IS61C1024AL
IS64C1024AL

128K x 8 HIGH-SPEED CMOS STATIC RAM

JANUARY 2025

FEATURES

- High-speed access time: 12, 15 ns
- Low active power: 160 mW (typical)
- Low standby power: 1000 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 5V (±10%) power supply
- Commercial, industrial, and automotive temperature ranges available
- Lead free available

DESCRIPTION

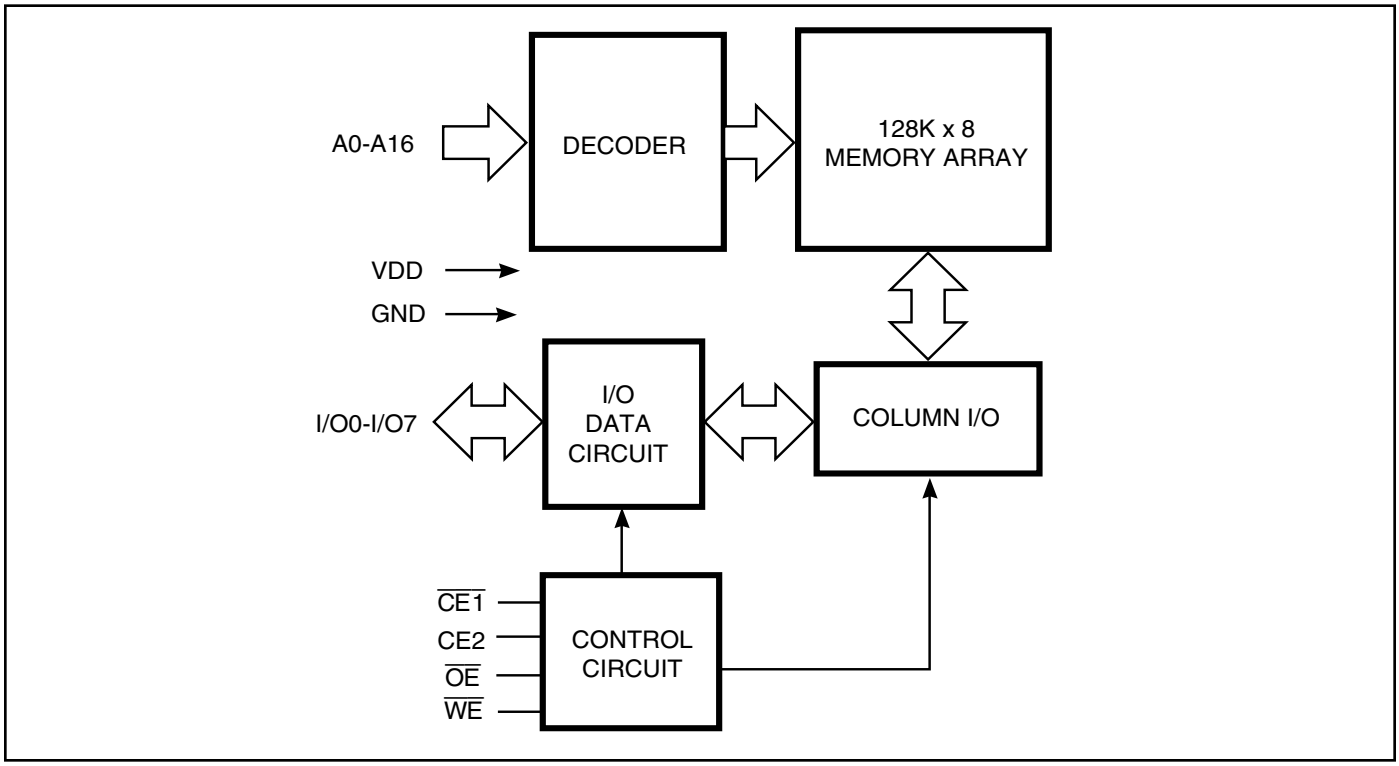
The *ISSI* IS61C1024AL/IS64C1024AL is a very high-speed, low power, 131,072-word by 8-bit CMOS static RAMs. They are fabricated using *ISSI*'s high-performance CMOS technology. This highly reliable process coupled with innovative circuit design techniques, yields higher performance and low power consumption 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 IS61C1024AL/IS64C1024AL is available in 32-pin TSOP (Type I, 8x20) and 32-pin sTSOP (Type I, 8 x 13.4) packages.

