

SOJ, TSOP
Commercial Temp
Industrial Temp

1M x 4

4Mb Asynchronous SRAM

8, 10, 12, 15ns
3.3V V_{DD}
Center V_{DD} & V_{SS}

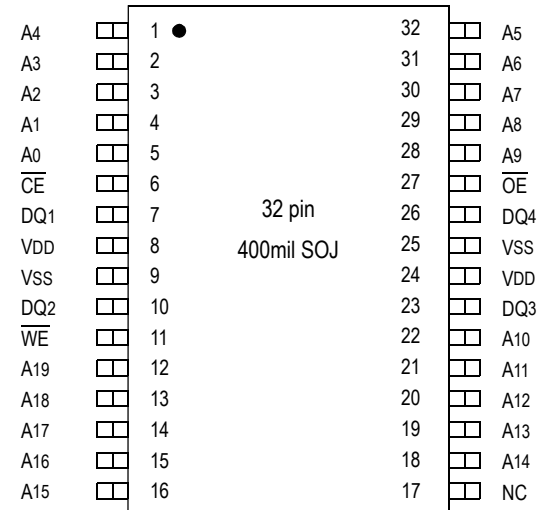
Features

- Fast access time: 8, 10, 12, 15ns
- CMOS low power operation: 150/125/110/90 mA at min. cycle time.
- Single 3.3V ± 0.3V power supply
- All inputs and outputs are TTL compatible
- Fully static operation
- Industrial Temperature Option: -40° to 85°C
- Package line up
 - J: 400mil, 32 pin SOJ package
 - TP: 400mil, 44 pin TSOP Type II package

Description

The GS74104 is a high speed CMOS static RAM organized as 1,048,576-words by 4-bits. Static design eliminates the need for external clocks or timing strobes. Operating on a single 3.3V power supply and all inputs and outputs are TTL compatible. The GS74104 is available in 400 mil SOJ and 400 mil TSOP Type-II packages.

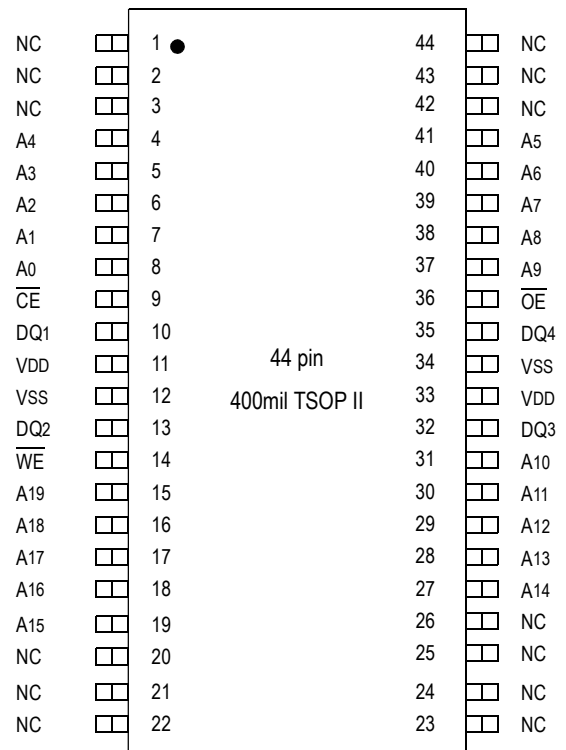
SOJ 1M x 4 Pin Configuration



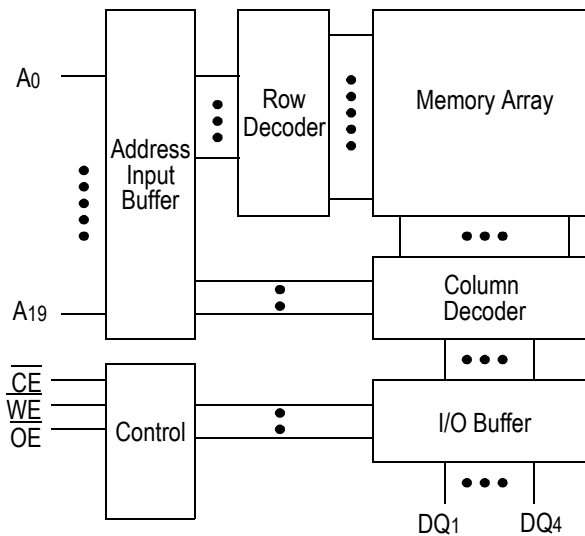
Pin Descriptions

Symbol	Description
A ₀ to A ₁₉	Address input
DQ ₁ to DQ ₄	Data input/output
\overline{CE}	Chip enable input
\overline{WE}	Write enable input
\overline{OE}	Output enable input
V _{DD}	+3.3V power supply
V _{SS}	Ground
NC	No connect

