IS62LV1024

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 µW (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

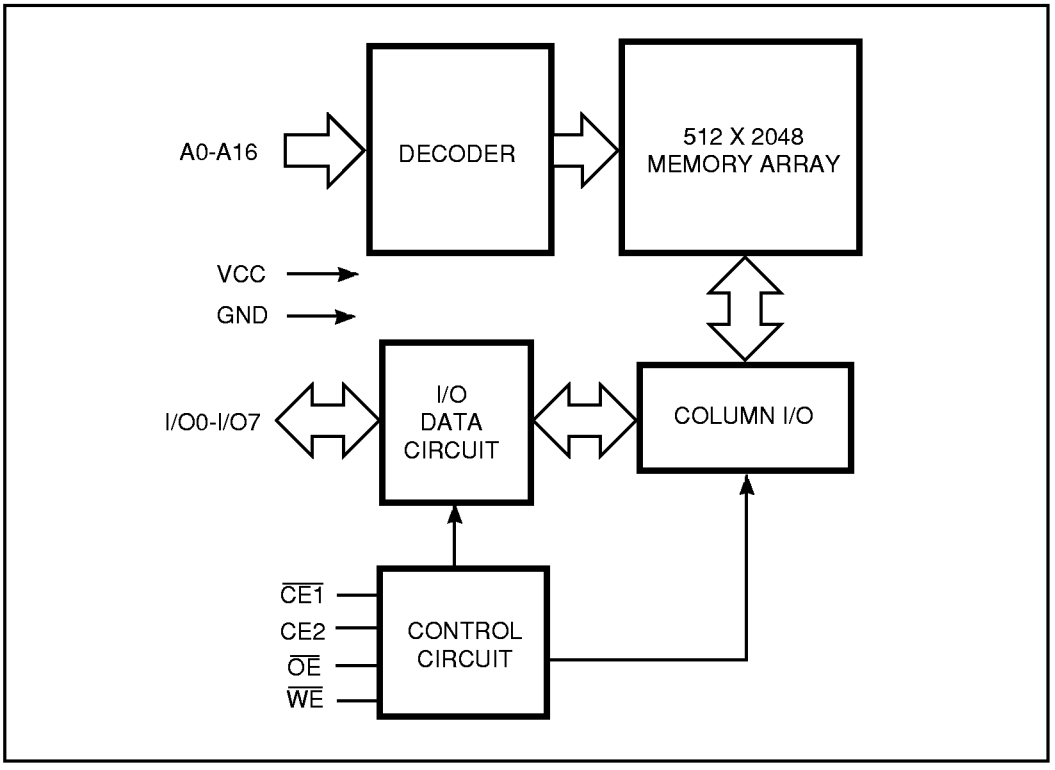
The *ISSI* IS62LV1024 is a low voltage and low power, 131,072-word by 8-bit CMOS static RAM. It is fabricated using *ISSI*'s high-performance CMOS technology. This highly reliable process coupled with innovative circuit design techniques, yields higher performance and low power consumption devices.

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.

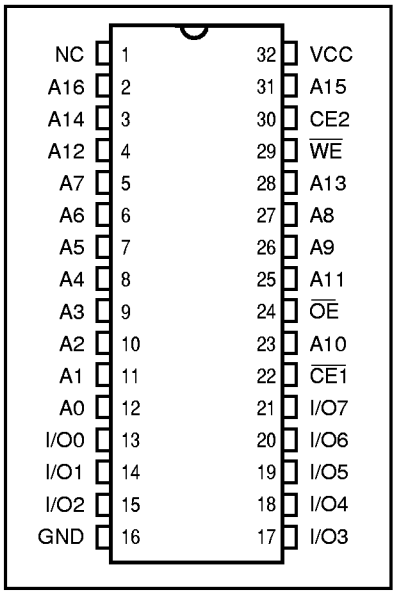
Easy memory expansion is provided by using two Chip Enable inputs, $\overline{CE1}$ and CE2. The active LOW Write Enable ($\overline{WE}$) controls both writing and reading of the memory.

