SOJ, TSOP
Commercial Temp
Industrial Temp

1M x 4
4Mb Asynchronous SRAM

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

Features

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

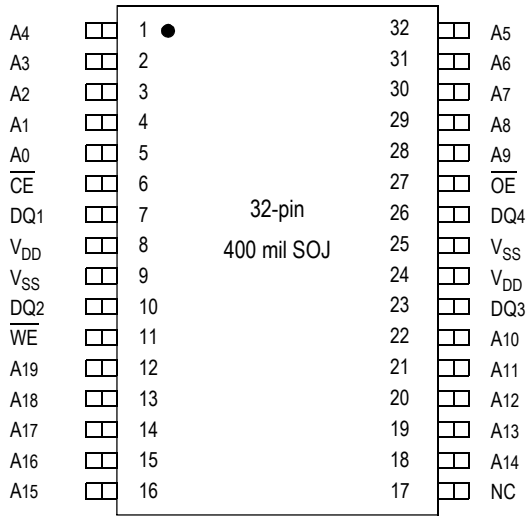
Description

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. The GS operates on a single 3.3 V 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.

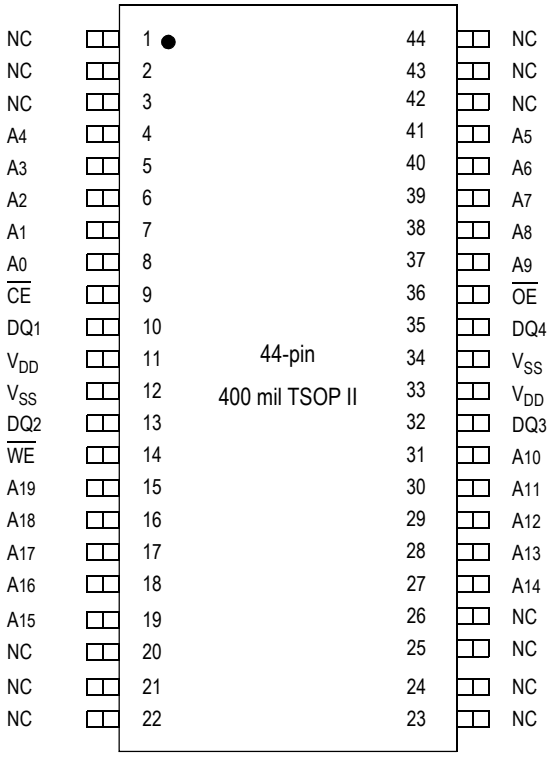
Pin Descriptions

Symbol	Description
A_0–A_{19}	Address input
DQ_1–DQ_4	Data input/output
$\overline{CE}$	Chip enable input
$\overline{WE}$	Write enable input
$\overline{OE}$	Output enable input
V_{DD}	+3.3 V power supply
V_{SS}	Ground
NC	No connect

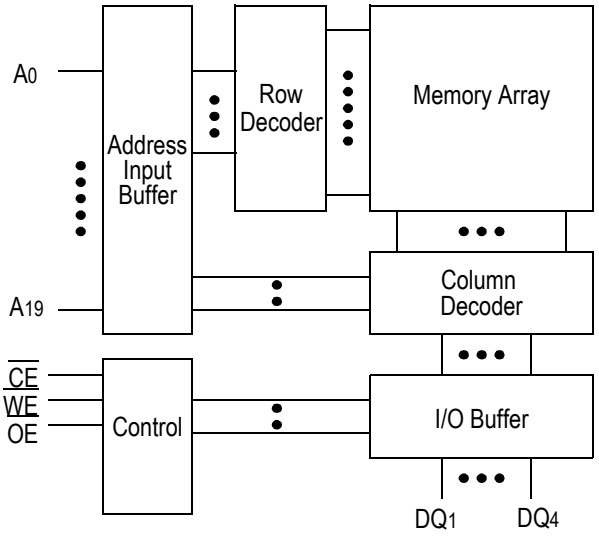
SOJ 1M x 4-Pin Configuraton



TSOP-II 1M x 4-Pin Configuration



Block Diagram



Truth Table

$\overline{CE}$	$\overline{OE}$	$\overline{WE}$	DQ1 to DQ8	V_{DD} Current
H	X	X	Not Selected	I_{SB1}, I_{SB2}
L	L	H	Read	I_{DD}
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 (≤ 4.6 V max.)	V
Output Voltage	V_{OUT}	–0.5 to V_{DD} +0.5 (≤ 4.6 V 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} +2 V and not exceed 20 ns.
2. Input undershoot voltage should be greater than –2 V and not exceed 20 ns.

