

128K x 8 LOW VOLTAGE AND POWER CMOS STATIC RAM

NOVEMBER 1996

FEATURES

- High-speed access time: 35, 45, 55, 70 ns
- Low active power: 100 mW (typical)
- Low standby power: 50 μ W (typical) CMOS standby
- Output Enable ($\overline{OE}$) and two Chip Enable ($\overline{CE1}$ and CE2) inputs for ease in applications
- Fully static operation: no clock or refresh required
- TTL compatible inputs and outputs
- Single 2.85 to 3.6V power supply

DESCRIPTION

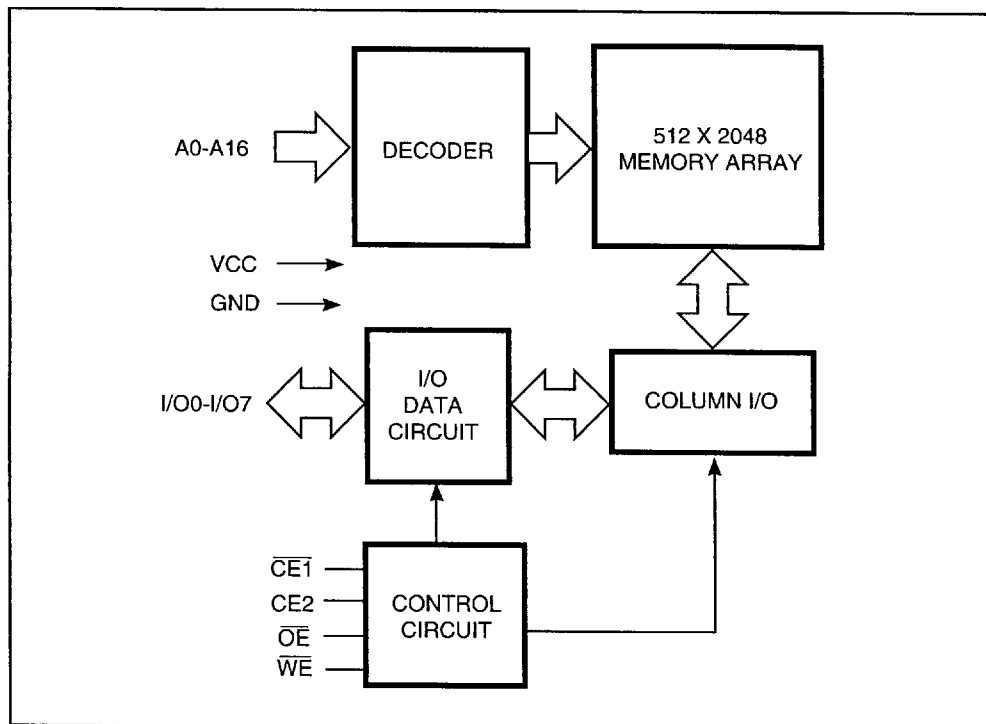
The *ISSI* IS62LV1024 is a low voltage and low power, 131,072-word by 8-bit CMOS static RAM. It is fabricated using *ISSI*'s high-performance CMOS technology. This highly reliable process coupled with innovative circuit design techniques, yields higher performance and low power consumption devices.

When $\overline{CE1}$ is HIGH or CE2 is LOW (deselected), the device assumes a standby mode at which the power dissipation can be reduced by using CMOS input levels.

Easy memory expansion is provided by using two Chip Enable inputs, $\overline{CE1}$ and CE2. The active LOW Write Enable ($\overline{WE}$) controls both writing and reading of the memory.

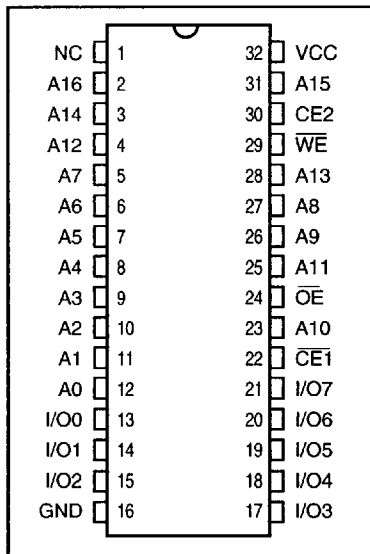
The IS62LV1024 is available in 32-pin 525-mil plastic SOP and TSOP (type 1) packages.