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

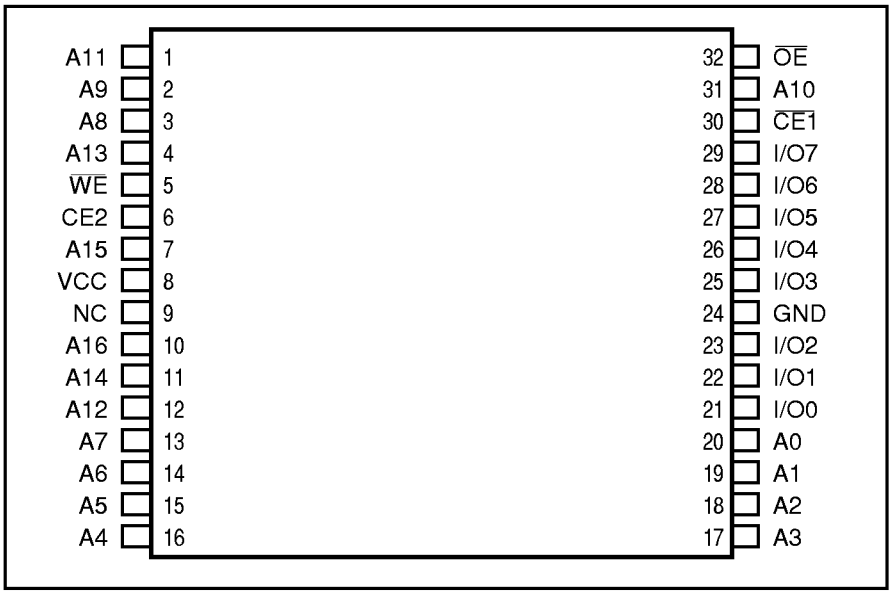
FUNCTIONAL BLOCK DIAGRAM



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	I_{SB1}, I_{SB2}
(Power-down)	X	X	L	X	High-Z	I_{SB1}, I_{SB2}
Output Disabled	H	L	H	H	High-Z	I_{CC}
Read	H	L	H	L	D_{OUT}	I_{CC}
Write	L	L	H	X	D_{IN}	I_{CC}

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

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 Min.	-35 Max.	-45 Min.	-45 Max.	-55 Min.	-55 Max.	-70 Min.	-70 Max.	Unit
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

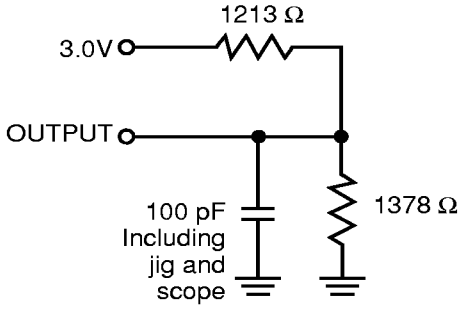


Figure 1a.