Capacitance

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

Notes:
1. Tested at T_A = 25°C, f = 1 MHz
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}	– 1 uA	1 uA
Output Leakage Current	I_{LO}	Output High Z V_{OUT} = 0 to V_{DD}	–1 uA	1 uA
Output High Voltage	V_{OH}	I_{OH} = –4mA	2.4	—
Output Low Voltage	V_{OL}	I_{LO} = +4mA	—	0.4 V

Power Supply Currents

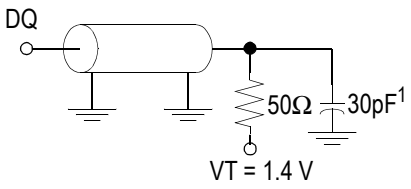
Parameter	Symbol	Test Conditions	0 to 70°C				–40 to 85°C		
			8 ns	10 ns	12 ns	15 ns	10 ns	12 ns	15 ns
Operating Supply Current	I_{DD} (max)	$\overline{CE} \le V_{IL}$ All other inputs $\ge V_{IH}$ or $\le V_{IL}$ Min. cycle time I_{OUT} = 0 mA	150 mA	125 mA	110 mA	90 mA	135 mA	120 mA	100 mA
Standby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

AC Test Conditions

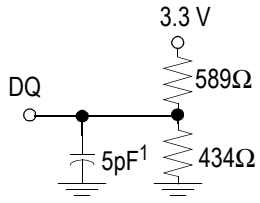
Parameter	Conditions
Input high level	V_{IH} = 2.4 V
Input low level	V_{IL} = 0.4 V
Input rise time	tr = 1 V/ns
Input fall time	tf = 1 V/ns
Input reference level	1.4 V
Output reference level	1.4 V
Output load	**Fig. 1& 2**

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}

Output Load 1



Output Load 2



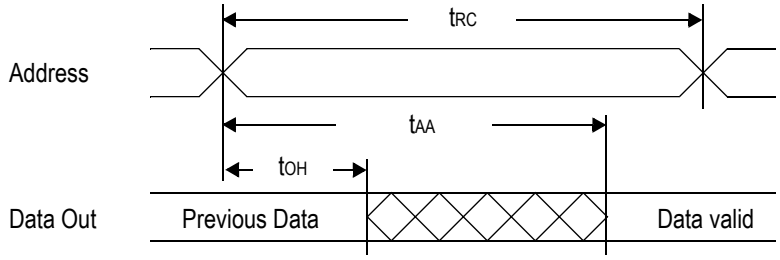
AC Characteristics

Read Cycle

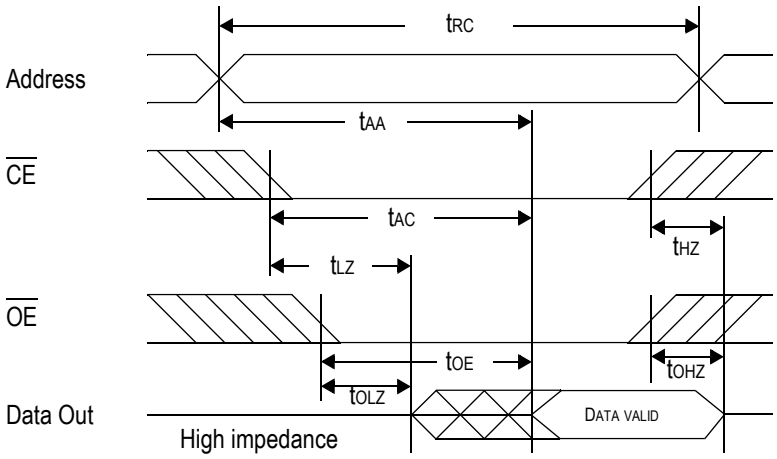
Parameter	Symbol	-8		-10		-12		-15		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
Read cycle time	t_{RC}	8	—	10	—	12	—	15	—	ns
Address access time	t_{AA}	—	8	—	10	—	12	—	15	ns
Chip enable access time ($\overline{CE}$)	t_{AC}	—	8	—	10	—	12	—	15	ns
Output enable to output valid ($\overline{OE}$)	t_{OE}	—	3.5	—	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}