FUNCTIONAL BLOCK DIAGRAM

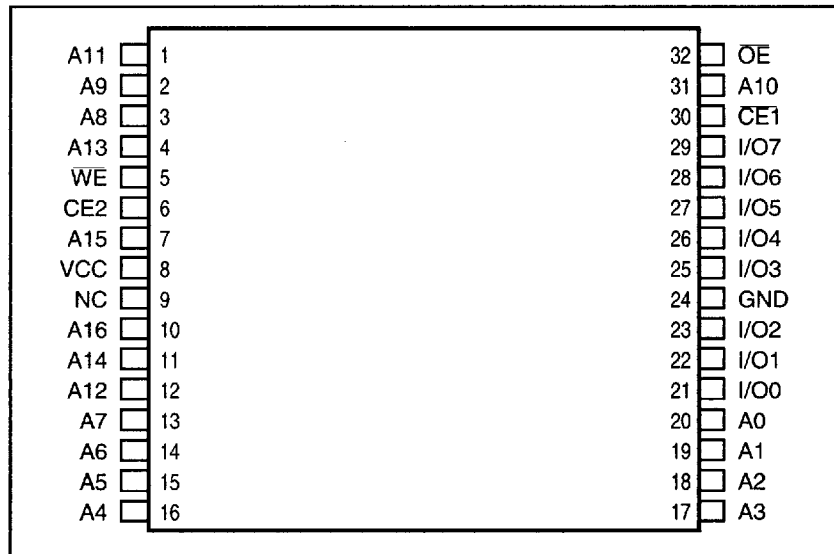


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PIN CONFIGURATION 32-Pin SOP



PIN CONFIGURATION 32-Pin TSOP (Type 1)



PIN DESCRIPTIONS

A0-A16	Address Inputs
$\overline{CE1}$	Chip Enable 1 Input
CE2	Chip Enable 2 Input
$\overline{OE}$	Output Enable Input
$\overline{WE}$	Write Enable Input
I/O0-I/O7	Input/Output
Vcc	Power
GND	Ground

OPERATING RANGE

Range	Ambient Temperature	Vcc
Commercial	0°C to +70°C	2.85V to 3.6V
Industrial	-40°C to +85°C	2.85V to 3.6V

TRUTH TABLE

Mode	$\overline{WE}$	$\overline{CE1}$	CE2	$\overline{OE}$	I/O Operation	Vcc Current
Not Selected	X	H	X	X	High-Z	Isb1, Isb2
(Power-down)	X	X	L	X	High-Z	Isb1, Isb2
Output Disabled	H	L	H	H	High-Z	Icc
Read	H	L	H	L	Dout	Icc
Write	L	L	H	X	Din	Icc

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Parameter	Value	Unit
V _{TERM}	Terminal Voltage with Respect to GND	-0.5 to +4.6	V
T _{BIAS}	Temperature Under Bias	-10 to +85	°C
T _{STG}	Storage Temperature	-65 to +150	°C
P _T	Power Dissipation	0.7	W

Notes:

1. Stress greater than those listed 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.

CAPACITANCE^(1,2)

Symbol	Parameter	Conditions	Max.	Unit
C _{IN}	Input Capacitance	V _{IN} = 0V	6	pF
C _{OUT}	Output Capacitance	V _{OUT} = 0V	8	pF

Notes:

1. Tested initially and after any design or process changes that may affect these parameters.
2. Test conditions: T_A = 25°C, f = 1 MHz, V_{CC} = 3.0V.

DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
V _{OH}	Output HIGH Voltage	V _{CC} = Min., I _{OH} = -1.0 mA	2.4	—	V
V _{OL}	Output LOW Voltage	V _{CC} = Min., I _{OL} = 2.1 mA	—	0.4	V
V _{IH}	Input HIGH Voltage		2.2	V _{CC} + 0.3	V
V _{IL}	Input LOW Voltage ⁽¹⁾		-0.3	0.4	V
I _{LI}	Input Leakage	GND ≤ V _{IN} ≤ V _{CC}	-2	2	μA
I _{LO}	Output Leakage	GND ≤ V _{OUT} ≤ V _{CC}	-2	2	μA

Notes:

1. V_{IL} = -3.0V for pulse width less than 10 ns.

POWER SUPPLY CHARACTERISTICS⁽¹⁾ (Over Operating Range)

Symbol	Parameter	Test Conditions		-35 ns		-45 ns		-55 ns		-70 ns		Unit
				Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
I _{CC}	V _{CC} Dynamic Operating Supply Current	V _{CC} = Max., $\overline{CE} = V_{IL}$	Com.	—	55	—	50	—	45	—	40	mA
		I _{OUT} = 0 mA, f = f _{MAX}	Ind.	—	65	—	60	—	55	—	50	
I _{SB1}	TTL Standby Current (TTL Inputs)	V _{CC} = Max., f = 0	Com.	—	0.9	—	0.9	—	0.9	—	0.9	mA
		V _{IN} = V _{IH} or V _{IL} , $\overline{CE1} \geq V_{IH}$, or CE2 ≤ V _{IL} , f = 0	Ind.	—	1.2	—	1.2	—	1.2	—	1.2	
I _{SB2}	CMOS Standby Current (CMOS Inputs)	V _{CC} = Max.,	Com.	—	250	—	250	—	250	—	250	μA
		CE1 ≤ V _{CC} - 0.2V, CE2 ≤ 0.2V, V _{IN} > V _{CC} - 0.2V, or V _{IN} ≤ 0.2V, f = 0	Ind.	—	350	—	350	—	350	—	350	

