

# IS61WV25616ALL/ALS IS61WV25616BLL/BLS IS64WV25616BLL/BLS



## 256K x 16 HIGH SPEED ASYNCHRONOUS CMOS STATIC RAM

JULY 2010

### FEATURES

#### HIGH SPEED: (IS61/64WV25616ALL/BLL)

- High-speed access time: 8, 10, 20 ns
- Low Active Power: 85 mW (typical)
- Low Standby Power: 7 mW (typical)  
CMOS standby

#### LOW POWER: (IS61/64WV25616ALS/BLS)

- High-speed access time: 25, 35, 45 ns
- Low Active Power: 35 mW (typical)
- Low Standby Power: 0.6 mW (typical)  
CMOS standby
- Single power supply
  - $V_{DD}$  1.65V to 2.2V (IS61WV25616Axx)
  - $V_{DD}$  2.4V to 3.6V (IS61/64WV25616Bxx)
- Fully static operation: no clock or refresh required
- Three state outputs
- Data control for upper and lower bytes
- Industrial and Automotive temperature support
- Lead-free available

### DESCRIPTION

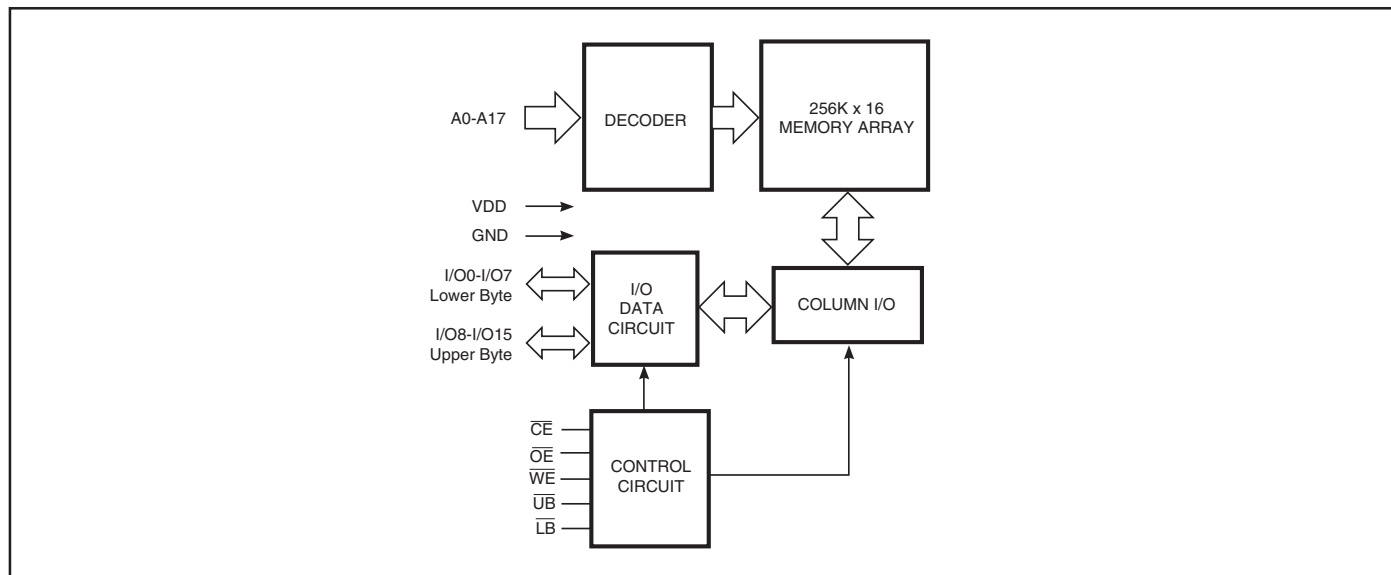
The *ISSI* IS61WV25616Axx/Bxx and IS64WV25616Bxx are high-speed, 4,194,304-bit static RAMs organized as 262,144 words by 16 bits. It is fabricated using *ISSI*'s high-performance CMOS technology. This highly reliable process coupled with innovative circuit design techniques, yields high-performance and low power consumption devices.

When  $\overline{CE}$  is HIGH (deselected), the device assumes a standby mode at which the power dissipation can be reduced down with CMOS input levels.

Easy memory expansion is provided by using Chip Enable and Output Enable inputs,  $\overline{CE}$  and  $\overline{OE}$ . The active LOW Write Enable ( $\overline{WE}$ ) controls both writing and reading of the memory. A data byte allows Upper Byte ( $\overline{UB}$ ) and Lower Byte ( $\overline{LB}$ ) access.

The IS61WV25616Axx/Bxx and IS64WV25616Bxx are packaged in the JEDEC standard 44-pin TSOP Type II and 48-pin Mini BGA (6mm x 8mm).

### FUNCTIONAL BLOCK DIAGRAM



Copyright © 2010 Integrated Silicon Solution, Inc. All rights reserved. ISSI reserves the right to make changes to this specification and its products at any time without notice. ISSI assumes no liability arising out of the application or use of any information, products or services described herein. Customers are advised to obtain the latest version of this device specification before relying on any published information and before placing orders for products.