TSOP-II 1M x 4 Pin Configuration



Block Diagram



Truth Table

\overline{CE}	\overline{OE}	\overline{WE}	DQ1 to DQ8	VDD Current
H	X	X	Not Selected	ISB1, ISB2
L	L	H	Read	IDD
L	X	L	Write	
L	H	H	High Z	

Note: X: "H" or "L"

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply Voltage	V _{DD}	-0.5 to +4.6	V
Input Voltage	V _{IN}	-0.5 to V _{DD} +0.5 (≤ 4.6V max.)	V
Output Voltage	V _{OUT}	-0.5 to V _{DD} +0.5 (≤ 4.6V max.)	V
Allowable power dissipation	PD	0.7	W
Storage temperature	T _{STG}	-55 to 150	°C

Note:

Permanent device damage may occur if Absolute Maximum Ratings are exceeded. Functional operation shall be restricted to Recommended Operating Conditions. Exposure to higher than recommended voltages for extended periods of time could affect device reliability.

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage for -10/12/15	V _{DD}	3.0	3.3	3.6	V
Supply Voltage for -8	V _{DD}	3.135	3.3	3.6	V
Input High Voltage	V _{IH}	2.0	-	V _{DD} +0.3	V
Input Low Voltage	V _{IL}	-0.3	-	0.8	V
Ambient Temperature, Commercial Range	T _{Ac}	0	-	70	°C
Ambient Temperature, Industrial Range	T _{AI}	-40	-	85	°C

Note:

1. Input overshoot voltage should be less than V_{DD}+2V and not exceed 20ns.
2. Input undershoot voltage should be greater than -2V and not exceed 20ns.

Capacitance

Parameter	Symbol	Test Condition	Max	Unit
Input Capacitance	C _{IN}	V _{IN} =0V	5	pF
Output Capacitance	C _{OUT}	V _{OUT} =0V	7	pF

Notes:

1. Tested at T_A=25°C, f=1MHz
2. These parameters are sampled and are not 100% tested

DC I/O Pin Characteristics

Parameter	Symbol	Test Conditions	Min	Max
Input Leakage Current	I _{IL}	V _{IN} = 0 to V _{DD}	-1uA	1uA
Output Leakage Current	I _{LO}	Output High Z V _{OUT} = 0 to V _{DD}	-1uA	1uA
Output High Voltage	V _{OH}	I _{OH} = - 4mA	2.4	
Output Low Voltage	V _{OL}	I _{LO} = + 4mA		0.4V

Power Supply Currents

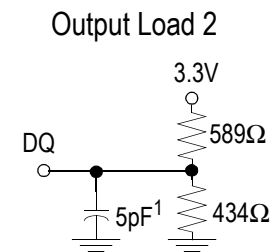
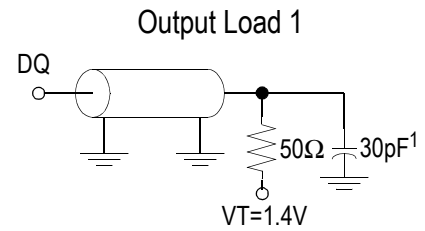
Parameter	Symbol	Test Conditions	0 to 70°C				-40 to 85°C		
			8ns	10ns	12ns	15ns	10ns	12ns	15ns
Operating Supply Current	I _{DD}	$\overline{CE} \leq V_{IL}$ All other inputs $\geq V_{IH}$ or $\leq V_{IL}$ Min. cycle time $I_{OUT} = 0 \text{ mA}$	150mA	125mA	110mA	90mA	135mA	120mA	100mA
Standby Current	I _{SB1}	$\overline{CE} \geq V_{IH}$ All other inputs $\geq V_{IH}$ or $\leq V_{IL}$ Min. cycle time	70mA	65mA	60mA	55mA	75mA	70mA	65mA
Standby Current	I _{SB2}	$\overline{CE} \geq V_{DD} - 0.2V$ All other inputs $\geq V_{DD} - 0.2V$ or $\leq 0.2V$	30mA				40mA		

AC Test Conditions

Parameter	Conditions
Input high level	$V_{IH}=2.4V$
Input low level	$V_{IL}=0.4V$
Input rise time	$t_r=1V/ns$
Input fall time	$t_f=1V/ns$
Input reference level	1.4V
Output reference level	1.4V
Output load	Fig. 1 & 2

Note:

1. Include scope and jig capacitance.
2. Test conditions as specified with output loading as shown in Fig. 1 unless otherwise noted
3. Output load 2 for t_{LZ} , t_{HZ} , t_{OLZ} and t_{OHZ} .