FUNCTIONAL BLOCK DIAGRAM



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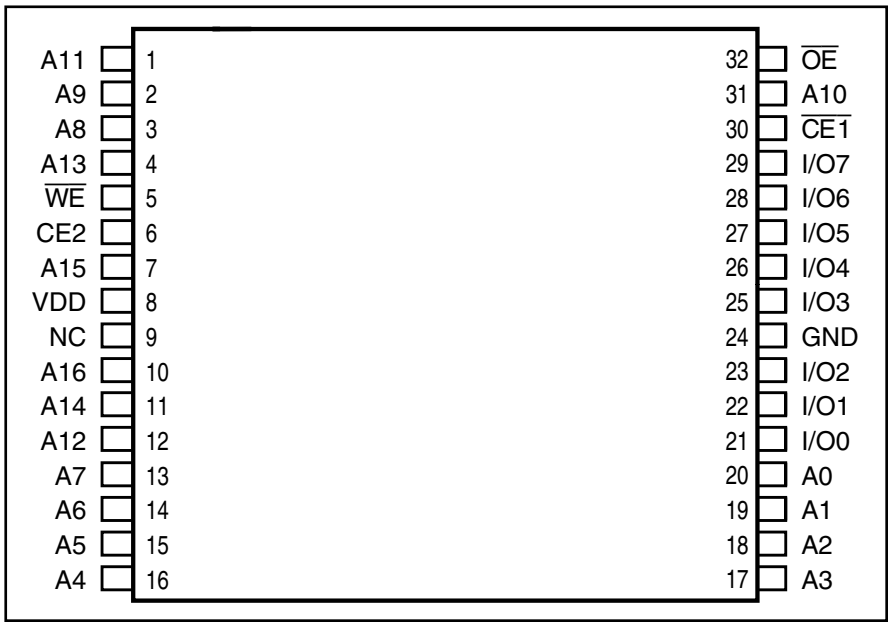
a.) the risk of injury or damage has been minimized;
b.) the user assume all such risks; and
c.) potential liability of Integrated Silicon Solution, Inc is adequately protected under the circumstances

PIN CONFIGURATION

32-Pin TSOP (Type 1) (T) and sTSOP (Type 1) (H)



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
V_{DD}	Power
GND	Ground

OPERATING RANGE (IS61C1024AL)

Range	Ambient Temperature	V_{DD}
Commercial	0°C to +70°C	5V ± 10%
Industrial	-40°C to +85°C	5V ± 10%

OPERATING RANGE (IS64C1024AL)

Range	Ambient Temperature	V_{DD}
Automotive	-40°C to +125°C	5V ± 10%

TRUTH TABLE

Mode	$\overline{WE}$	$\overline{CE1}$	CE2	$\overline{OE}$	I/O Operation	V_{DD} 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_{CC1}, I_{CC2}
Read	H	L	H	L	D_{OUT}	I_{CC1}, I_{CC2}
Write	L	L	H	X	D_{IN}	I_{CC1}, I_{CC2}

ABSOLUTE MAXIMUM RATINGS[1]

Symbol	Parameter	Value	Unit
V_{TERM}	Terminal Voltage with Respect to GND	–0.5 to +7.0	V
T_{STG}	Storage Temperature	–65 to +150	°C
P_T	Power Dissipation	1.5	W
I_{OUT}	DC Output Current (LOW)	20	mA

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	5	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V	7	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_{DD} = 5.0V.

DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

Symbol	Parameter	Test Conditions		Min.	Max.	Unit
V_{OH}	Output HIGH Voltage	V_{DD} = Min., I_{OH} = –4.0 mA		2.4	—	V
V_{OL}	Output LOW Voltage	V_{DD} = Min., I_{OL} = 8.0 mA		—	0.4	V
V_{IH}	Input HIGH Voltage			2.2	V_{DD} + 0.5	V
V_{IL}	Input LOW Voltage[1]			–0.3	0.8	V
I_{LI}	Input Leakage	GND ≤ V_{IN} ≤ V_{DD}	Com.	–1	1	µA
			Ind.	–2	2	
			Auto.	–5	5	
I_{LO}	Output Leakage	GND ≤ V_{OUT} ≤ V_{DD}	Com.	–1	1	µA
		Outputs Disabled	Ind.	–2	2	
			Auto.	–5	5	

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

IS61C1024AL/IS64C1024AL POWER SUPPLY CHARACTERISTICS[1] (Over Operating Range)

Symbol	Parameter	Test Conditions		-12 ns Min.	-12 ns Max.	-15 ns Min.	-15 ns Max.	Unit
I_{CC1}	V_{DD} Operating Supply Current	$V_{DD} = V_{DD\ MAX.}$, $\overline{CE1} = V_{IL}$ I_{OUT} = 0 mA, f = 0	Com. Ind. Auto.	— —	35 40	 —	 45	mA
I_{CC2}	V_{DD} Dynamic Operating Supply Current	$V_{DD} = V_{DD\ MAX.}$, $\overline{CE1} = V_{IL}$ I_{OUT} = 0 mA, f = f_{MAX}	Com. Ind. Auto. typ.[2]	— — —	45 50 32	 —	 55	mA
I_{SB1}	TTL Standby Current (TTL Inputs)	$V_{DD} = V_{DD\ MAX.}$, $V_{IN} = V_{IH}$ or V_{IL} $\overline{CE1} \geq V_{IH}$, f = 0 or $CE2 \leq V_{IL}$, f = 0	Com. Ind. Auto.	— —	1 1.5	 —	 2	mA
I_{SB2}	CMOS Standby Current (CMOS Inputs)	$V_{DD} = V_{DD\ MAX.}$, $\overline{CE1} \geq V_{DD} - 0.2V$, $CE2 \leq 0.2V$ $V_{IN} \geq V_{DD} - 0.2V$, or $V_{IN} \leq 0.2V$, f = 0	Com. Ind. Auto. typ.[2]	— — —	400 450 200	 —	 500	µA

Note:
1. At f = f_{MAX}, address and data inputs are cycling at the maximum frequency, f = 0 means no input lines change.
2. Typical Values are measured at V_{DD} = 5V, T_A = 25°C and not 100% tested.