Integrated Silicon Solution, Inc. does not recommend the use of any of its products in life support applications where the failure or malfunction of the product can reasonably be expected to cause failure of the life support system or to significantly affect its safety or effectiveness. Products are not authorized for use in such applications unless Integrated Silicon Solution, Inc. receives written assurance to its satisfaction, that:

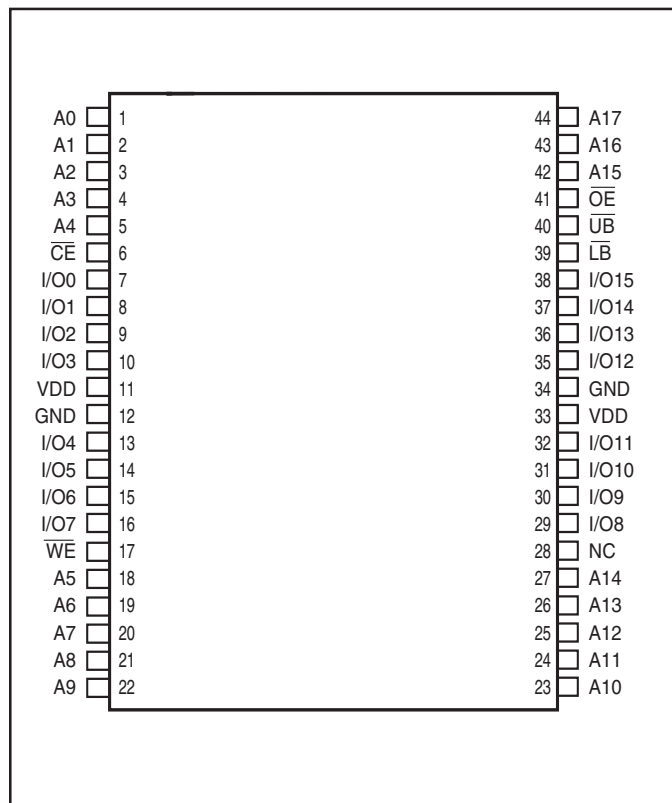
- a.) the risk of injury or damage has been minimized;
- b.) the user assume all such risks; and
- c.) potential liability of Integrated Silicon Solution, Inc is adequately protected under the circumstances

## TRUTH TABLE

| Mode            | $\overline{WE}$ | $\overline{CE}$ | $\overline{OE}$ | $\overline{LB}$ | $\overline{UB}$ | I/O PIN   |            | V <sub>DD</sub> Current |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------|------------|-------------------------|
|                 |                 |                 |                 |                 |                 | I/O0-I/O7 | I/O8-I/O15 |                         |
| Not Selected    | X               | H               | X               | X               | X               | High-Z    | High-Z     | ISB1, ISB2              |
| Output Disabled | H               | L               | H               | X               | X               | High-Z    | High-Z     | I <sub>CC</sub>         |
|                 | X               | L               | X               | H               | H               | High-Z    | High-Z     |                         |
| Read            | H               | L               | L               | L               | H               | DOUT      | High-Z     | I <sub>CC</sub>         |
|                 | H               | L               | L               | H               | L               | High-Z    | DOUT       |                         |
|                 | H               | L               | L               | L               | L               | DOUT      | DOUT       |                         |
| Write           | L               | L               | X               | L               | H               | DIN       | High-Z     | I <sub>CC</sub>         |
|                 | L               | L               | X               | H               | L               | High-Z    | DIN        |                         |
|                 | L               | L               | X               | L               | L               | DIN       | DIN        |                         |

## PIN CONFIGURATIONS

### 44-Pin TSOP (Type II) and SOJ



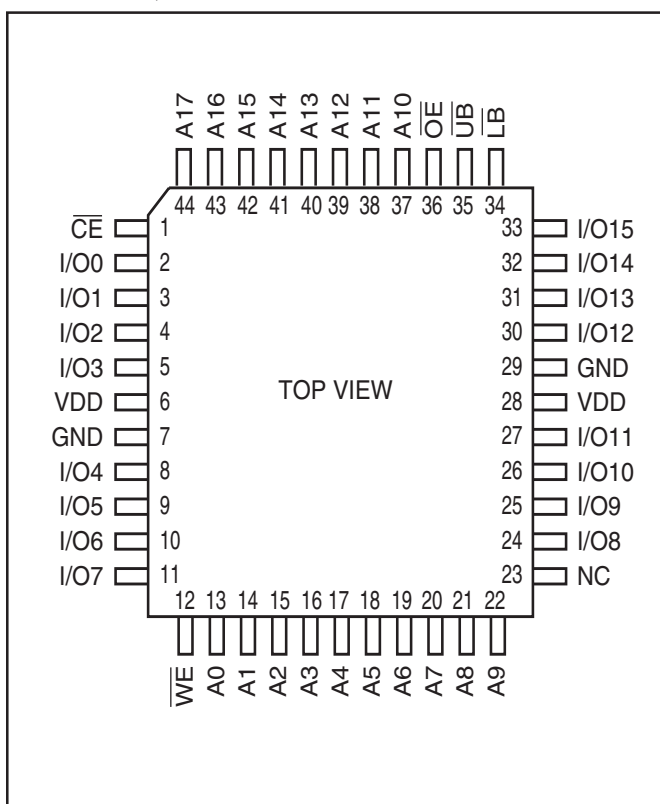
\*SOJ package under evaluation.

