



512K x 8 SRAM MODULE

SYS8512FKX-70/85/100/12

Issue 5.0: November 1999

Description

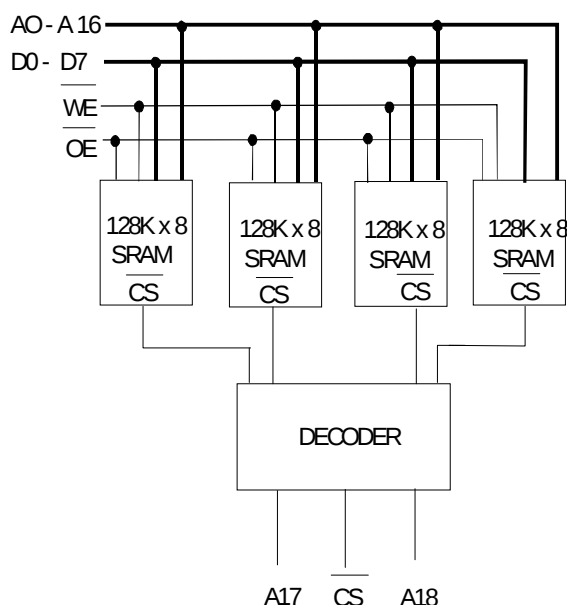
The SYS8512FKX is plastic 4M Static RAM Module housed in a standard 32 pin Dual-In-Line package organised as 512K x 8. The module utilises fast SRAMs housed in TSOP packages, and uses double sided surface mount techniques, buried decoder and dual board construction to achieve a very high density module.

The module has Chip Select, Write Enable and Output Enable control inputs; the Output Enable pin allows faster access times than address access during a Read Cycle.

Features

- Access Times of 70/85/100/120 ns.
- Low seated height
- 32 Pin 0.6" Dual-In-Line package with JEDEC compatible pinout.
- 5 Volt Supply $\pm 10\%$.
- Low Power Dissipation:
Average (min cycle) 605mW (maximum).
Standby (CMOS) 44mW (maximum).
- Completely Static Operation.
- Equal Access and Cycle Times.
- All Inputs and Outputs Directly TTL Compatible.
- On-board Supply Decoupling Capacitors.

Block Diagram



Pin Definition

A18	1	32	VCC
A16	2	31	A15
A14	3	30	A17
A12	4	29	WE
A7	5	28	A13
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	OE
A2	10	23	A10
A1	11	22	CS
A0	12	21	D7
D0	13	20	D6
D1	14	19	D5
D2	15	18	D4
GND	16	17	D3

Pin Functions

Address Inputs	A0 - A18
Data Input/Output	D0 - D7
Chip Select Input	CS
Read/Write Input	WE
Output Enable Input	OE
Power (+5V)	V_{CC}
Ground	GND

DC OPERATING CONDITIONS**Absolute Maximum Ratings** ⁽¹⁾

<i>Parameter</i>	<i>Symbol</i>	<i>min</i>	<i>typ</i>	<i>max</i>	<i>unit</i>
Voltage on any pin relative to V_{SS}	V_T	-0.3V	-	+7	V
Power Dissipation	P_T	-	1	-	W
Storage Temperature	T_{STG}	-55	-	+150	°C

Notes :

(1) Stresses above those listed may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those 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 device reliability.

(2) V_I can be -3.5V pulse of less than 20ns.