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

Symbol	Parameter	-12 Min.	-12 Max.	-15 Min.	-15 Max.	Unit
t_{RC}	Read Cycle Time	12	—	15	—	ns
t_{AA}	Address Access Time	—	12	—	15	ns
t_{OHA}	Output Hold Time	3	—	3	—	ns
t_{ACE1}	$\overline{CE1}$ Access Time	—	12	—	15	ns
t_{ACE2}	CE2 Access Time	—	12	—	15	ns
t_{DOE}	$\overline{OE}$ Access Time	—	6	—	7	ns
t_{LZOE}[2]	$\overline{OE}$ to Low-Z Output	0	—	0	—	ns
t_{HZOE}[2]	$\overline{OE}$ to High-Z Output	0	6	0	6	ns
t_{LZCE1}[2]	$\overline{CE1}$ to Low-Z Output	2	—	2	—	ns
t_{LZCE2}[2]	CE2 to Low-Z Output	2	—	2	—	ns
t_{HZCE}[2]	$\overline{CE1}$ or CE2 to High-Z Output	0	7	0	8	ns
t_{PU}[3]	$\overline{CE1}$ or CE2 to Power-Up	0	—	0	—	ns
t_{PD}[3]	$\overline{CE1}$ or CE2 to Power-Down	—	12	—	12	ns

Notes:
1. Test conditions assume signal transition times of 3 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V and output loading specified in Figure 1.
2. Tested with the load in Figure 2. Transition is measured ±500 mV from steady-state voltage. Not 100% tested.
3. Not 100% tested.

AC TEST CONDITIONS

Parameter	Unit
Input Pulse Level	0V to 3.0V
Input Rise and Fall Times	3 ns
Input and Output Timing and Reference Level	1.5V
Output Load	See Figures 1 and 2

AC TEST LOADS

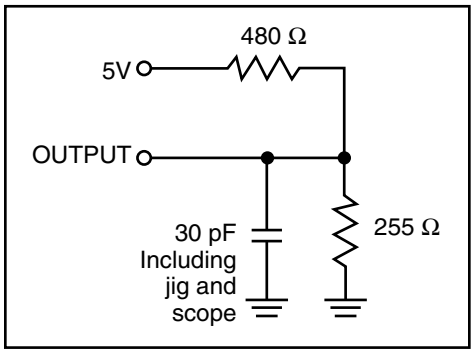


Figure 1

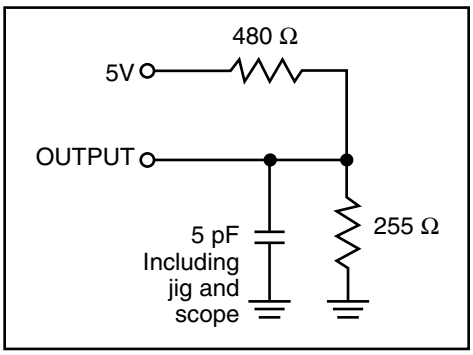
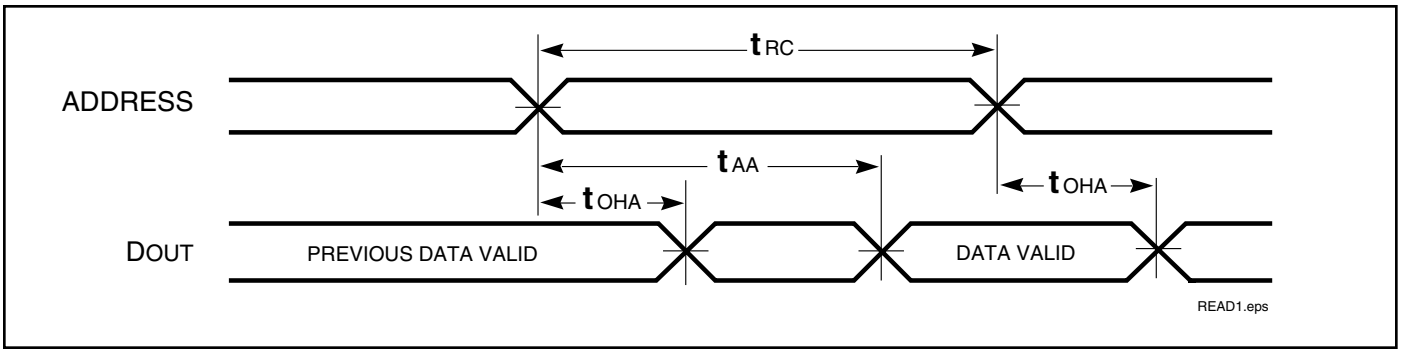