## PIN DESCRIPTIONS

|                 |                                 |
|-----------------|---------------------------------|
| A0-A17          | Address Inputs                  |
| I/O0-I/O15      | Data Inputs/Outputs             |
| $\overline{CE}$ | Chip Enable Input               |
| $\overline{OE}$ | Output Enable Input             |
| $\overline{WE}$ | Write Enable Input              |
| $\overline{LB}$ | Lower-byte Control (I/O0-I/O7)  |
| $\overline{UB}$ | Upper-byte Control (I/O8-I/O15) |
| NC              | No Connection                   |
| V <sub>DD</sub> | Power                           |
| GND             | Ground                          |

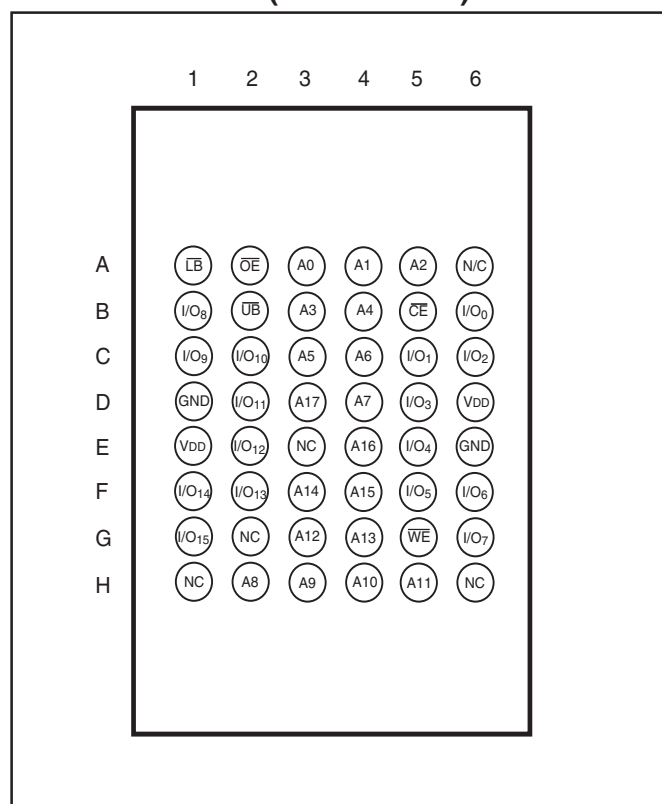
## PIN CONFIGURATIONS

### 44-Pin LQFP



\*LQFP package under evaluation.

### 48-Pin mini BGA (6mm x 8mm)



## PIN DESCRIPTIONS

|                 |                                 |
|-----------------|---------------------------------|
| A0-A17          | Address Inputs                  |
| I/O0-I/O15      | Data Inputs/Outputs             |
| $\overline{CE}$ | Chip Enable Input               |
| $\overline{OE}$ | Output Enable Input             |
| $\overline{WE}$ | Write Enable Input              |
| $\overline{LB}$ | Lower-byte Control (I/O0-I/O7)  |
| $\overline{UB}$ | Upper-byte Control (I/O8-I/O15) |
| NC              | No Connection                   |
| VDD             | Power                           |
| GND             | Ground                          |

## DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

$V_{DD} = 3.3V \pm 5\%$

| Symbol   | Parameter                        | Test Conditions                                   | Min. | Max.           | Unit    |
|----------|----------------------------------|---------------------------------------------------|------|----------------|---------|
| $V_{OH}$ | Output HIGH Voltage              | $V_{DD} = \text{Min.}, I_{OH} = -4.0 \text{ mA}$  | 2.4  | —              | V       |
| $V_{OL}$ | Output LOW Voltage               | $V_{DD} = \text{Min.}, I_{OL} = 8.0 \text{ mA}$   | —    | 0.4            | V       |
| $V_{IH}$ | Input HIGH Voltage               |                                                   | 2    | $V_{DD} + 0.3$ | V       |
| $V_{IL}$ | Input LOW Voltage <sup>(1)</sup> |                                                   | -0.3 | 0.8            | V       |
| $I_{LI}$ | Input Leakage                    | $GND \leq V_{IN} \leq V_{DD}$                     | -1   | 1              | $\mu A$ |
| $I_{LO}$ | Output Leakage                   | $GND \leq V_{OUT} \leq V_{DD}$ , Outputs Disabled | -1   | 1              | $\mu A$ |

**Note:**

1.  $V_{IL} (\text{min.}) = -0.3V \text{ DC}$ ;  $V_{IL} (\text{min.}) = -2.0V \text{ AC}$  (pulse width < 10 ns). Not 100% tested.  
 $V_{IH} (\text{max.}) = V_{DD} + 0.3V \text{ DC}$ ;  $V_{IH} (\text{max.}) = V_{DD} + 2.0V \text{ AC}$  (pulse width < 10 ns). Not 100% tested.

## DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

$V_{DD} = 2.4V-3.6V$

| Symbol   | Parameter                        | Test Conditions                                   | Min. | Max.           | Unit    |
|----------|----------------------------------|---------------------------------------------------|------|----------------|---------|
| $V_{OH}$ | Output HIGH Voltage              | $V_{DD} = \text{Min.}, I_{OH} = -1.0 \text{ mA}$  | 1.8  | —              | V       |
| $V_{OL}$ | Output LOW Voltage               | $V_{DD} = \text{Min.}, I_{OL} = 1.0 \text{ mA}$   | —    | 0.4            | V       |
| $V_{IH}$ | Input HIGH Voltage               |                                                   | 2.0  | $V_{DD} + 0.3$ | V       |
| $V_{IL}$ | Input LOW Voltage <sup>(1)</sup> |                                                   | -0.3 | 0.8            | V       |
| $I_{LI}$ | Input Leakage                    | $GND \leq V_{IN} \leq V_{DD}$                     | -1   | 1              | $\mu A$ |
| $I_{LO}$ | Output Leakage                   | $GND \leq V_{OUT} \leq V_{DD}$ , Outputs Disabled | -1   | 1              | $\mu A$ |

**Note:**

1.  $V_{IL} (\text{min.}) = -0.3V \text{ DC}$ ;  $V_{IL} (\text{min.}) = -2.0V \text{ AC}$  (pulse width < 10 ns). Not 100% tested.  
 $V_{IH} (\text{max.}) = V_{DD} + 0.3V \text{ DC}$ ;  $V_{IH} (\text{max.}) = V_{DD} + 2.0V \text{ AC}$  (pulse width < 10 ns). Not 100% tested.

## DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

$V_{DD} = 1.65V-2.2V$

| Symbol         | Parameter           | Test Conditions                                   | $V_{DD}$  | Min. | Max.           | Unit    |
|----------------|---------------------|---------------------------------------------------|-----------|------|----------------|---------|
| $V_{OH}$       | Output HIGH Voltage | $I_{OH} = -0.1 \text{ mA}$                        | 1.65-2.2V | 1.4  | —              | V       |
| $V_{OL}$       | Output LOW Voltage  | $I_{OL} = 0.1 \text{ mA}$                         | 1.65-2.2V | —    | 0.2            | V       |
| $V_{IH}$       | Input HIGH Voltage  |                                                   | 1.65-2.2V | 1.4  | $V_{DD} + 0.2$ | V       |
| $V_{IL}^{(1)}$ | Input LOW Voltage   |                                                   | 1.65-2.2V | -0.2 | 0.4            | V       |
| $I_{LI}$       | Input Leakage       | $GND \leq V_{IN} \leq V_{DD}$                     |           | -1   | 1              | $\mu A$ |
| $I_{LO}$       | Output Leakage      | $GND \leq V_{OUT} \leq V_{DD}$ , Outputs Disabled |           | -1   | 1              | $\mu A$ |

**Note:**

1.  $V_{IL} (\text{min.}) = -0.3V \text{ DC}$ ;  $V_{IL} (\text{min.}) = -2.0V \text{ AC}$  (pulse width < 10 ns). Not 100% tested.  
 $V_{IH} (\text{max.}) = V_{DD} + 0.3V \text{ DC}$ ;  $V_{IH} (\text{max.}) = V_{DD} + 2.0V \text{ AC}$  (pulse width < 10 ns). Not 100% tested.

## AC TEST CONDITIONS

| Parameter                                                    | Unit<br>(2.4V-3.6V) | Unit<br>(3.3V $\pm$ 10%) | Unit<br>(1.65V-2.2V) |
|--------------------------------------------------------------|---------------------|--------------------------|----------------------|
| Input Pulse Level                                            | 0V to 3V            | 0V to 3V                 | 0V to 1.8V           |
| Input Rise and Fall Times                                    | 1V/ns               | 1V/ns                    | 1V/ns                |
| Input and Output Timing<br>and Reference Level ( $V_{Ref}$ ) | 1.5V                | 1.5V                     | 0.9V                 |
| Output Load                                                  | See Figures 1 and 2 | See Figures 1 and 2      | See Figures 1 and 2  |

## AC TEST LOADS

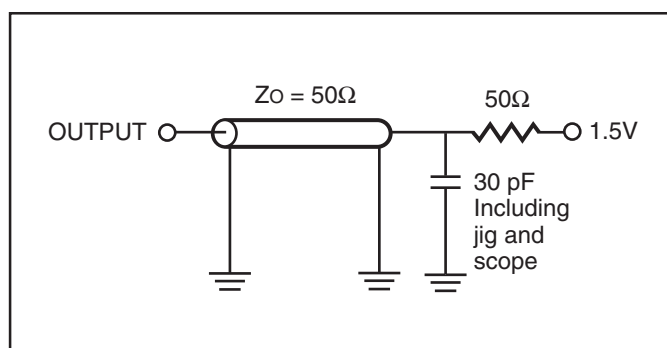


Figure 1.

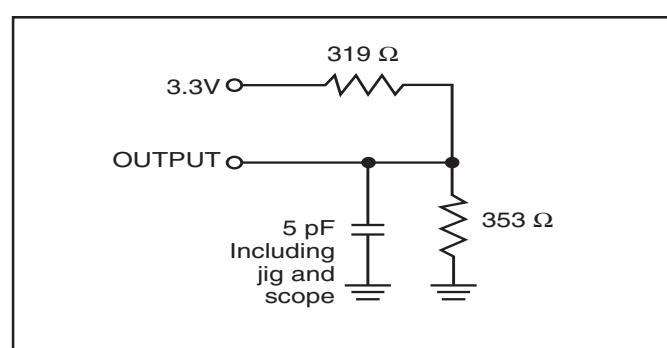


Figure 2.

## ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

| Symbol            | Parameter                            | Value                         | Unit |
|-------------------|--------------------------------------|-------------------------------|------|
| V <sub>TERM</sub> | Terminal Voltage with Respect to GND | −0.5 to V <sub>DD</sub> + 0.5 | V    |
| V <sub>DD</sub>   | V <sub>DD</sub> Relates to GND       | −0.3 to 4.0                   | V    |
| T <sub>STG</sub>  | Storage Temperature                  | −65 to +150                   | °C   |
| P <sub>T</sub>    | Power Dissipation                    | 1.0                           | 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<sup>(1,2)</sup>

| Symbol           | Parameter                | Conditions            | Max. | Unit |
|------------------|--------------------------|-----------------------|------|------|
| C <sub>IN</sub>  | Input Capacitance        | V <sub>IN</sub> = 0V  | 6    | pF   |
| C <sub>I/O</sub> | Input/Output Capacitance | V <sub>OUT</sub> = 0V | 8    | pF   |

### Notes:

1. Tested initially and after any design or process changes that may affect these parameters.
2. Test conditions: T<sub>A</sub> = 25°C, f = 1 MHz, V<sub>DD</sub> = 3.3V.

## HIGH SPEED (IS61WV25616ALL/BLL)

### OPERATING RANGE ( $V_{DD}$ ) (IS61WV25616ALL)

| Range      | Ambient Temperature | $V_{DD}$   | Speed |
|------------|---------------------|------------|-------|
| Commercial | 0°C to +70°C        | 1.65V-2.2V | 20ns  |
| Industrial | -40°C to +85°C      | 1.65V-2.2V | 20ns  |
| Automotive | -40°C to +125°C     | 1.65V-2.2V | 20ns  |

### OPERATING RANGE ( $V_{DD}$ ) (IS61WV25616BLL)<sup>(1)</sup>

| Range      | Ambient Temperature | $V_{DD}$ (8 ns) <sup>1</sup> | $V_{DD}$ (10 ns) <sup>1</sup> |
|------------|---------------------|------------------------------|-------------------------------|
| Commercial | 0°C to +70°C        | 3.3V $\pm$ 5%                | 2.4V-3.6V                     |
| Industrial | -40°C to +85°C      | 3.3V $\pm$ 5%                | 2.4V-3.6V                     |

**Note:**

1. When operated in the range of 2.4V-3.6V, the device meets 10ns. When operated in the range of 3.3V  $\pm$  5%, the device meets 8ns.

### OPERATING RANGE ( $V_{DD}$ ) (IS64WV25616BLL)

| Range      | Ambient Temperature | $V_{DD}$ (10 ns) |
|------------|---------------------|------------------|
| Automotive | -40°C to +125°C     | 2.4V-3.6V        |

## POWER SUPPLY CHARACTERISTICS<sup>(1)</sup> (Over Operating Range)

| Symbol    | Parameter                                 | Test Conditions                                                                                                                         |                     | -8   |      | -10  |      | -20  |      | Unit |
|-----------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|------|------|------|------|
|           |                                           |                                                                                                                                         |                     | Min. | Max. | Min. | Max. | Min. | Max. |      |
| $I_{CC}$  | $V_{DD}$ Dynamic Operating Supply Current | $V_{DD} = \text{Max.},$<br>$I_{OUT} = 0 \text{ mA}, f = f_{MAX}$                                                                        | Com.                | —    | 50   | —    | 40   | —    | 35   | mA   |
|           |                                           |                                                                                                                                         | Ind.                | —    | 55   | —    | 45   | —    | 40   |      |
|           |                                           |                                                                                                                                         | Auto.               | —    | —    | —    | 65   | —    | 60   |      |
|           |                                           |                                                                                                                                         | typ. <sup>(2)</sup> |      |      | 25   |      |      |      |      |
| $I_{CC1}$ | Operating Supply Current                  | $V_{DD} = \text{Max.},$<br>$I_{OUT} = 0 \text{ mA}, f = 0$                                                                              | Com.                | —    | 35   | —    | 35   | —    | 30   | mA   |
|           |                                           |                                                                                                                                         | Ind.                | —    | 40   | —    | 40   | —    | 40   |      |
|           |                                           |                                                                                                                                         | Auto.               | —    | —    | —    | 60   | —    | 60   |      |
|           |                                           |                                                                                                                                         |                     |      |      |      |      |      |      |      |
| $I_{SB1}$ | TTL Standby Current (TTL Inputs)          | $V_{DD} = \text{Max.},$<br>$V_{IN} = V_{IH} \text{ or } V_{IL}$<br>$\overline{CE} \geq V_{IH}, f = 0$                                   | Com.                | —    | 10   | —    | 10   | —    | 10   | mA   |
|           |                                           |                                                                                                                                         | Ind.                | —    | 15   | —    | 15   | —    | 15   |      |
|           |                                           |                                                                                                                                         | Auto.               | —    | —    | —    | 30   | —    | 30   |      |
|           |                                           |                                                                                                                                         |                     |      |      |      |      |      |      |      |
| $I_{SB2}$ | CMOS Standby Current (CMOS Inputs)        | $V_{DD} = \text{Max.},$<br>$\overline{CE} \geq V_{DD} - 0.2V,$<br>$V_{IN} \geq V_{DD} - 0.2V, \text{ or }$<br>$V_{IN} \leq 0.2V, f = 0$ | Com.                | —    | 8    | —    | 8    | —    | 8    | mA   |
|           |                                           |                                                                                                                                         | Ind.                | —    | 9    | —    | 9    | —    | 9    |      |
|           |                                           |                                                                                                                                         | Auto.               | —    | —    | —    | 20   | —    | 20   |      |
|           |                                           |                                                                                                                                         | typ. <sup>(2)</sup> |      |      | 2    |      |      |      |      |

**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  $V_{DD} = 3.0V$ ,  $T_A = 25^\circ\text{C}$  and not 100% tested.