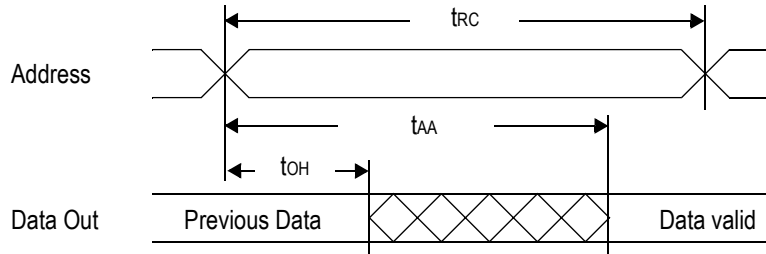
AC Characteristics

Read Cycle

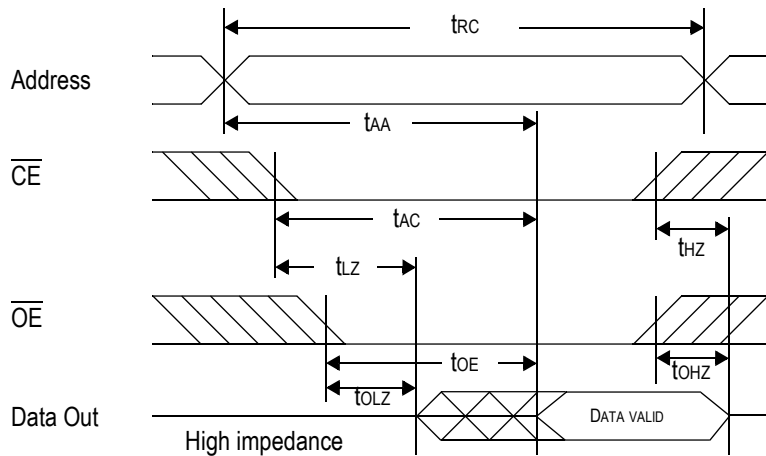
Parameter	Symbol	-8		-10		-12		-15		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
Read cycle time	t_{RC}	8	---	10	---	12	---	15	---	ns
Address access time	t_{AA}	---	8	---	10	---	12	---	15	ns
Chip enable access time (\overline{CE})	t_{AC}	---	8	---	10	---	12	---	15	ns
Output enable to output valid (\overline{OE})	t_{OE}	---	3.5	---	4	---	5	---	6	ns
Output hold from address change	t_{OH}	3	---	3	---	3	---	3	---	ns
Chip enable to output in low Z (\overline{CE})	t_{LZ}^*	3	---	3	---	3	---	3	---	ns
Output enable to output in low Z (\overline{OE})	t_{OLZ}^*	0	---	0	---	0	---	0	---	ns
Chip disable to output in High Z (\overline{CE})	t_{HZ}^*	---	4	---	5	---	6	---	7	ns
Output disable to output in High Z (\overline{OE})	t_{OHZ}^*	---	3.5	---	4	---	5	---	6	ns