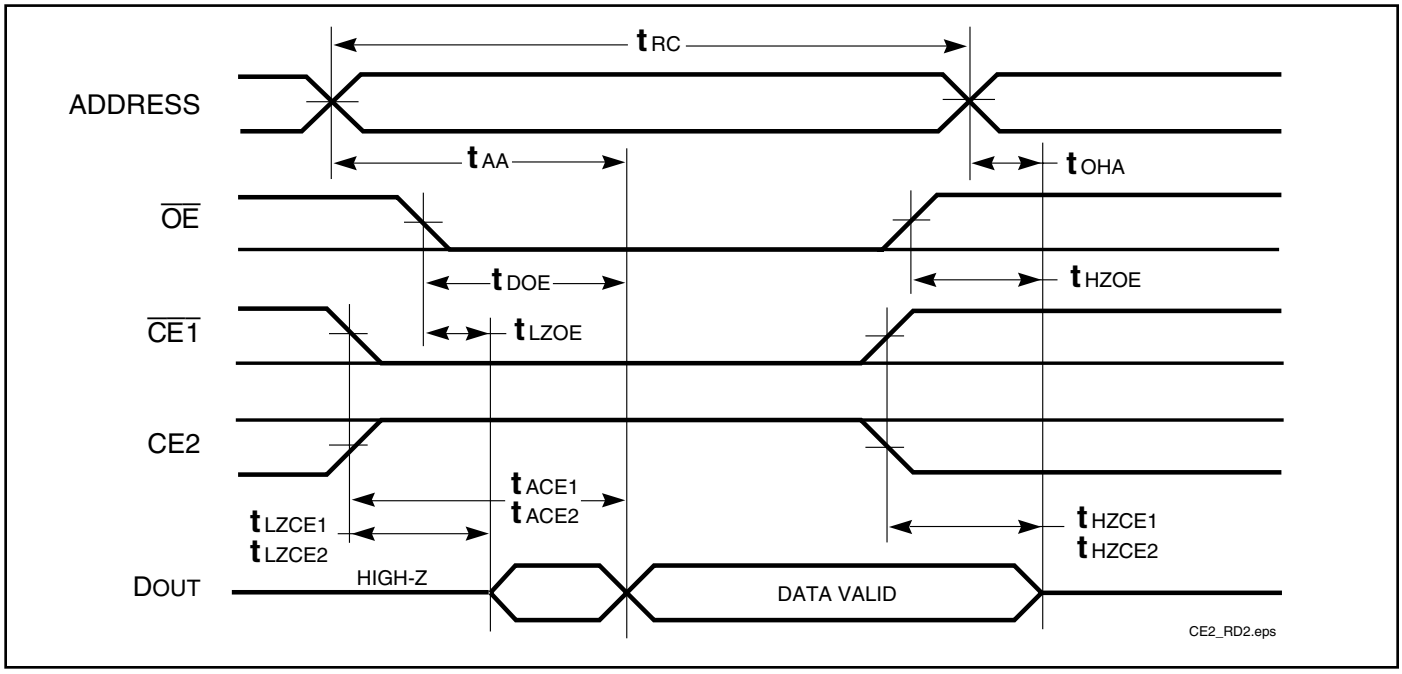
Figure 2

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.