Recommended Operating Conditions

<i>Parameter</i>	<i>Symbol</i>	<i>min</i>	<i>typ</i>	<i>max</i>	<i>unit</i>
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
Input High Voltage	V_{IH}	2.2	-	$V_{CC} + 0.3$	V
Input Low Voltage	V_{IL}	-0.3	-	0.8	V
Operating Temperature	T_A	0	-	70	°C
	T_{AI}	-40	-	85	°C (I)

DC Electrical Characteristics ($V_{CC}=5V\pm10\%$) T_A 0 to 70°C

<i>Parameter</i>	<i>Symbol</i>	<i>Test Condition</i>	<i>min</i>	<i>typ</i> ⁽²⁾	<i>max</i>	<i>Unit</i>
I/P Leakage Current A0~A16, OE	I_{LI1}	$0V - V_{IN} - V_{CC}$	-	-	±8	μA
Output Leakage Current D0~D7	I_{LO}	$\overline{CS} = V_{IH}, V_{IO} = GND \text{ to } V_{CC}$	-	-	±8	μA
Operating Supply Current	I_{CC}	$\overline{CS} = V_{IL}, I_{IO} = 0mA, V_{IL} - V_{IN} - V_{CC} - 2.1V$	-	16	45	mA
Average Supply Current TTL levels	I_{CC1}	Min. Cycle, $\overline{CS} = V_{IL}, V_{IN} = V_{IL}/V_{CC} - 2.1V$	-	70	110	mA
CMOS levels	I_{CC2}	Min. Cycle, $\overline{CS} - 0.2V, V_{IN} = 0.2V/V_{CC} - 0.2V$	-	24	40	mA
Standby Supply Current TTL levels	I_{SB}	$\overline{CS}, A17-A18 = V_{CC} - 2.1V, V_{IL} - V_{IN} - V_{CC} - 2.1V$	-	5	12	mA
CMOS levels	I_{SB1}	$\overline{CS}, A17-A18 = V_{CC} - 0.2V, 0.2 - V_{IN} - V_{CC} - 0.2V$	-	0.2	8	mA
-L Part	I_{SB2}	As above	-	10	500	μA
Output Voltage	V_{OL}	$I_{OL} = 2.1mA$	-	-	0.4	V
	V_{OH}	$I_{OH} = -1.0mA$	2.4	-	-	V

Typical values are at $V_{CC}=5.0V, T_A=25^\circ C$ and specified loading.

Capacitance ($V_{CC}=5V\pm10\%$, $T_A=25^\circ C$)

Note: Capacitance calculated, not measured.

Parameter	Symbol	Test Condition	max	Unit
Input Capacitance ($\overline{CS}$, A17, A18)	C_{IN1}	$V_{IN} = 0V$	10	pF
I/P Capacitance (other)	C_{IN2}	$V_{IN} = 0V$	40	pF
I/O Capacitance	$C_{I/O}$	$V_{I/O} = 0V$	40	pF

Operation Truth Table

$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	DATA PINS	SUPPLY CURRENT	MODE
H	X	X	High Impedance	I_{SB1}, I_{SB2}	Standby
L	L	H	Data Out	I_{CC1}, I_{CC2}	Read
L	L	L	Data In	I_{CC1}, I_{CC2}	Write
L	H	L	Data In	I_{CC1}, I_{CC2}	Write

Notes : H = V_{IH} : L = V_{IL} : X = V_{IH} or V_{IL} **Low V_{CC} Data Retention Characteristics - L Version Only***-L Part*

Parameter	Symbol	Test Condition	min	typ ⁽¹⁾	max
V_{CC} for Data Retention	V_{DR}	$\overline{CS} - V_{CC} - 0.2V$	2.0	-	-
Data Retention Current		$V_{CC} = 3.0V, \overline{CS} = V_{CC} - 0.2V$			
	I_{CCDR2}	$T_{OP} = 0C \text{ to } 70C$	-	9	230
	I_{CCDR3}	$T_{OP} = T_{AI}$	-	-	310
Chip Deselect to					
Data Retention Time	t_{CDR}	See Retention Waveform	0	-	-
Operation Recovery Time	t_R	See Retention Waveform	5	-	-

Notes (1) Typical figures are measured at $25^\circ C$.

(2) This parameter is guaranteed not tested.