## LOW POWER (IS61WV25616ALS/BLS)

### OPERATING RANGE ( $V_{DD}$ ) (IS61WV25616ALS)

| Range      | Ambient Temperature | $V_{DD}$   | Speed |
|------------|---------------------|------------|-------|
| Commercial | 0°C to +70°C        | 1.65V-2.2V | 45ns  |
| Industrial | -40°C to +85°C      | 1.65V-2.2V | 45ns  |
| Automotive | -40°C to +125°C     | 1.65V-2.2V | 45ns  |

### OPERATING RANGE ( $V_{DD}$ ) (IS61WV25616BLS)

| Range      | Ambient Temperature | $V_{DD}$ (25 ns) |
|------------|---------------------|------------------|
| Commercial | 0°C to +70°C        | 2.4V-3.6V        |
| Industrial | -40°C to +85°C      | 2.4V-3.6V        |

### OPERATING RANGE ( $V_{DD}$ ) (IS64WV25616BLS)

| Range      | Ambient Temperature | $V_{DD}$ (35 ns) |
|------------|---------------------|------------------|
| Automotive | -40°C to +125°C     | 2.4V-3.6V        |

## POWER SUPPLY CHARACTERISTICS<sup>(1)</sup> (Over Operating Range)

| Symbol           | Parameter                                        | Test Conditions                                                                                                                                     |                     | -25  |      | -35  |      | -45  |      | Unit |
|------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|------|------|------|------|
|                  |                                                  |                                                                                                                                                     |                     | Min. | Max. | Min. | Max. | Min. | Max. |      |
| I <sub>CC</sub>  | V <sub>DD</sub> Dynamic Operating Supply Current | V <sub>DD</sub> = Max.,<br>I <sub>OUT</sub> = 0 mA, f = f <sub>MAX</sub>                                                                            | Com.                | —    | 20   | —    | 20   | —    | 15   | mA   |
|                  |                                                  |                                                                                                                                                     | Ind.                | —    | 25   | —    | 25   | —    | 20   |      |
|                  |                                                  |                                                                                                                                                     | Auto.               | —    | 50   | —    | 50   | —    | 40   |      |
|                  |                                                  |                                                                                                                                                     | typ. <sup>(2)</sup> | 11   |      |      |      |      |      |      |
| I <sub>CC1</sub> | Operating Supply Current                         | V <sub>DD</sub> = Max.,<br>I <sub>OUT</sub> = 0 mA, f = 0                                                                                           | Com.                | —    | 10   | —    | 10   | —    | 10   | mA   |
|                  |                                                  |                                                                                                                                                     | Ind.                | —    | 12   | —    | 12   | —    | 12   |      |
|                  |                                                  |                                                                                                                                                     | Auto.               | —    | 20   | —    | 20   | —    | 20   |      |
| I <sub>SB1</sub> | TTL Standby Current (TTL Inputs)                 | V <sub>DD</sub> = Max.,<br>V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>$\overline{CE} \geq V_{IH}$ , f = 0                              | Com.                | —    | 5    | —    | 5    | —    | 5    | mA   |
|                  |                                                  |                                                                                                                                                     | Ind.                | —    | 7    | —    | 7    | —    | 7    |      |
|                  |                                                  |                                                                                                                                                     | Auto.               | —    | 10   | —    | 10   | —    | 10   |      |
| I <sub>SB2</sub> | CMOS Standby Current (CMOS Inputs)               | V <sub>DD</sub> = Max.,<br>$\overline{CE} \geq V_{DD} - 0.2V$ ,<br>V <sub>IN</sub> $\geq V_{DD} - 0.2V$ , or<br>V <sub>IN</sub> $\leq 0.2V$ , f = 0 | Com.                | —    | 1    | —    | 1    | —    | 1    | mA   |
|                  |                                                  |                                                                                                                                                     | Ind.                | —    | 2    | —    | 2    | —    | 2    |      |
|                  |                                                  |                                                                                                                                                     | Auto.               | —    | 10   | —    | 10   | —    | 10   |      |
|                  |                                                  |                                                                                                                                                     | typ. <sup>(2)</sup> | 0.2  |      |      |      |      |      |      |

#### Note:

- At f = f<sub>MAX</sub>, address and data inputs are cycling at the maximum frequency, f = 0 means no input lines change.
- Typical values are measured at V<sub>DD</sub> = 3.0V, T<sub>A</sub> = 25°C and not 100% tested.