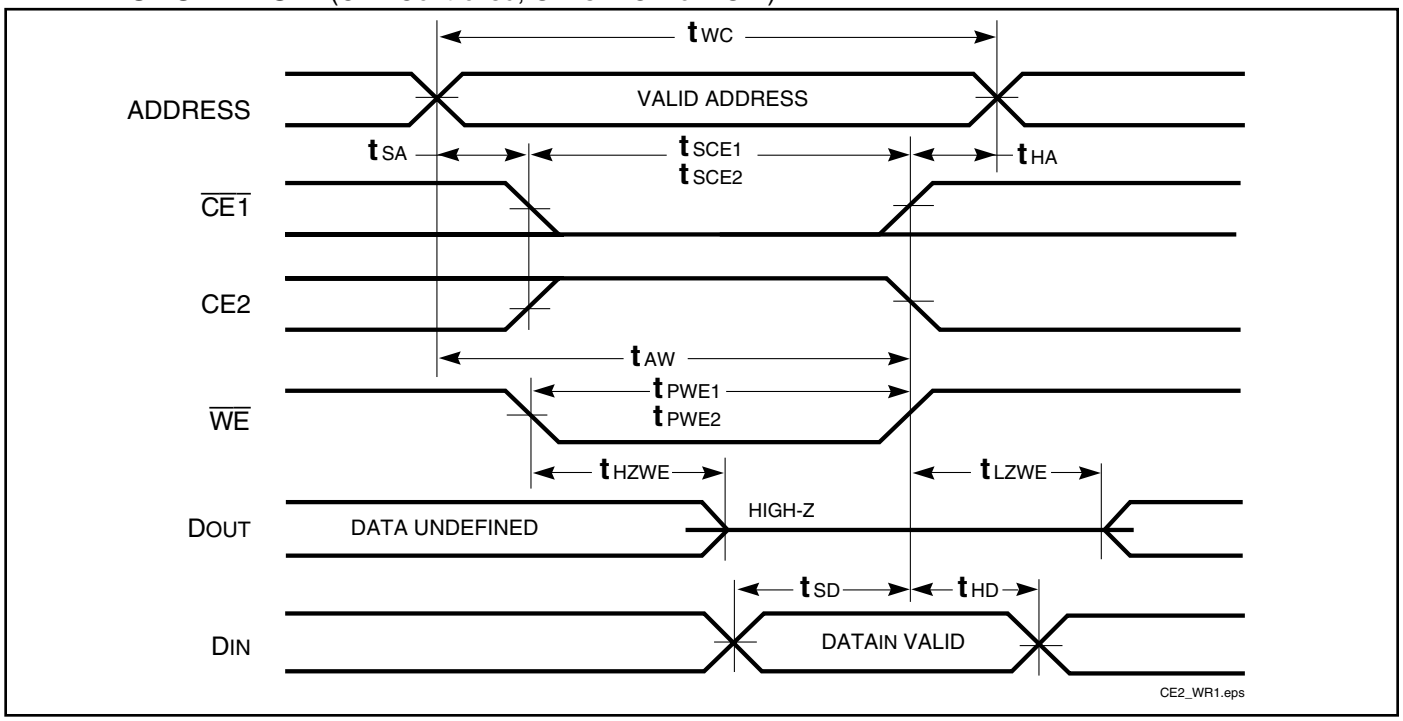
WRITE CYCLE SWITCHING CHARACTERISTICS[1,2] (Over Operating Range, Standard and Low Power)

Symbol	Parameter	-12 ns Min.	-12 ns Max.	-15 ns Min.	-15 ns Max.	Unit
t_{WC}	Write Cycle Time	12	—	15	—	ns
t_{SCE1}	$\overline{CE1}$ to Write End	10	—	12	—	ns
t_{SCE2}	CE2 to Write End	10	—	12	—	ns
t_{AW}	Address Setup Time to Write End	10	—	12	—	ns
t_{HA}	Address Hold from Write End	0	—	0	—	ns
t_{SA}	Address Setup Time	0	—	0	—	ns
t_{PWE}[3]	$\overline{WE}$ Pulse Width	10	—	12	—	ns
t_{SD}	Data Setup to Write End	7	—	10	—	ns
t_{HD}	Data Hold from Write End	0	—	0	—	ns
t_{HZWE}[4]	$\overline{WE}$ LOW to High-Z Output	—	7	—	7	ns
t_{LZWE}[4]	$\overline{WE}$ HIGH to Low-Z Output	2	—	2	—	ns

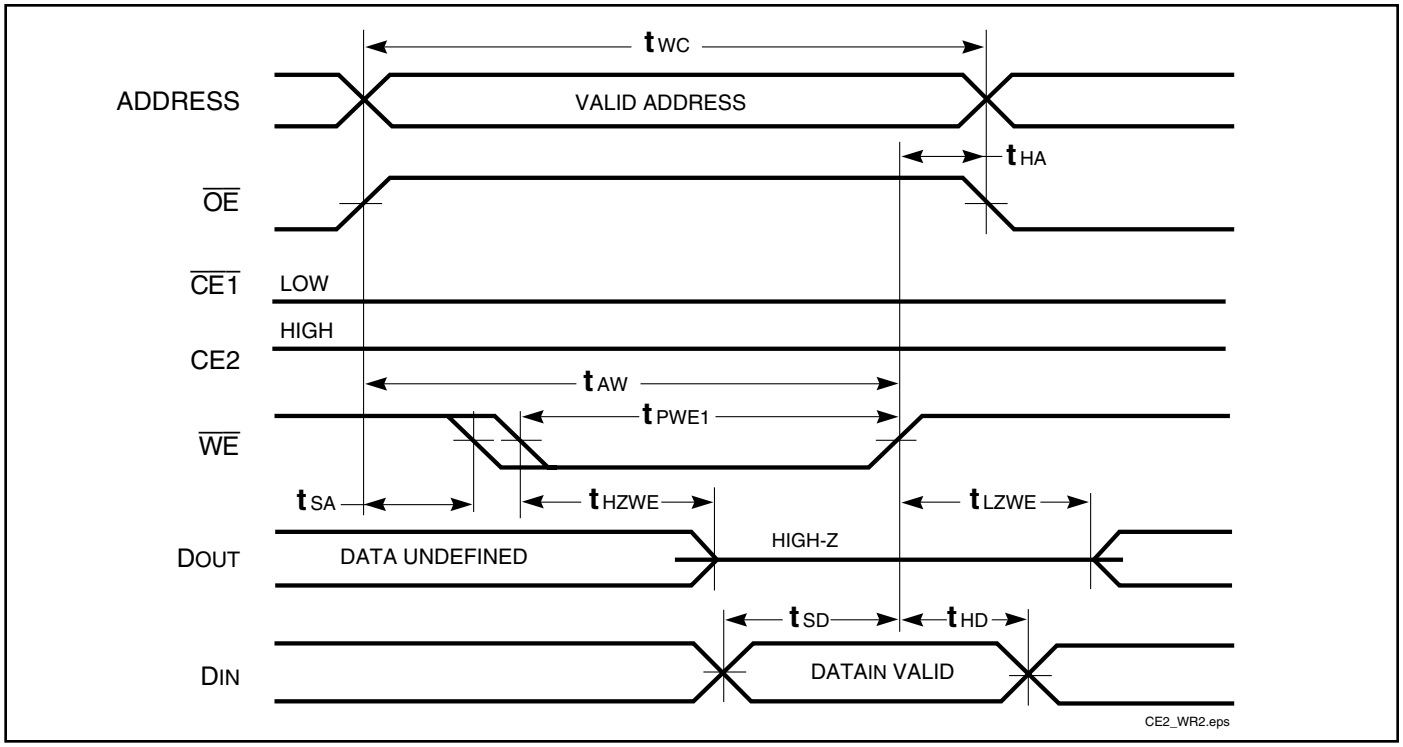
Notes:
1. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V and output loading specified in Figure 1.
2. The internal write time is defined by the overlap of $\overline{CE1}$ LOW, CE2 HIGH and $\overline{WE}$ LOW. All signals 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.
3. Tested with $\overline{OE}$ HIGH.
4. Tested with the load in Figure 2. Transition is measured ±500 mV from steady-state voltage. Not 100% tested.