AC Test Conditions**Output Load**

- * Input pulse levels: 0V to 3.0V
- * Input rise and fall times: 5ns
- * Input and Output timing reference levels: 1.5V
- * Output load: see diagram
- * $V_{CC}=5V\pm10\%$

AC OPERATING CONDITIONS**Read Cycle**

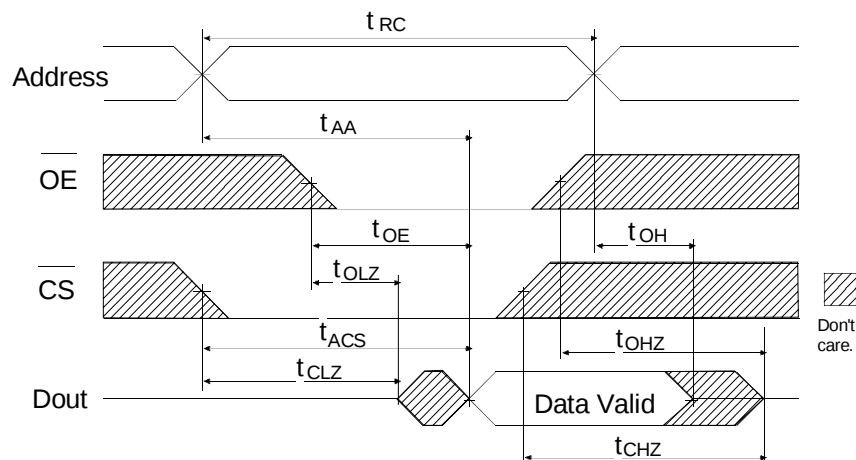
<i>Parameter</i>	<i>Symbol</i>	<i>-70</i>		<i>-85</i>		<i>-10</i>		<i>-12</i>		<i>Unit</i>
		<i>min</i>	<i>max</i>	<i>min</i>	<i>max</i>	<i>min</i>	<i>max</i>	<i>min</i>	<i>max</i>	
Read Cycle Time	t_{RC}	70	-	85	-	100	-	120	-	ns
Address Access Time	t_{AA}	-	70	-	85	-	100	-	120	ns
Chip Select Access Time	t_{ACS}	-	70	-	85	-	100	-	120	ns
Output Enable to Output Valid	t_{OE}	-	50	-	55	-	60	-	70	ns
Output Hold from Address Change	t_{OH}	10	-	10	-	10	-	10	-	ns
Chip Selection to Output in Low Z	t_{CLZ}	10	-	10	-	10	-	10	-	ns
Output Enable to Output in Low Z	t_{OLZ}	5	-	5	-	5	-	5	-	ns
Chip Deselection to O/P in High Z	t_{CHZ}	0	25	0	30	0	35	0	45	ns
Output Disable to Output in High Z	t_{OHZ}	0	25	0	30	0	35	0	45	ns

Notes. (1) t_{HZ} and t_{OHZ} are defined as the time at which the outputs achieve open circuit conditions and are not referenced to output voltage levels. These parameters are sampled and not 100% tested.

Write Cycle

<i>Parameter</i>	<i>Sym</i>	<i>-70</i>		<i>-85</i>		<i>-10</i>		<i>-12</i>		<i>Unit</i>
		<i>min</i>	<i>max</i>	<i>min</i>	<i>max</i>	<i>min</i>	<i>max</i>	<i>min</i>	<i>max</i>	
Write Cycle Time	t_{WC}	70	-	85	-	100	-	120	-	ns
Chip Selection to End of Write	t_{CW}	60	-	80	-	90	-	100	-	ns
Address Valid to End of Write	t_{AW}	60	-	80	-	90	-	100	-	ns
Address Setup Time	t_{AS}	0	-	0	-	0	-	0	-	ns
Write Pulse Width	t_{WP}	55	-	65	-	75	-	85	-	ns
Write Recovery Time	t_{WR}	5	-	5	-	10	-	10	-	ns
Write to Output in High Z	$t_{WHZ}^{(11)}$	0	25	0	30	0	35	0	40	ns
Data to Write Time Overlap	t_{DW}	30	-	35	-	40	-	45	-	ns
Data Hold from Write Time	t_{DH}	0	-	0	-	0	-	0	-	ns
Output active from end of write	$t_{OW}^{(10)}$	5	-	5	-	5	-	5	-	ns