Note:

1. At f = f_{MAX}, address and data inputs are cycling at the maximum frequency, f = 0 means no input lines change.

READ CYCLE SWITCHING CHARACTERISTICS⁽¹⁾ (Over Operating Range)

Symbol	Parameter	-35		-45		-55		-70		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t_{RC}	Read Cycle Time	35	—	45	—	55	—	70	—	ns
t_{AA}	Address Access Time	—	35	—	45	—	55	—	70	ns
t_{OHA}	Output Hold Time	3	—	3	—	3	—	3	—	ns
t_{ACE1}	$\overline{CE1}$ Access Time	—	35	—	45	—	55	—	70	ns
t_{ACE2}	$CE2$ Access Time	—	35	—	45	—	55	—	70	ns
t_{DOE}	$\overline{OE}$ Access Time	—	10	—	20	—	25	—	35	ns
$t_{LZOE}^{(2)}$	$\overline{OE}$ to Low-Z Output	0	—	0	—	0	—	0	—	ns
$t_{HZOE}^{(2)}$	$\overline{OE}$ to High-Z Output	0	10	0	15	0	20	0	25	ns
$t_{LZCE1}^{(2)}$	$\overline{CE1}$ to Low-Z Output	3	—	5	—	7	—	10	—	ns
$t_{LZCE2}^{(2)}$	$CE2$ to Low-Z Output	3	—	5	—	7	—	10	—	ns
$t_{HZCE}^{(2)}$	$\overline{CE1}$ or $CE2$ to High-Z Output	0	10	0	15	0	20	0	25	ns

Notes:

1. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0.4V to 2.2V and output loading specified in Figure 1a.
2. Tested with the load in Figure 1b. Transition is measured ± 500 mV from steady-state voltage. Not 100% tested.

AC TEST CONDITIONS

Parameter	Unit
Input Pulse Level	0.4V to 2.2V
Input Rise and Fall Times	5 ns
Input and Output Timing and Reference Level	1.5V
Output Load	See Figures 1a and 1b

AC TEST LOADS

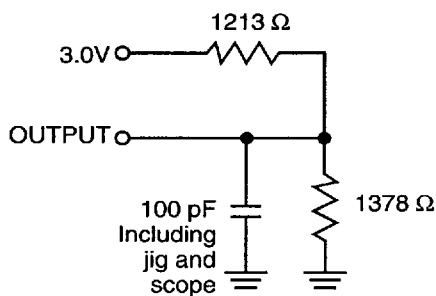


Figure 1a.