* These parameters are sampled and are not 100% tested

Read Cycle 1: $\overline{CE} = \overline{OE} = V_{IL}, \overline{WE} = V_{IH}$



Read Cycle 2: $\overline{WE} = V_{IH}$

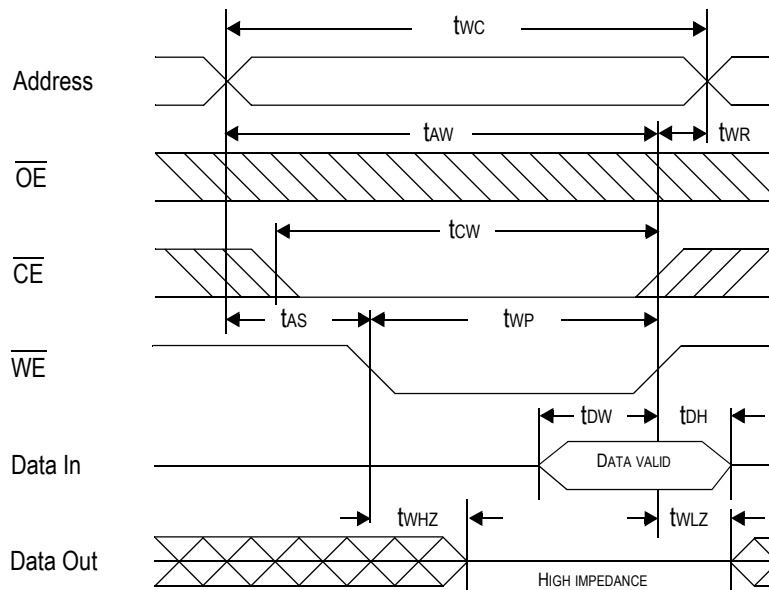


Write Cycle

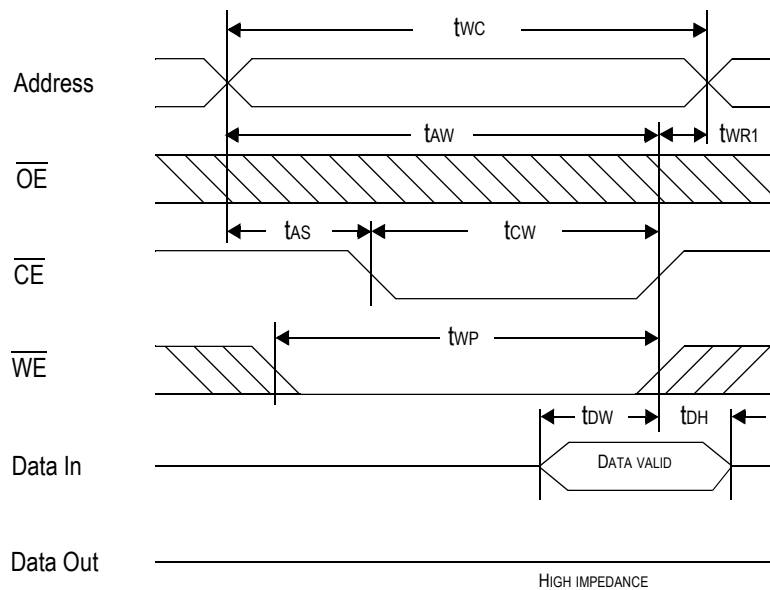
Parameter	Symbol	-8		-10		-12		-15		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
Write cycle time	tWC	8	---	10	---	12	---	15	---	ns
Address valid to end of write	tAW	5.5	---	7	---	8	---	10	---	ns
Chip enable to end of write	tCW	5.5	---	7	---	8	---	10	---	ns
Data set up time	tDW	4	---	5	---	6	---	7	---	ns
Data hold time	tDH	0	---	0	---	0	---	0	---	ns
Write pulse width	tWP	5.5	---	7	---	8	---	10	---	ns
Address set up time	tAS	0	---	0	---	0	---	0	---	ns
Write recovery time (\overline{WE})	tWR	0	---	0	---	0	---	0	---	ns
Write recovery time (\overline{CE})	tWR1	0	---	0	---	0	---	0	---	ns
Output Low Z from end of write	tWLZ*	3	---	3	---	3	---	3	---	ns
Write to output in High Z	tWHZ*	---	3.5	---	4	---	5	---	6	ns

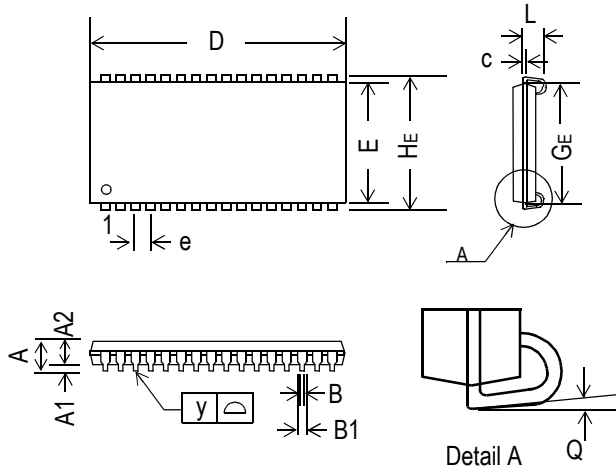
* These parameters are sampled and are not 100% tested