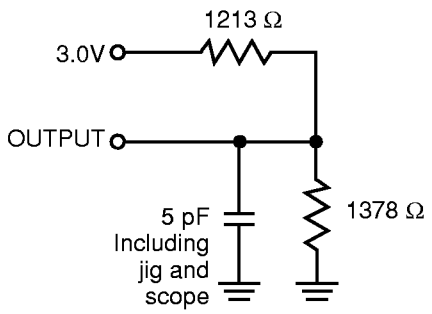
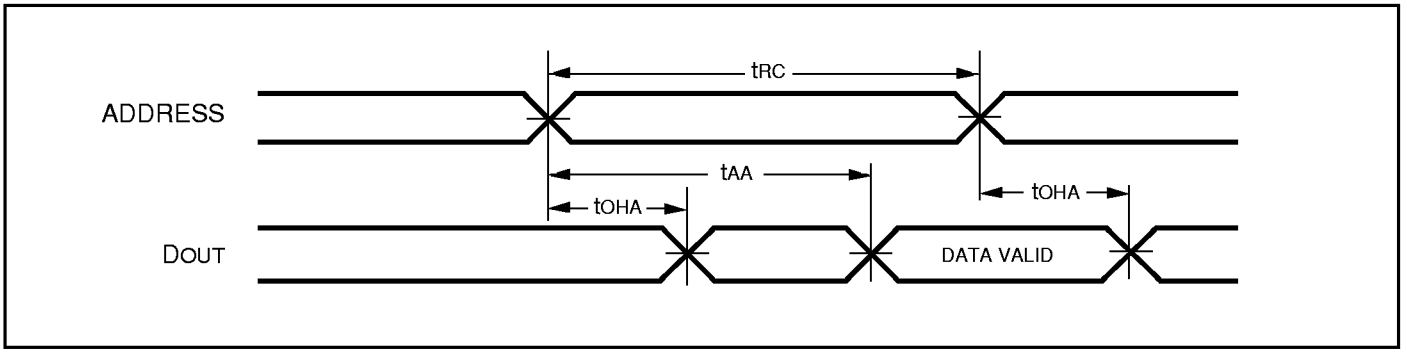


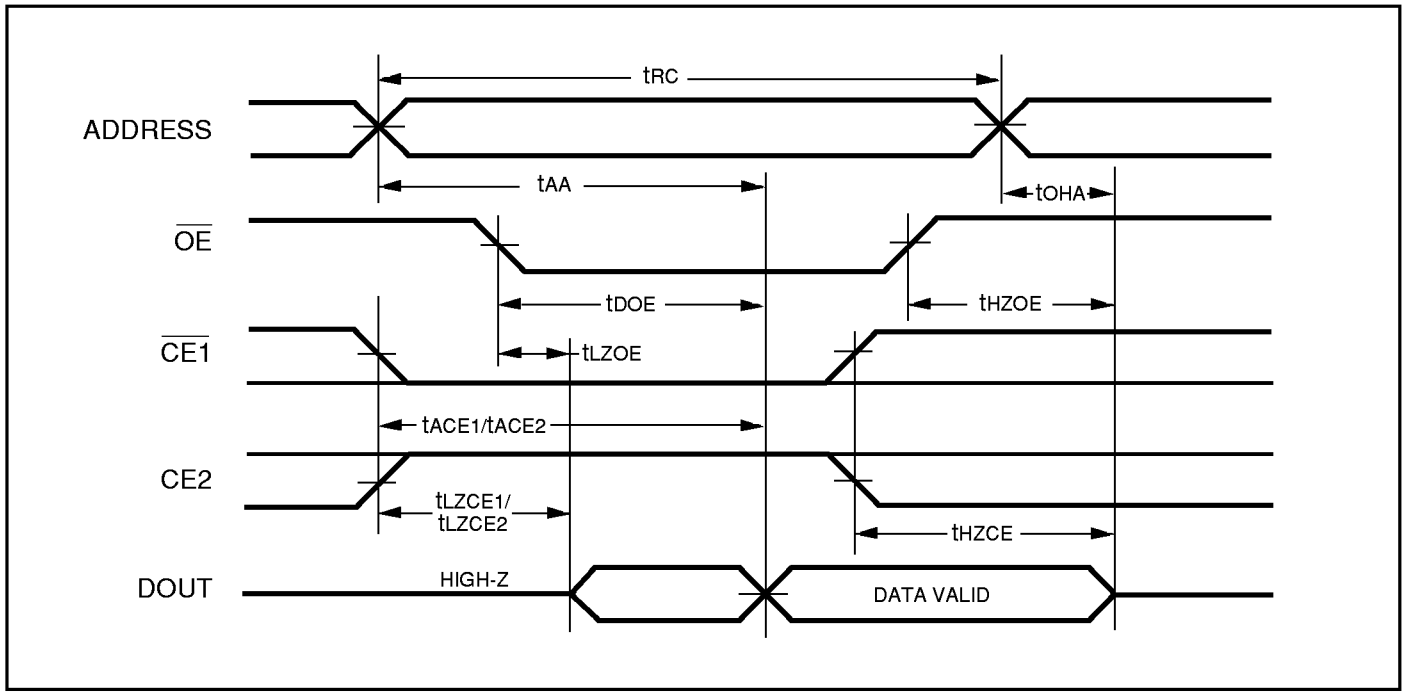
Figure 1b.