AC WAVEFORMS

WRITE CYCLE NO. 1 ($\overline{CE1}$ Controlled, $\overline{OE}$ is HIGH or LOW) (1)



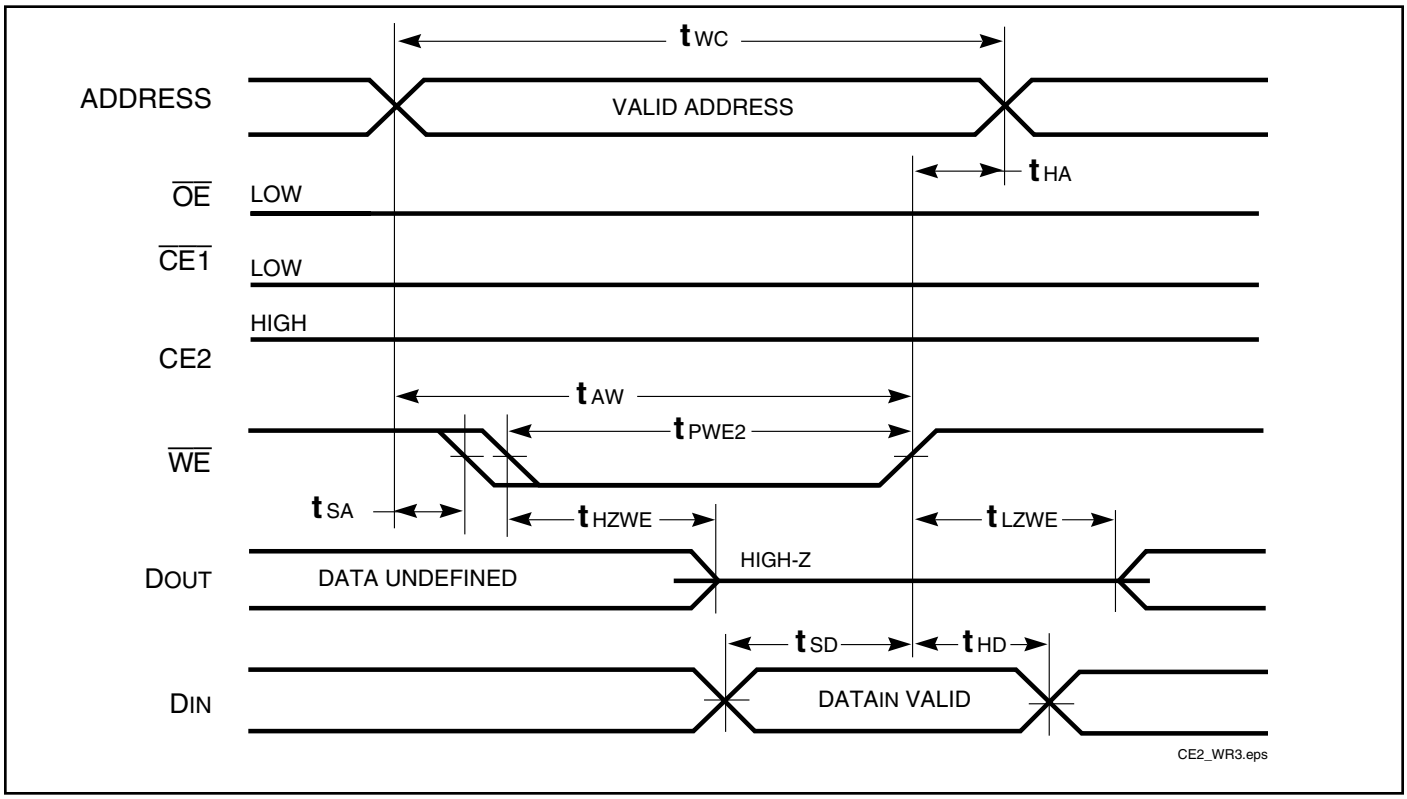
WRITE CYCLE NO. 2 ($\overline{OE}$ is HIGH During Write Cycle) (1,2)



