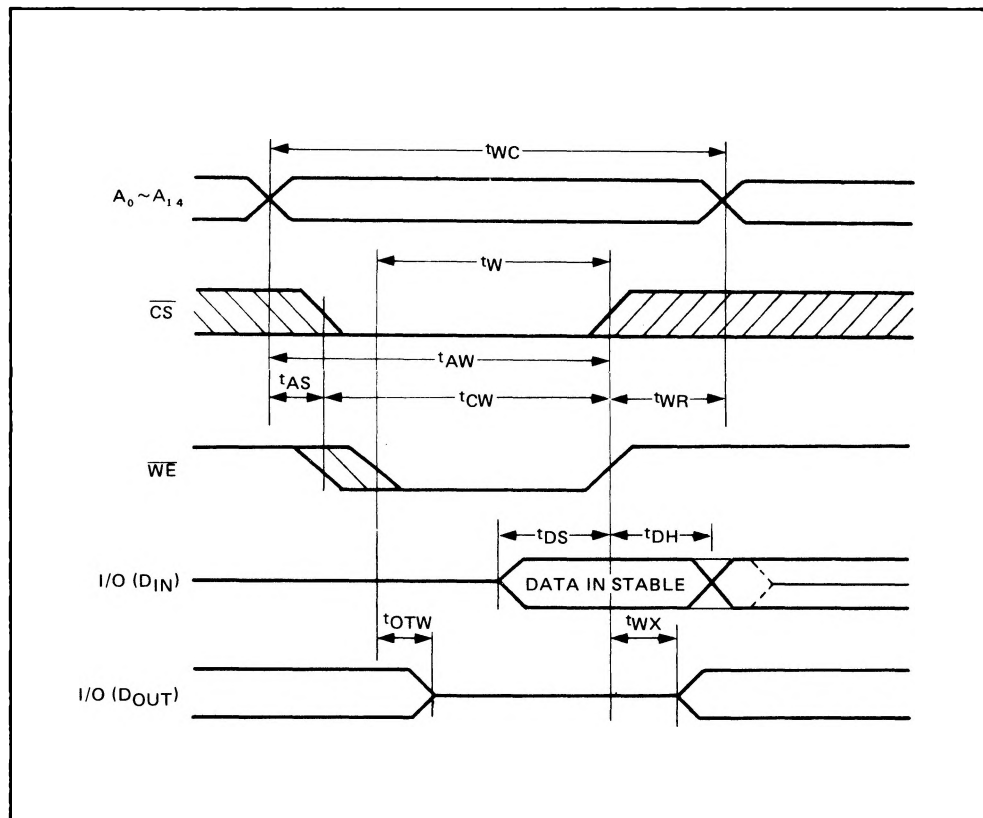
WRITE CYCLE

($V_{CC} = 5V \pm 10\%$, $T_a = 0^\circ C$ to $+70^\circ C$)

Item	Symbol	MSM51257L-85		MSM51257L-10		MSM51257L-12		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Write Cycle Time	t_{WC}	85		100		120		ns
Address to Write Setup Time	t_{AS}	0		0		0		ns
Write Time	t_W	65		75		90		ns
Write Recovery Time	t_{WR}	5		10		10		ns
Data Setup Time	t_{DS}	35		40		50		ns
Data Hold from Write Time	t_{DH}	0		0		0		ns
Output 3-State from Write	t_{OTW}	0	30	0	35	0	40	ns
Chip Selection to End of Write	t_{CW}	75		90		100		ns
Address Valid to End of Write	t_{AW}	75		90		100		ns
Output Active from End of Write	t_{WX}	5		5		15		ns

- Notes:**
1. A Write Cycle occurs during the overlap of a low $\overline{CS}$, and a low $\overline{WE}$.
 2. $\overline{OE}$ may be both high and low in a Write Cycle.
 3. t_{AS} is specified from $\overline{CS}$ or $\overline{WE}$, whichever occurs last.
 4. t_W is an overlap time of a low $\overline{CS}$, and a low $\overline{WE}$.
 5. t_{WR} , t_{DS} and t_{DH} are specified from $\overline{CS}$ or $\overline{WE}$, whichever occurs first.
 6. t_{OTW} is specified by the time when DATA OUT is floating, not defined by output level.
 7. When I/O pins are Data output mode, don't force inverse signal to those pins.

WRITE CYCLE

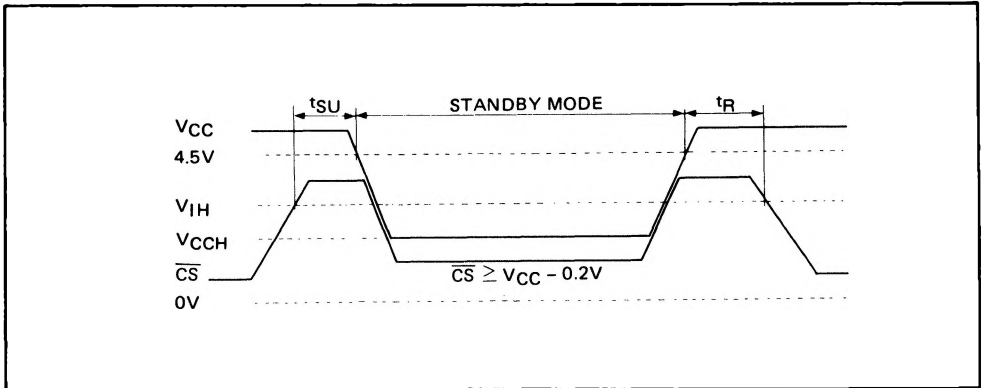


LOW V_{CC} DATA RETENTION CHARACTERISTICS

(T_a = 0°C to +70°C, unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
V _{CC} for Data Retention	V _{CCH}	2			V	$\overline{CS} \geq V_{CC} - 0.2V$
Data Retention Current	I _{CCH}		1	50	μA	V _{CC} = 3V, $\overline{CS} \geq V_{CC} - 0.2V$
CS to Data Retention Time	t _{SU}	0			ns	
Operation Recovery Time	t _R	t _{RC}			ns	

CS CONTROL



CAPACITANCE

($T_a = 25^\circ\text{C}$, $f = 1\text{MHz}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Input/Output Capacitance	$C_{I/O}$			8	pF
Input Capacitance	C_{IN}			6	pF

Note: This parameter is periodically sampled and not 100% tested.