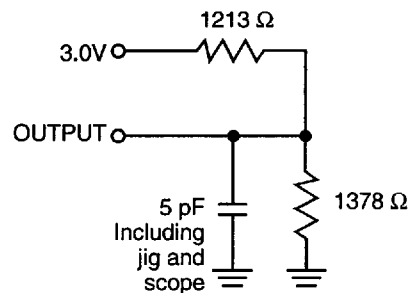
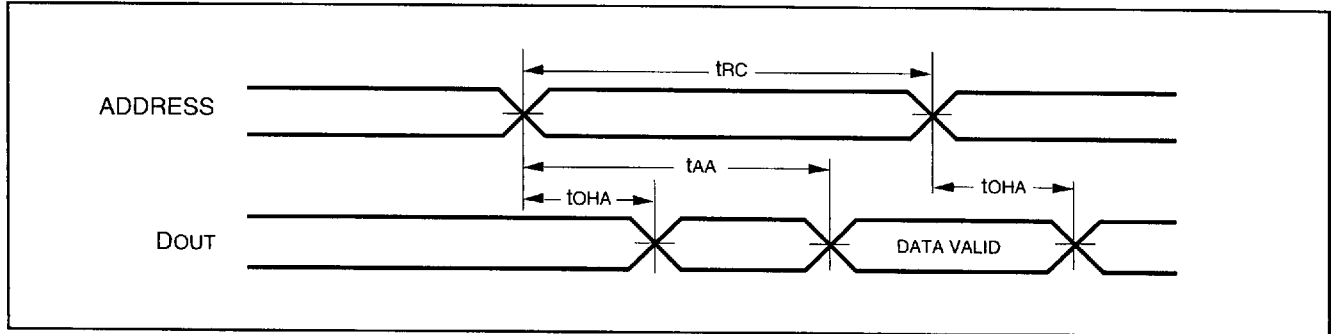
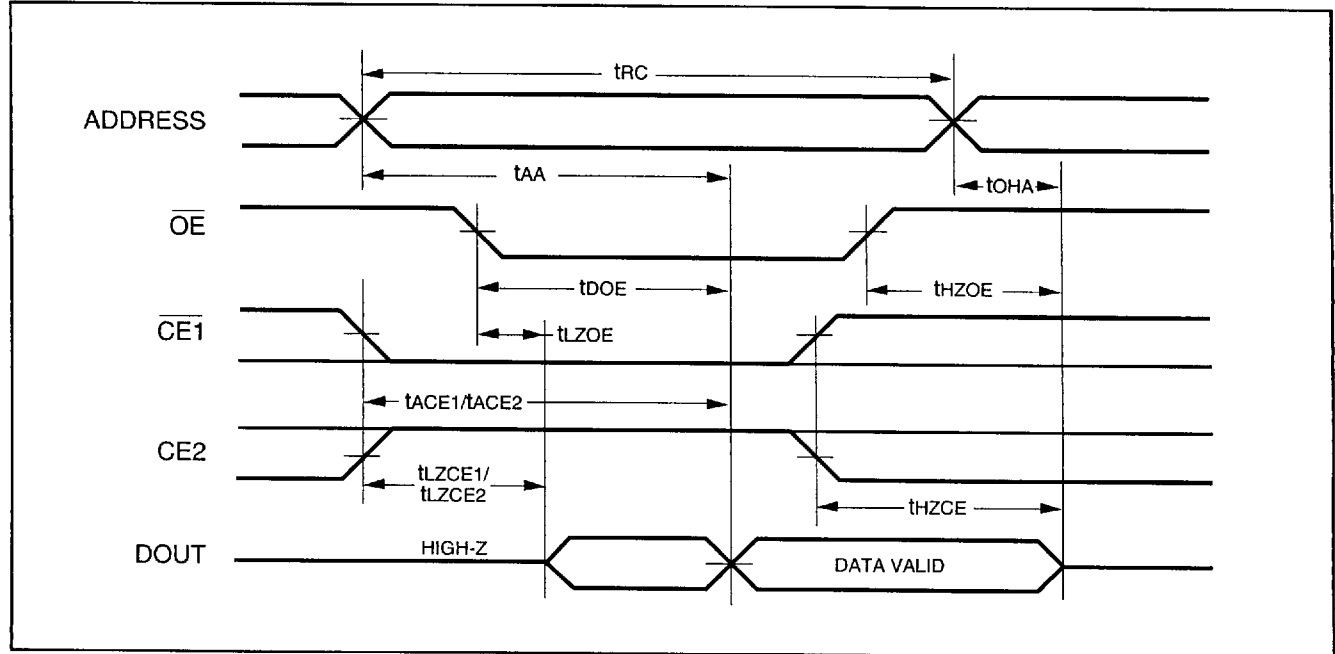


Figure 1b.

AC WAVEFORMS

READ CYCLE NO. 1^(1,2)READ CYCLE NO. 2^(1,3)**Notes:**

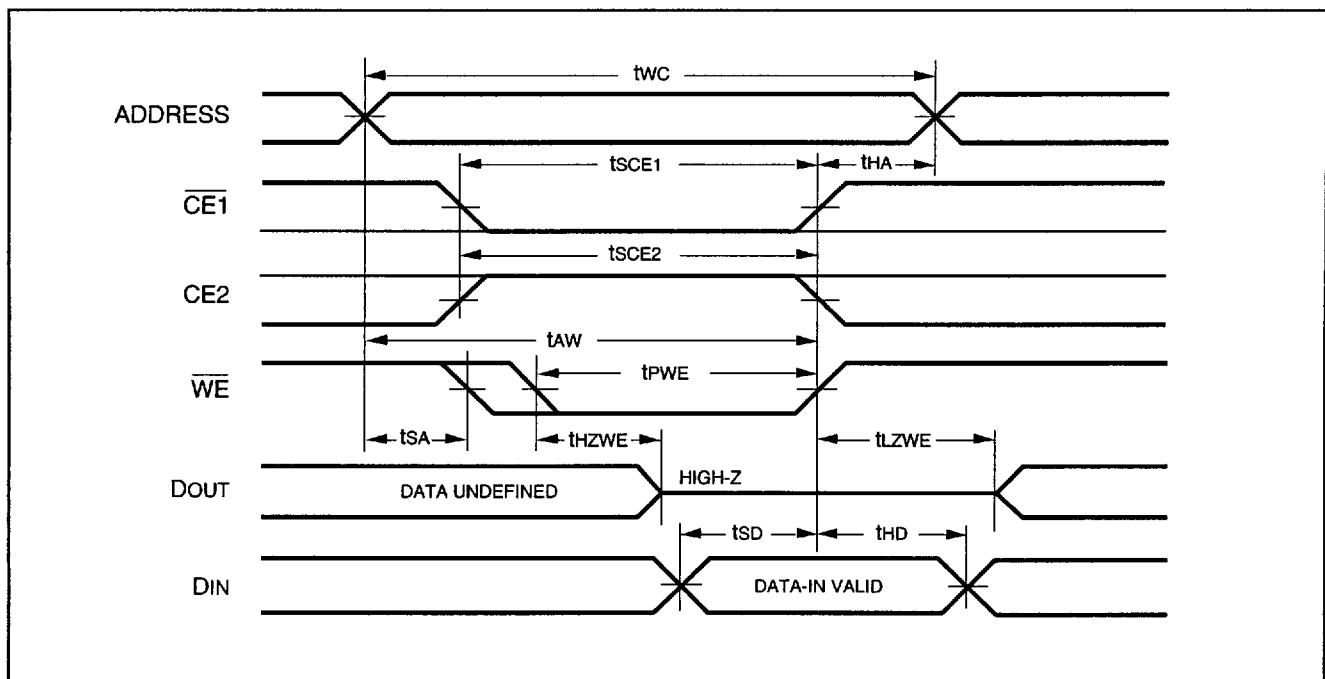
1. $\overline{WE}$ is HIGH for a Read Cycle.
2. The device is continuously selected. $\overline{OE}$, $\overline{CE1} = V_{IL}$, $CE2 = V_{IH}$.
3. Address is valid prior to or coincident with $\overline{CE1}$ LOW and CE2 HIGH transitions.