Write Cycle 1: \overline{WE} control



Write Cycle 2: \overline{CE} control

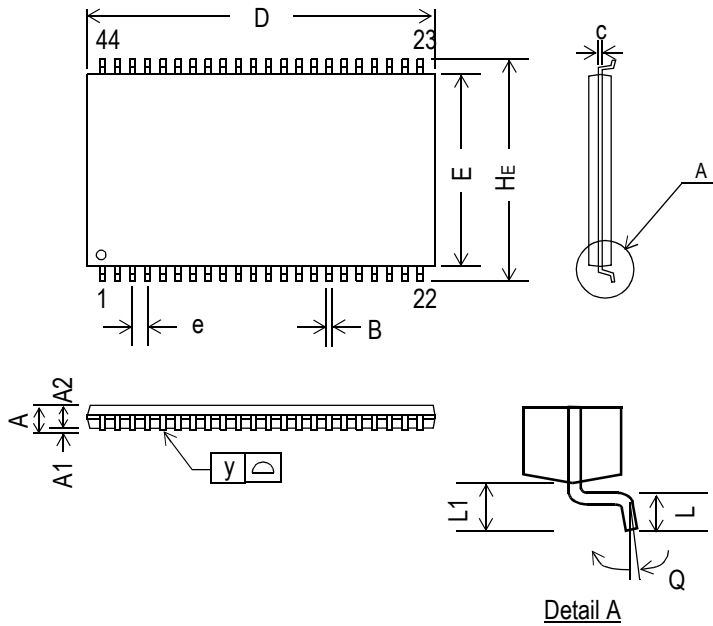


32 Pin SOJ, 300 mil


Symbol	Dimension in inch			Dimension in mm		
	min	nom	max	min	nom	max
A	0.125	-	0.148	3.175	-	3.76
A1	0.026	-	-	0.66	-	-
A2	0.095	0.100	0.105	2.41	2.54	2.67
B	0.013	0.017	0.021	0.33	0.43	0.53
B1	0.024	0.028	0.032	0.61	0.71	0.81
c	0.006	0.008	0.012	0.15	0.20	0.30
D	0.820	0.825	0.830	20.82	20.95	21.08
E	0.295	0.300	0.305	7.49	7.62	7.75
e	-	0.05	-	-	1.27	-
HE	0.330	0.335	0.340	8.38	8.51	8.64
GE	0.255	0.267	0.275	6.48	6.78	6.985
L	0.082	-	-	2.08	-	-
y	-	-	0.004	-	-	0.10
Q	0°	-	10°	0°	-	10°

Note:

1. Dimension D & E do not include interlead flash
2. Dimension B1 does not include dambar protrusion / intrusion
3. Controlling dimension: inches

44 Pin, 400 mil TSOP-II


Symbol	Dimension in inch			Dimension in mm		
	min	nom	max	min	nom	max
A	-	-	0.047	-	-	1.20
A1	0.002	-	-	0.05	-	-
A2	0.037	0.039	0.041	0.95	1.00	1.05
B	0.01	0.014	0.018	0.25	0.35	0.45
c	-	0.006	-	-	0.15	-
D	0.721	0.725	0.729	18.31	18.41	18.51
E	0.396	0.400	0.404	10.06	10.16	10.26
e	-	0.031	-	-	0.80	-
HE	0.455	0.463	0.471	11.56	11.76	11.96
L	0.016	0.020	0.024	0.40	0.50	0.60
L1	-	0.031	-	-	0.80	-
y	-	-	0.004	-	-	0.10
Q	0°	-	5°	0°	-	5°

Note:

1. Dimension D & E do not include interlead flash
2. Dimension B does not include dambar protrusion / intrusion
3. Controlling dimension: mm

Ordering Information

Part Number *	Package	Access Time	Temp. Range	Status
GS74104TP-8	400 mil TSOP-II	8 ns	Commercial	
GS74104TP-10	400 mil TSOP-II	10 ns	Commercial	
GS74104TP-12	400 mil TSOP-II	12 ns	Commercial	
GS74104TP-15	400 mil TSOP-II	15 ns	Commercial	
GS74104TP-8I	400 mil TSOP-II	8 ns	Industrial	
GS74104TP-10I	400 mil TSOP-II	10 ns	Industrial	
GS74104TP-12I	400 mil TSOP-II	12 ns	Industrial	
GS74104TP-15I	400 mil TSOP-II	15 ns	Industrial	
GS74104J-8	400 mil SOJ	8 ns	Commercial	
GS74104J-10	400 mil SOJ	10 ns	Commercial	
GS74104J-12	400 mil SOJ	12 ns	Commercial	
GS74104J-15	400 mil SOJ	15 ns	Commercial	
GS74104J-8I	400 mil SOJ	8 ns	Industrial	
GS74104J-10I	400 mil SOJ	10 ns	Industrial	
GS74104J-12I	400 mil SOJ	12 ns	Industrial	
GS74104J-15I	400 mil SOJ	15 ns	Industrial	

* Customers requiring delivery in Tape and Reel should add the character "T" to the end of the part number. For example: GS74104TP-8T

Revision History

Rev. Code: Old; New	Types of Changes Format or Content	Page #/Revisions/Reason
GS74104Rev1.05 1/2000K;Rev 6 2/2000L	Format/Content	1. GSI Logo 2.