# READ CYCLE SWITCHING CHARACTERISTICS<sup>(1)</sup> (Over Operating Range)

| Symbol                           | Parameter                                                     | -8   |      | -10  |      | Unit |
|----------------------------------|---------------------------------------------------------------|------|------|------|------|------|
|                                  |                                                               | Min. | Max. | Min. | Max. |      |
| t <sub>RC</sub>                  | Read Cycle Time                                               | 8    | —    | 10   | —    | ns   |
| t <sub>AA</sub>                  | Address Access Time                                           | —    | 8    | —    | 10   | ns   |
| t <sub>OHA</sub>                 | Output Hold Time                                              | 2.0  | —    | 2.0  | —    | ns   |
| t <sub>ACE</sub>                 | $\overline{\text{CE}}$ Access Time                            | —    | 8    | —    | 10   | ns   |
| t <sub>DOE</sub>                 | $\overline{\text{OE}}$ Access Time                            | —    | 4.5  | —    | 4.5  | ns   |
| t <sub>HZOE</sub> <sup>(2)</sup> | $\overline{\text{OE}}$ to High-Z Output                       | —    | 3    | —    | 4    | ns   |
| t <sub>LZOE</sub> <sup>(2)</sup> | $\overline{\text{OE}}$ to Low-Z Output                        | 0    | —    | 0    | —    | ns   |
| t <sub>HZCE</sub> <sup>(2)</sup> | $\overline{\text{CE}}$ to High-Z Output                       | 0    | 3    | 0    | 4    | ns   |
| t <sub>LZCE</sub> <sup>(2)</sup> | $\overline{\text{CE}}$ to Low-Z Output                        | 3    | —    | 3    | —    | ns   |
| t <sub>BA</sub>                  | $\overline{\text{LB}}, \overline{\text{UB}}$ Access Time      | —    | 5.5  | —    | 6.5  | ns   |
| t <sub>HZB</sub> <sup>(2)</sup>  | $\overline{\text{LB}}, \overline{\text{UB}}$ to High-Z Output | 0    | 3    | 0    | 3    | ns   |
| t <sub>LZB</sub> <sup>(2)</sup>  | $\overline{\text{LB}}, \overline{\text{UB}}$ to Low-Z Output  | 0    | —    | 0    | —    | ns   |
| t <sub>PU</sub>                  | Power Up Time                                                 | 0    | —    | 0    | —    | ns   |
| t <sub>PD</sub>                  | Power Down Time                                               | —    | 8    | —    | 10   | ns   |

## Notes:

1. Test conditions assume signal transition times of 3 ns or less, timing reference levels of 1.5V, input pulse levels of 0V to 3.0V and output loading specified in Figure 1.
2. Tested with the load in Figure 2. Transition is measured  $\pm 500$  mV from steady-state voltage.

**READ CYCLE SWITCHING CHARACTERISTICS<sup>(1)</sup>** (Over Operating Range)

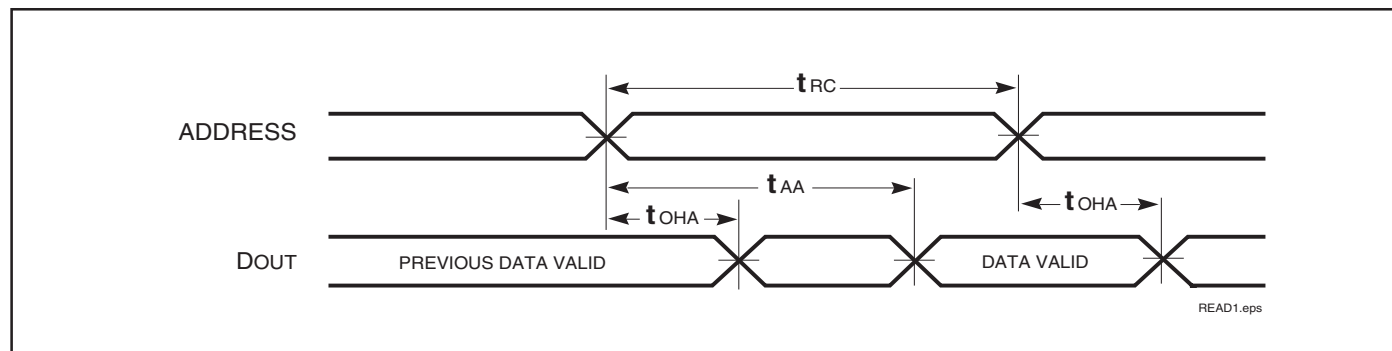
| Symbol                          | Parameter                                                     | -20 ns |      | -25 ns |      | -35 ns |      | -45ns |      | Unit |
|---------------------------------|---------------------------------------------------------------|--------|------|--------|------|--------|------|-------|------|------|
|                                 |                                                               | Min.   | Max. | Min.   | Max. | Min.   | Max. | Min.  | Max. |      |
| t <sub>RC</sub>                 | Read Cycle Time                                               | 20     | —    | 25     | —    | 35     | —    | 45    | —    | ns   |
| t <sub>AA</sub>                 | Address Access Time                                           | —      | 20   | —      | 25   | —      | 35   | —     | 45   | ns   |
| t <sub>OH</sub>                 | Output Hold Time                                              | 2.5    | —    | 4      | —    | 4      | —    | 7     | —    | ns   |
| t <sub>ACE</sub>                | $\overline{\text{CE}}$ Access Time                            | —      | 20   | —      | 25   | —      | 35   | —     | 45   | ns   |
| t <sub>DOE</sub>                | $\overline{\text{OE}}$ Access Time                            | —      | 8    | —      | 12   | —      | 15   | —     | 20   | ns   |
| t <sub>HZOE<sup>(2)</sup></sub> | $\overline{\text{OE}}$ to High-Z Output                       | 0      | 8    | 0      | 8    | 0      | 10   | 0     | 15   | ns   |
| t <sub>LZOE<sup>(2)</sup></sub> | $\overline{\text{OE}}$ to Low-Z Output                        | 0      | —    | 0      | —    | 0      | —    | 0     | —    | ns   |
| t <sub>HZCE<sup>(2)</sup></sub> | $\overline{\text{CE}}$ to High-Z Output                       | 0      | 8    | 0      | 8    | 0      | 10   | 0     | 15   | ns   |
| t <sub>LZCE<sup>(2)</sup></sub> | $\overline{\text{CE}}$ to Low-Z Output                        | 3      | —    | 10     | —    | 10     | —    | 15    | —    | ns   |
| t <sub>BA</sub>                 | $\overline{\text{LB}}, \overline{\text{UB}}$ Access Time      | —      | 8    | —      | 25   | —      | 35   | —     | 45   | ns   |
| t <sub>HZB</sub>                | $\overline{\text{LB}}, \overline{\text{UB}}$ to High-Z Output | 0      | 8    | 0      | 8    | 0      | 10   | 0     | 15   | ns   |
| t <sub>LZB</sub>                | $\overline{\text{LB}}, \overline{\text{UB}}$ to Low-Z Output  | 0      | —    | 0      | —    | 0      | —    | 0     | —    | ns   |