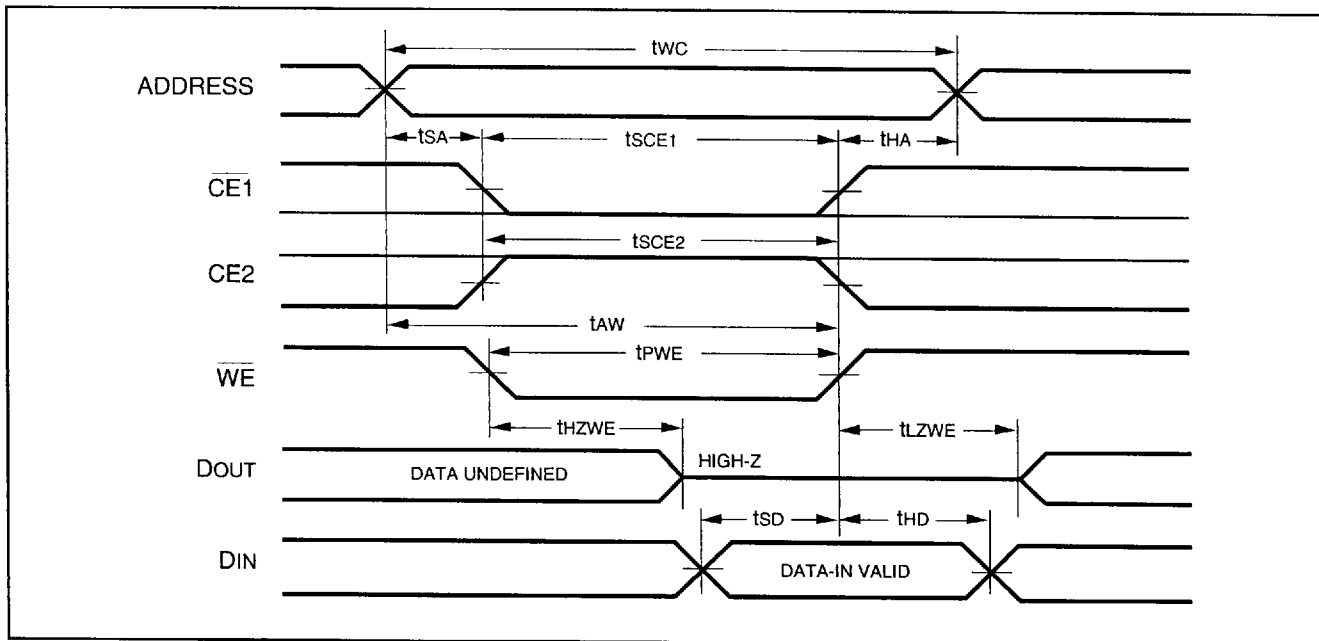
WRITE CYCLE SWITCHING CHARACTERISTICS^(1,3) (Over Operating Range, Standard and Low Power)