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}.

WRITE CYCLE NO. 3 ($\overline{OE}$ is LOW During Write Cycle) [1]



ORDERING INFORMATION: IS61C1024AL
Industrial Range: –40°C to +85°C

Speed (ns)	Order Part No.	Package
12	IS61C1024AL-12HLI	sTSOP (Type I), green
	IS61C1024AL-12TLI	TSOP (Type I), green

ORDERING INFORMATION: IS64C1024AL
Automotive Range: –40°C to +125°C

Speed (ns)	Order Part No.	Package
15	IS64C1024AL-15TLA3	TSOP (Type I), green

Note:
All products listed above are green. This refers to the package being (RoHS Compliant, Halogen-free) and TSCA Compliant.

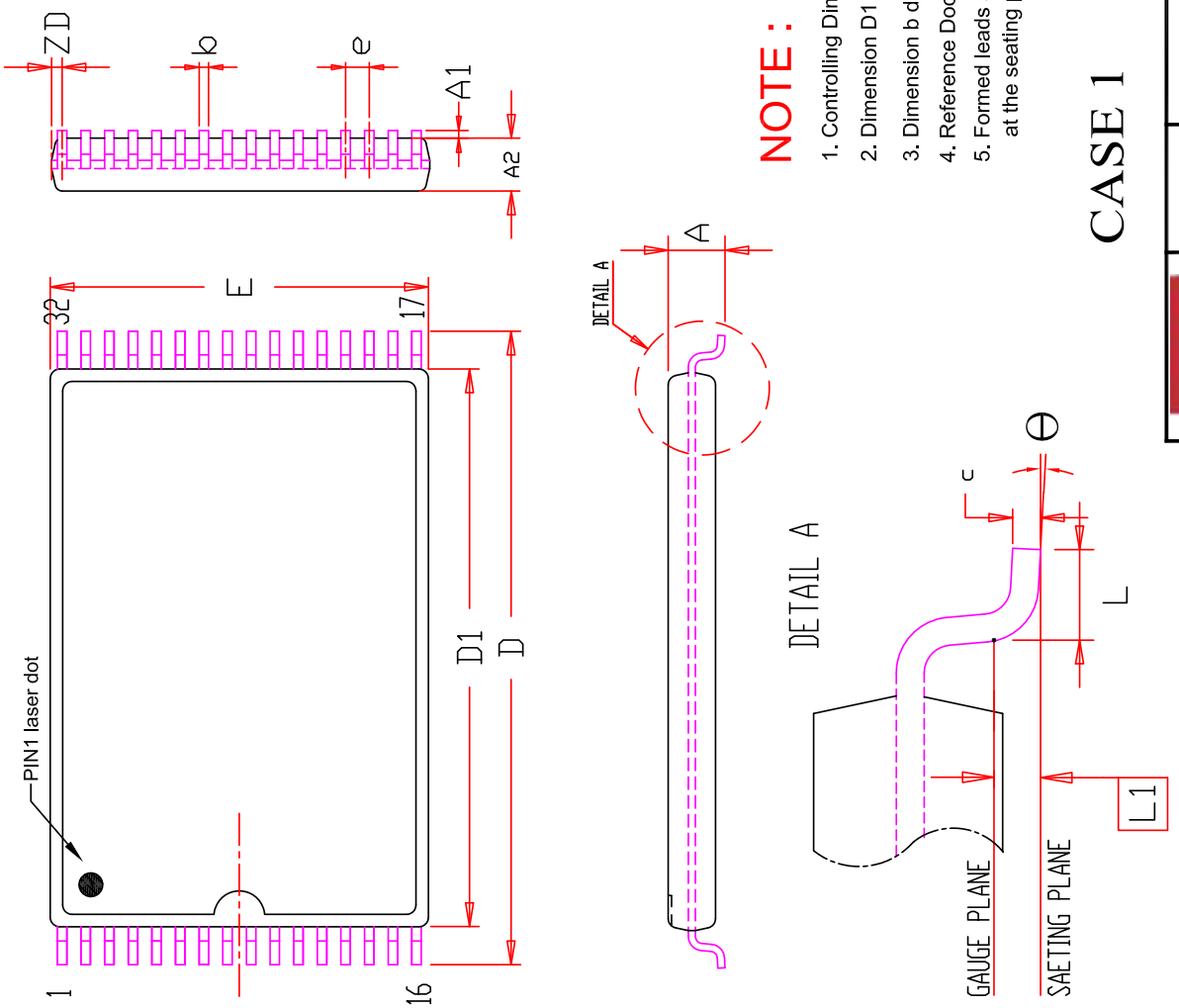
SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.95	—	1.25	0.037	—	0.049
A1	0.05	—	0.15	0.002	—	0.008
A2	0.90	—	1.05	0.035	—	0.041
b	0.16	—	0.27	0.006	—	0.011
D	13.10	13.40	13.70	0.516	0.528	0.539
D1	11.70	11.80	11.90	0.461	0.465	0.469
E	7.90	8.00	8.10	0.311	0.315	0.319
e	0.50 BSC.			0.020 BSC.		
L	0.30	0.50	0.70	0.012	0.020	0.028
L1	0.25 BSC.			0.010 BSC.		
ZD	0.25 REF.			0.010 REF.		
Θ	0	3°	5°	0	3°	5°
c	0.10	—	0.21	0.004	—	0.008