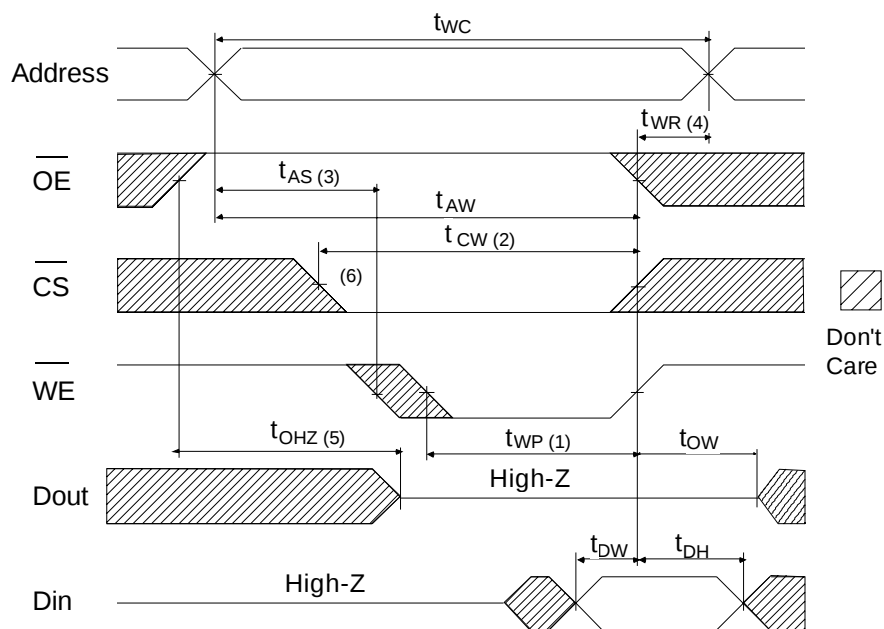
Read Cycle Timing Waveform ^(1,2)



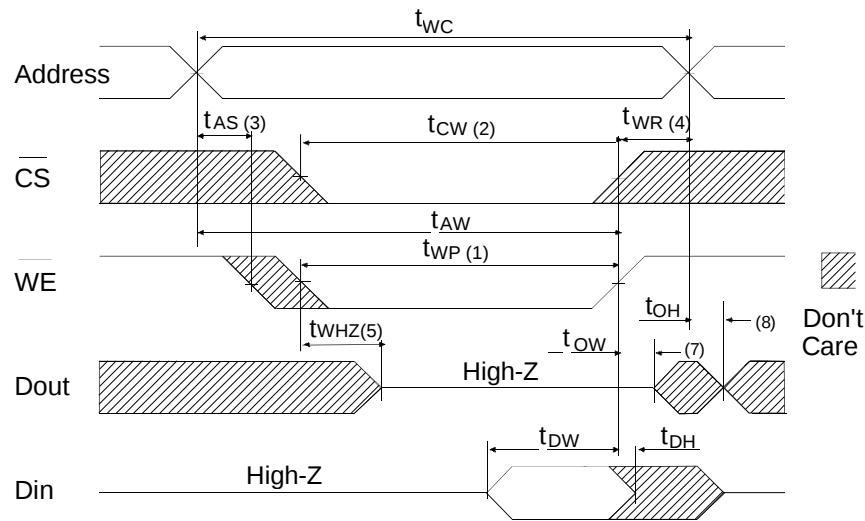
Notes (1) WE is High for Read Cycle.