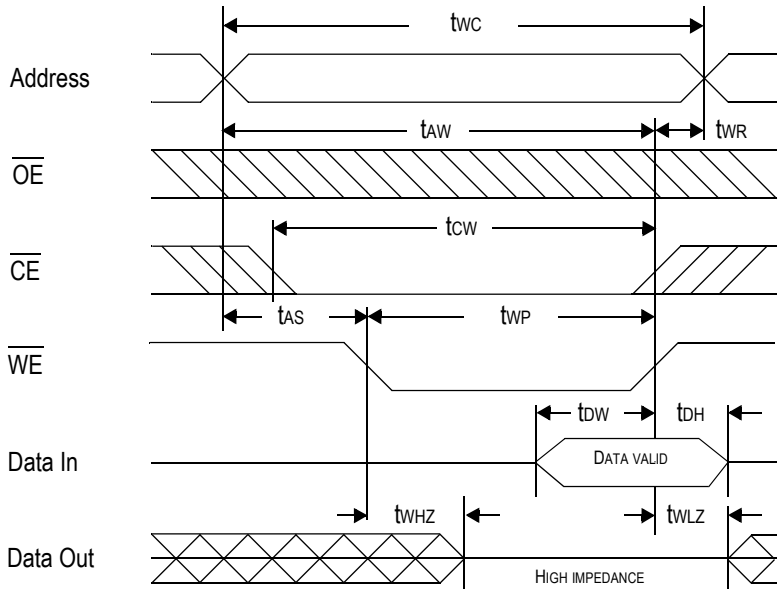


Write Cycle

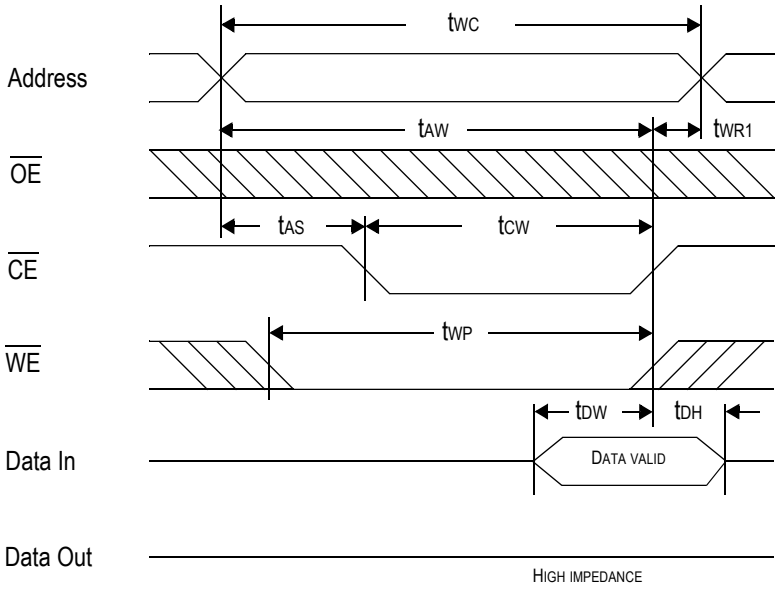
Parameter	Symbol	-8		-10		-12		-15		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
Write cycle time	tWC	8	—	10	—	12	—	15	—	ns
Address valid to end of write	tAW	5.5	—	7	—	8	—	10	—	ns
Chip enable to end of write	tCW	5.5	—	7	—	8	—	10	—	ns
Data set up time	tDW	4	—	5	—	6	—	7	—	ns
Data hold time	tDH	0	—	0	—	0	—	0	—	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.