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.

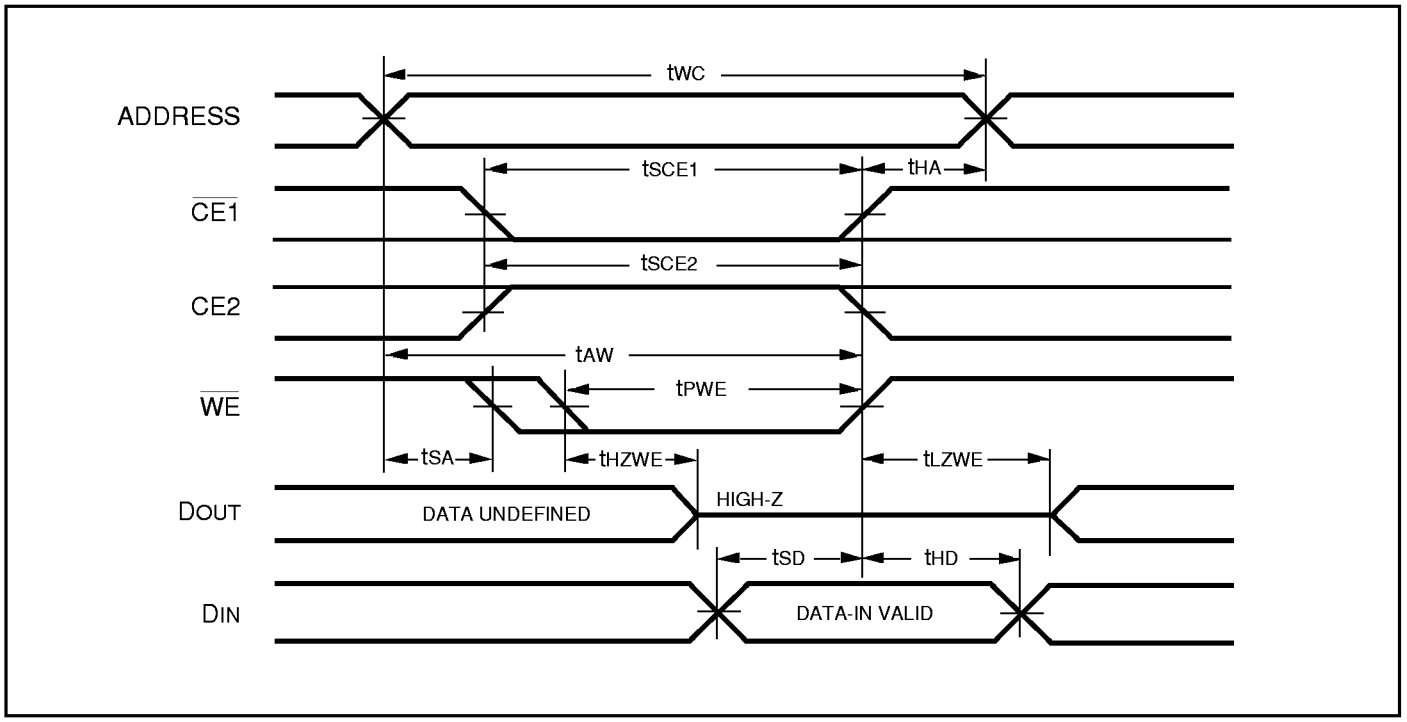
WRITE CYCLE SWITCHING CHARACTERISTICS[1,3] (Over Operating Range, Standard and Low Power)