Symbol	Parameter	-35		-45		-55		-70		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t _{WC}	Write Cycle Time	35	—	45	—	55	—	70	—	ns
t _{SCE1}	$\overline{CE1}$ to Write End	25	—	35	—	50	—	60	—	ns
t _{SCE2}	CE2 to Write End	25	—	35	—	50	—	60	—	ns
t _{AW}	Address Setup Time to Write End	25	—	35	—	45	—	60	—	ns
t _{HA}	Address Hold from Write End	0	—	0	—	0	—	0	—	ns
t _{SA}	Address Setup Time	0	—	0	—	0	—	0	—	ns
t _{PWE⁽⁴⁾}	$\overline{WE}$ Pulse Width	25	—	35	—	40	—	50	—	ns
t _{SD}	Data Setup to Write End	20	—	25	—	25	—	30	—	ns
t _{HD}	Data Hold from Write End	0	—	0	—	0	—	0	—	ns
t _{HZWE⁽²⁾}	$\overline{WE}$ LOW to High-Z Output	—	10	—	15	—	20	—	25	ns
t _{LZWE⁽²⁾}	$\overline{WE}$ HIGH to Low-Z Output	3	—	5	—	5	—	5	—	ns

Notes:

1. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0.4V to 2.2V and output loading specified in Figure 1a.
2. Tested with the load in Figure 1b. Transition is measured ± 500 mV from steady-state voltage. Not 100% tested.
3. The internal write time is defined by the overlap of $\overline{CE1}$ LOW, CE2 HIGH and $\overline{WE}$ LOW. All signals must be in valid states to initiate a Write, but any one can go inactive to terminate the Write. The Data Input Setup and Hold timing are referenced to the rising or falling edge of the signal that terminates the Write.
4. Tested with $\overline{OE}$ HIGH.

AC WAVEFORMS**WRITE CYCLE NO. 1 ($\overline{WE}$ Controlled)^(1,2)**

WRITE CYCLE NO. 2 ($\overline{CE1}$, CE2 Controlled)^(1,2)**Notes:**

1. The internal write time is defined by the overlap of $\overline{CE1}$ LOW, CE2 HIGH and $\overline{WE}$ LOW. All signals must be in valid states to initiate a Write, but any one can go inactive to terminate the Write. The Data Input Setup and Hold timing are referenced to the rising or falling edge of the signal that terminates the Write.
2. I/O will assume the High-Z state if $\overline{OE} = V_{IH}$.

ORDERING INFORMATION**Commercial Range: 0°C to +70°C**

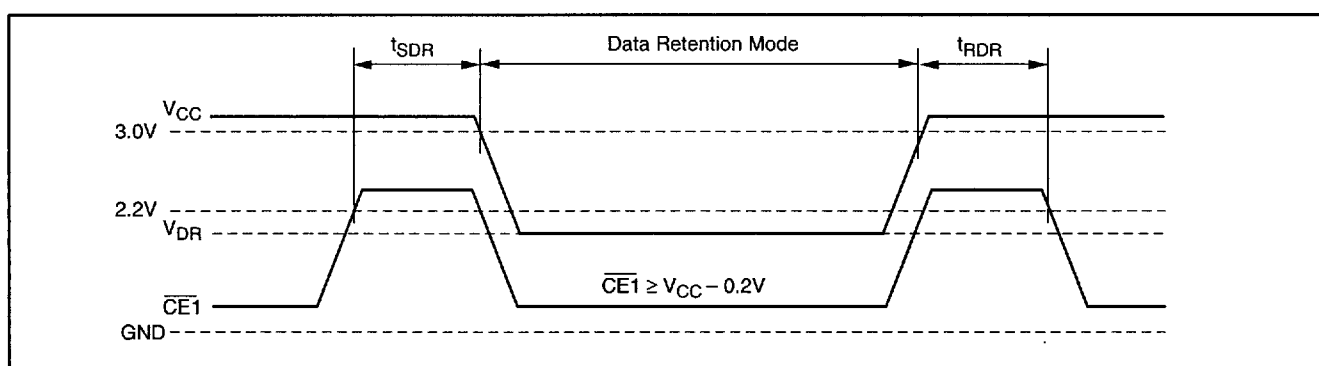
Speed (ns)	Order Part No.	Package
35	IS62LV1024-35Q	525-mil Plastic SOP
35	IS62LV1024-35T	TSOP, Type 1
45	IS62LV1024-45Q	525-mil Plastic SOP
45	IS62LV1024-45T	TSOP, Type 1
55	IS62LV1024-55Q	525-mil Plastic SOP
55	IS62LV1024-55T	TSOP, Type 1
70	IS62LV1024-70Q	525-mil Plastic SOP
70	IS62LV1024-70T	TSOP, Type 1