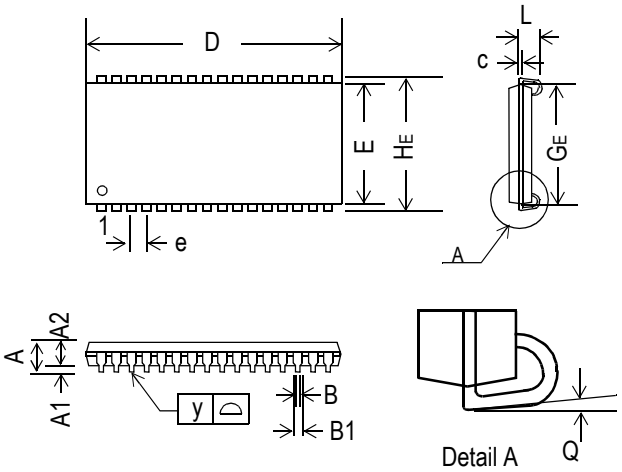
Write Cycle 1: $\overline{WE}$ control



Write Cycle 2: $\overline{CE}$ control



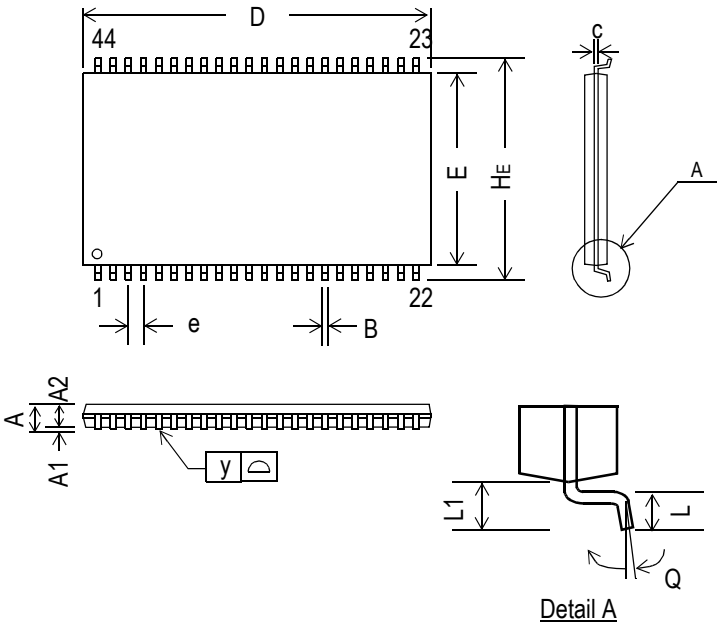
32-Pin SOJ, 400 mil



Symbol	Dimension in inch			Dimension in mm		
	min	nom	max	min	nom	max
A	—	—	0.146	—	—	3.70
A1	0.026	—	—	0.66	—	—
A2	0.105	0.110	0.115	2.67	2.80	2.92
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	0.824	0.829	20.83	20.93	21.06
E	0.395	0.400	0.405	10.04	10.16	10.28
e	—	0.05	—	—	1.27	—
HE	0.430	0.435	0.440	10.93	11.05	11.17
GE	0.354	0.366	0.378	9.00	9.30	9.60
L	0.082	—	—	2.08	—	—
y	—	—	0.004	—	—	0.10
Q	0^o	—	10^o	0^o	—	10^o

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	—
H_E	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^o	—	5^o	0^o	—	5^o

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	• GSI Logo
74104_r1_06; 74104_r1_07	Format	• Updated format to comply with Technical Publications standard • Specifically noted that numbers in Power Supply Currents table are worst case scenario • Corrected package reference on page 9 (replaced 300 mil diagram with 400 mil diagram)