(2) t_{HZ} and t_{OHZ} are defined as the time at which the outputs achieve open circuit conditions and are not referenced to output voltage levels. These parameters are sampled and not 100% tested.

Write Cycle No.1 Timing Waveform



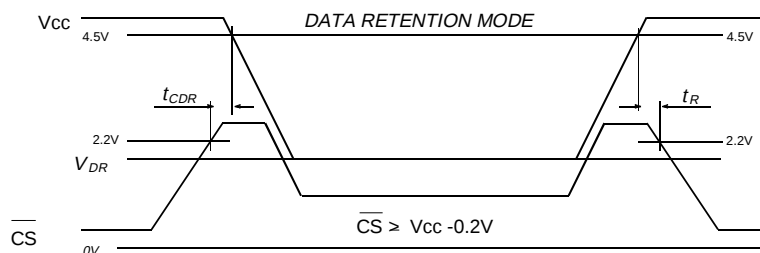
Write Cycle No.2 Timing Waveform



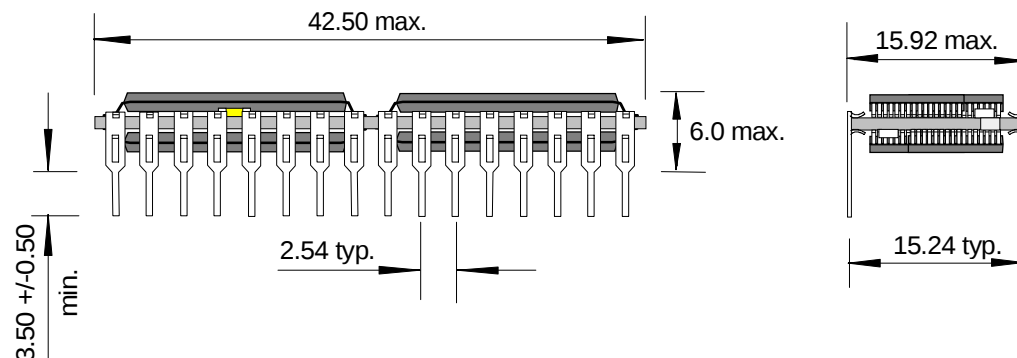
AC Characteristics Notes

- (1) A write occurs during the overlap (t_{WP}) of a low $\overline{CS}$ and a low $\overline{WE}$.
- (2) t_{CW} is measured from the earlier of $\overline{CS}$ or $\overline{WE}$ going high to the end of write cycle.
- (3) t_{AS} is measured from the address valid to the beginning of write.
- (4) t_{WR} is measured from the earliest of $\overline{CS}$ or $\overline{WE}$ going high to the end of write.
- (5) During this period, I/O pins are in the output state. Input signals out of phase must not be applied.
- (6) If $\overline{CS}$ goes low simultaneously with $\overline{WE}$ going low or after $\overline{WE}$ going low, outputs remain in a high impedance state.
- (7) D_{OUT} is in the same phase as written data of this write cycle.
- (8) D_{OUT} is the read data of next address.
- (9) If $\overline{CS}$ is low during this period, I/O pins are in the output state, and inputs out of phase must not be applied to I/O pins.
- (10) This parameter is sampled and not 100% tested.
- (11) t_{WHZ} is defined as the time at which the outputs achieve open circuit conditions and is not referenced to output voltage levels. This parameter is sampled and not 100% tested.

Data Retention Waveform



Package Information



Dimensions in mm

Ordering Information

SYS8512FKXLI-10

Speed	70 = 70 ns 85 = 85 ns 10 = 100 ns 12 = 120 ns
Temperature Range	Blank = Commercial Temperature I = Industrial Temperature
Power Consumption	Blank = Standard Part L = Low Power Part
Package	FKX = Plastic 32 pin DIL
Organization	8512 = 512K x 8
Memory Type	SYS = Static RAM

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