Symbol	Parameter	-35 Min.	-35 Max.	-45 Min.	-45 Max.	-55 Min.	-55 Max.	-70 Min.	-70 Max.	Unit
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

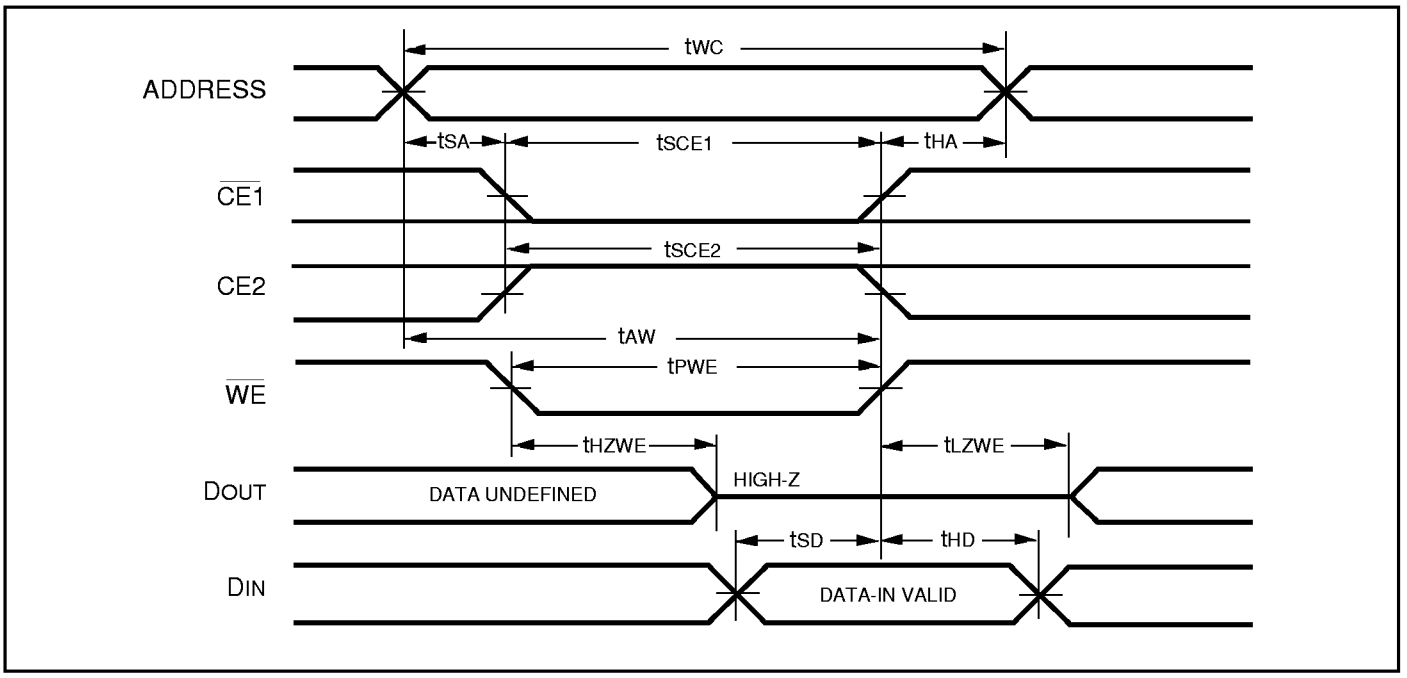
Notes:
1. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0.4V to 2.2V and output loading specified in Figure 1a.
2. Tested with the load in Figure 1b. Transition is measured ±500 mV from steady-state voltage. Not 100% tested.
3. 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