ORDERING INFORMATION**Industrial Range: -40°C to +85°C**

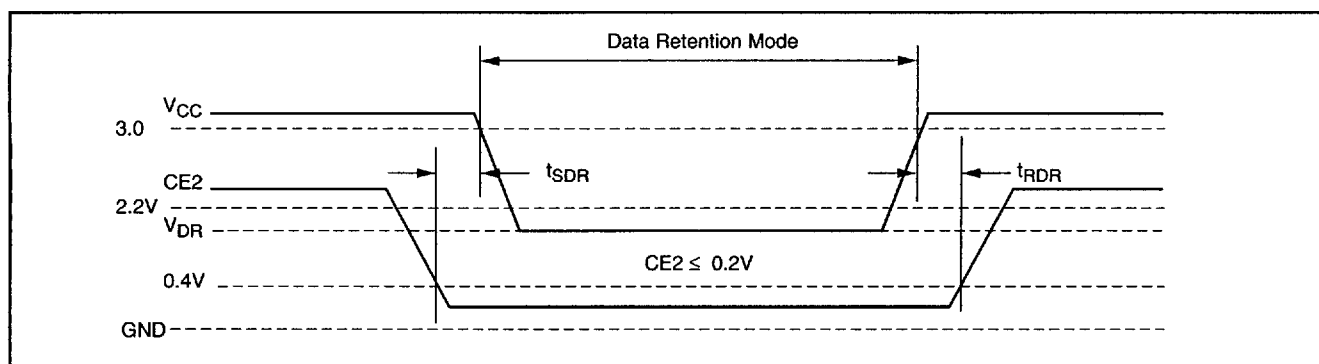
Speed (ns)	Order Part No.	Package
35	IS62LV1024-35QI	525-mil Plastic SOP
35	IS62LV1024-35TI	TSOP, Type 1
45	IS62LV1024-45QI	525-mil Plastic SOP
45	IS62LV1024-45TI	TSOP, Type 1
55	IS62LV1024-55QI	525-mil Plastic SOP
55	IS62LV1024-55TI	TSOP, Type 1
70	IS62LV1024-70QI	525-mil Plastic SOP
70	IS62LV1024-70TI	TSOP, Type 1

DATA RETENTION SWITCHING CHARACTERISTICS

Symbol	Parameter	Test Condition	Min.	Max.	Unit
V_{DR}	V_{CC} for Data Retention	See Data Retention Waveform	2.0	3.6	V
I_{DR}	Data Retention Current	$V_{CC} = 3.0V, \overline{CE1} \geq V_{CC} - 0.2V$	—	150	μA
t_{SDR}	Data Retention Setup Time	See Data Retention Waveform	0	—	ns
t_{RDR}	Recovery Time	See Data Retention Waveform	t_{RC}	—	ns

DATA RETENTION WAVEFORM ($\overline{CE1}$ Controlled)

DATA RETENTION WAVEFORM (CE2 Controlled)



ISSI

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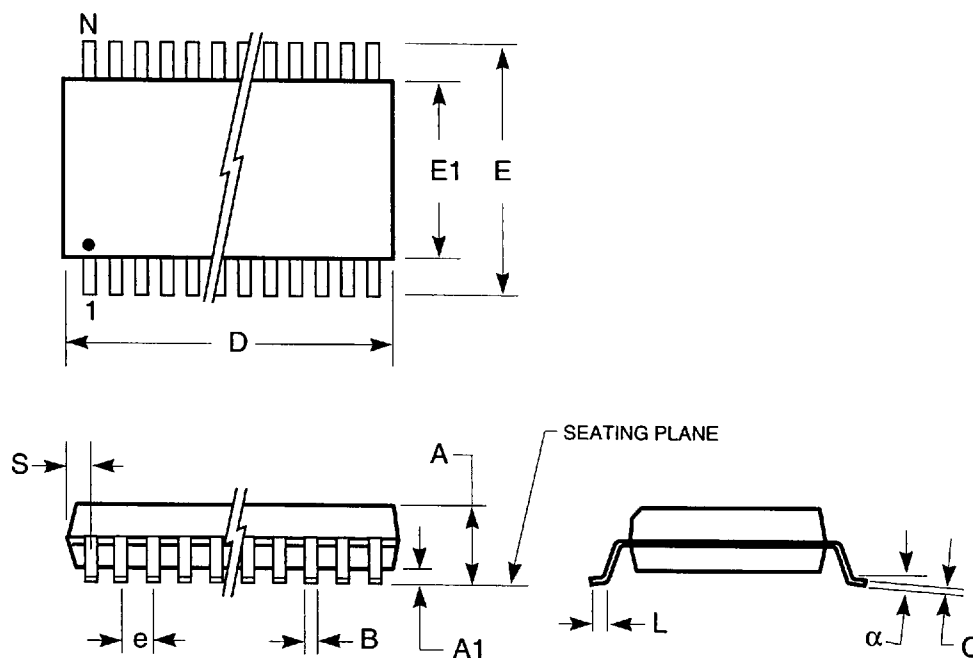
<http://www.issiusa.com>