NOTE :

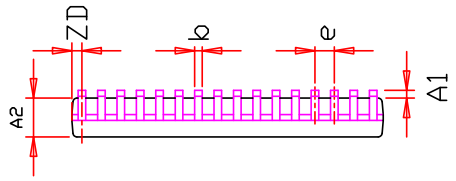
1. Controlling Dimension : mm
2. Dimension D1 and E do not include mold protrusion.
3. Dimension b does not include dambar protrusion/intrusion.
4. Reference Document : JEDEC MO-183
5. Formed leads shall be planar with respect to one another within 0.1mm at the seating plane after final test.

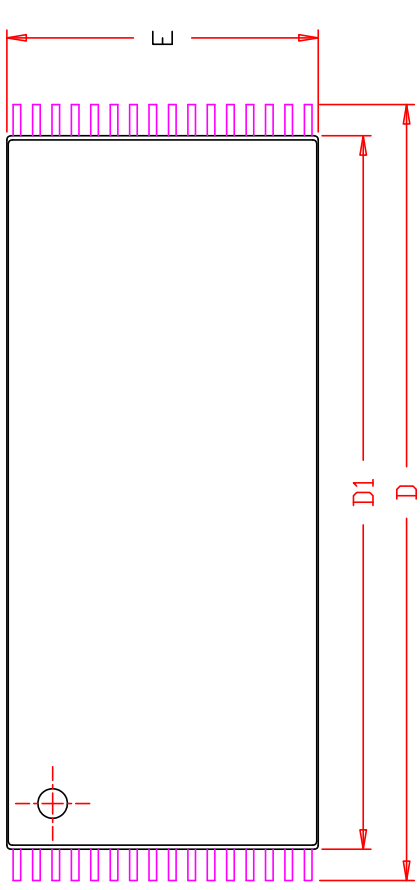
CASE 1

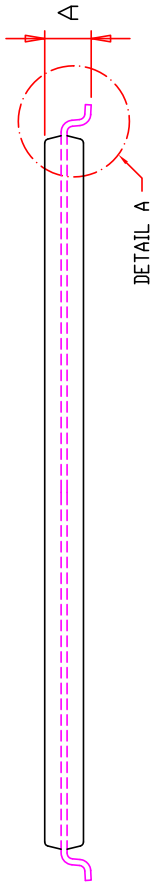
TITLE	32L 8x13.4mm TSOP-1 Package Outline	REV.	F	DATE	06/21/2017



SYMBOL	DIMENSION IN MM		
	MIN	NOM	MAX
A	1.00	—	1.20
A1	0.05	—	0.20
A2	0.95	1.00	1.05
b	0.17	—	0.27
c	0.10	—	0.21
D	19.80	20.00	20.20
D1	18.30	18.40	18.50
E	7.80	8.00	8.20
e		0.50 BSC.	
L	0.40	—	0.70
L1		0.25 BSC.	
ZD		0.25 REF.	
θ	0	5°	8°







NOTE :

1. Controlling dimension : mm
2. Dimension D1 adn E do not include mold protrusion .
3. Dimension b does not include dambar protrusion/intrusion.
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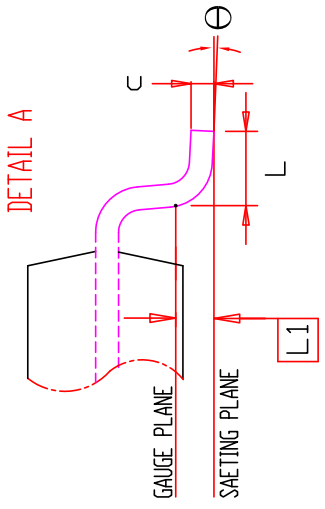

TITLE	32L 8x20mm TSOP-1 Package Outline	REV.	G1	DATE	01/04/2024