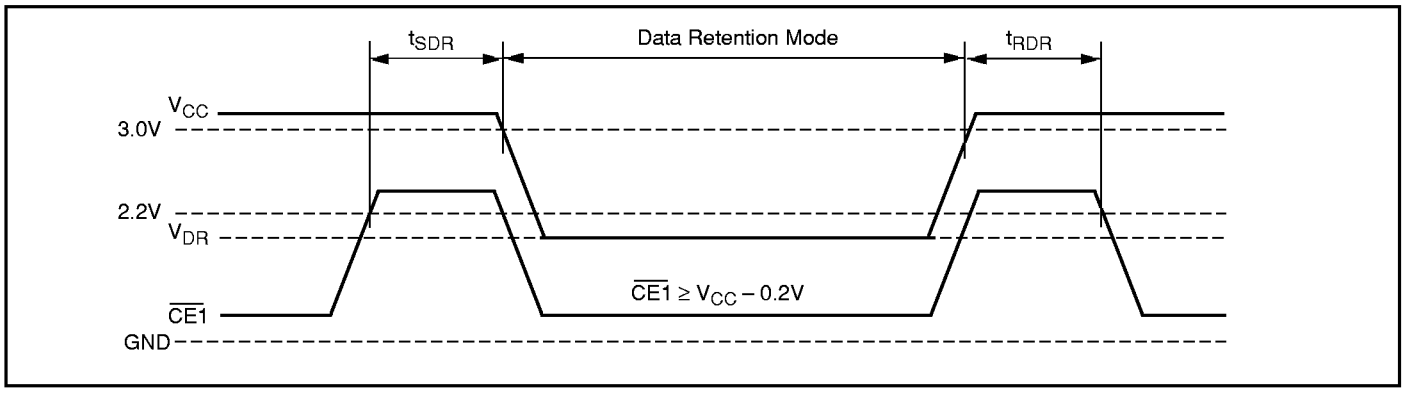
ORDERING INFORMATION
Industrial Range: –40°C to +85°C

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

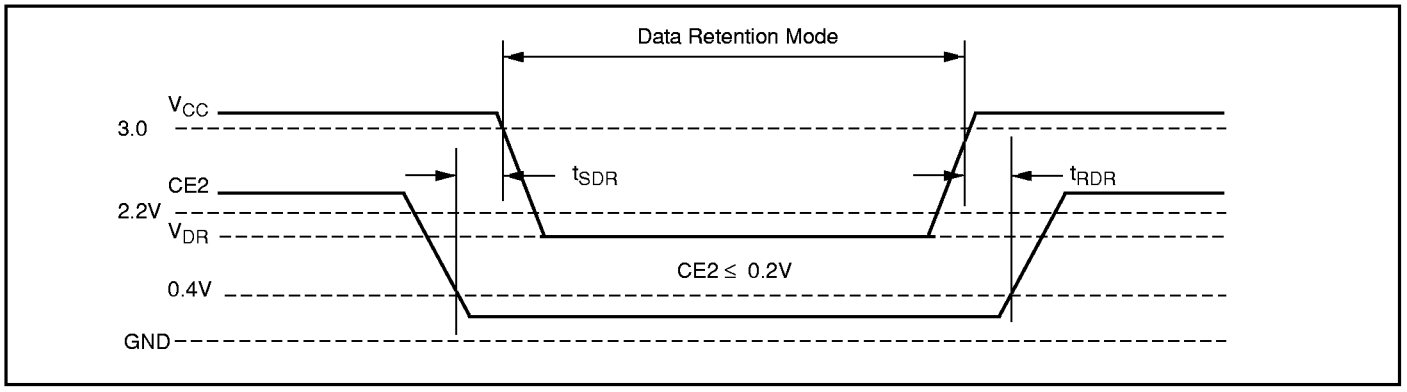
DATA RETENTION SWITCHING CHARACTERISTICS

Symbol	Parameter	Test Condition	Min.	Max.	Unit
V_{DR}	Vcc for Data Retention	See Data Retention Waveform	2.0	3.6	V
I_{DR}	Data Retention Current	Vcc = 3.0V, $\overline{CE1} \geq$ Vcc – 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)



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