PACKAGING INFORMATION

ISSI

450-mil Plastic SOP

Package Code: Q



450-mil Plastic SOP (Q)				
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
Ref. Std.				
No. Leads	32			
A	—	3.00	—	0.118
A1	0.100	—	0.004	—
B	0.356	0.508	0.014	0.020
C	0.152	0.203	0.006	0.012
D	20.142	20.715	0.793	0.817
E	13.888	14.376	0.546	0.566
E1	11.176	11.430	0.440	0.450
e	1.270 BSC		0.050 BSC	
L	0.584	0.991	0.023	0.039
α	0°	10°	0°	10°
S	—	0.965	—	0.036

Notes:

1. Controlling dimension: inches, unless otherwise specified.
2. BSC = Basic lead spacing between centers.
3. Dimensions D and E1 do not include mold flash protrusions and should be measured from the bottom of the package.
4. Formed leads shall be planar with respect to one another within 0.004 inches at the seating plane.

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PK13197Q Rev. B 01/31/97

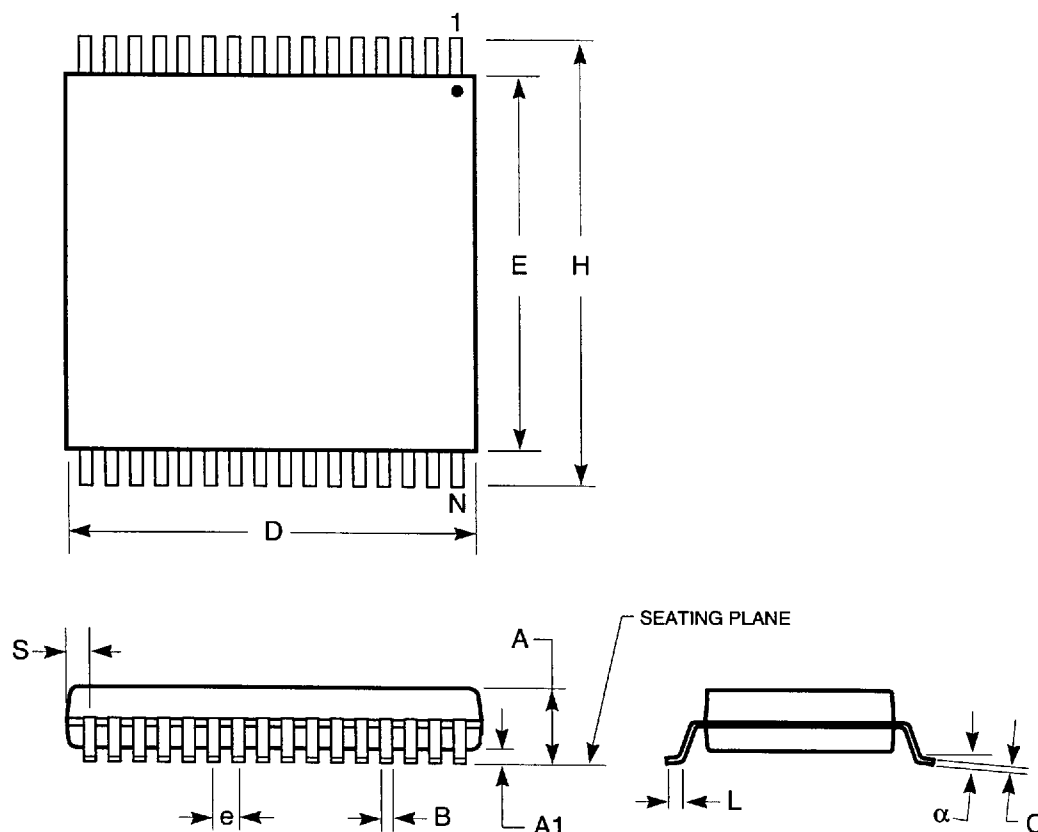
9004404 0000549 524

PACKAGING INFORMATION

ISSI

Plastic TSOP - 32 pins

Package Code: T (Type I)



Plastic TSOP (T—Type I)				
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
Ref. Std.				
No. Leads	32			
A	—	1.20	—	0.047
A1	0.05	0.25	0.002	0.010
B	0.17	0.23	0.007	0.009
C	0.12	0.17	0.006	0.014
D	7.90	8.10	0.308	0.316
E	18.30	18.50	0.714	0.722
H	19.80	20.20	0.772	0.788
e	0.50 BSC		0.020 BSC	
L	0.40	0.60	0.016	0.024
α	0°	8°	0°	8°

Notes:

1. Controlling dimension: millimeters, unless otherwise specified.
2. BSC = Basic lead spacing between centers.
3. Dimensions D and E do not include mold flash protrusions and should be measured from the bottom of the package.
4. Formed leads shall be planar with respect to one another within 0.004 inches at the seating plane.