**Notes:**

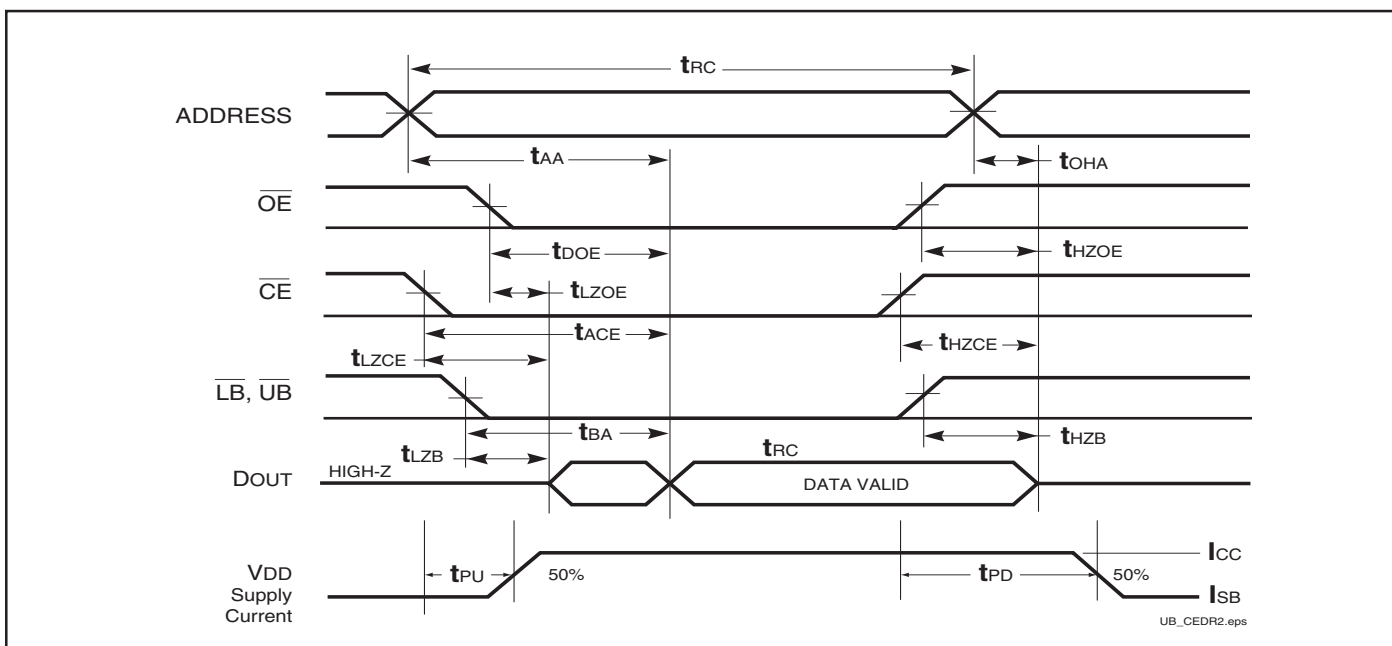
1. Test conditions assume signal transition times of 1.5 ns or less, timing reference levels of 1.25V, input pulse levels of 0.4V to V<sub>DD</sub>-0.3V and output loading specified in Figure 1a.
2. Tested with the load in Figure 1b. Transition is measured  $\pm 500$  mV from steady-state voltage. Not 100% tested.
3. Not 100% tested.

## AC WAVEFORMS

### READ CYCLE NO. 1<sup>(1,2)</sup> (Address Controlled) ( $\overline{CE} = \overline{OE} = V_{IL}$ , $\overline{UB}$ or $\overline{LB} = V_{IL}$ )



### READ CYCLE NO. 2<sup>(1,3)</sup>



#### Notes:

1.  $\overline{WE}$  is HIGH for a Read Cycle.
2. The device is continuously selected.  $\overline{OE}$ ,  $\overline{CE}$ ,  $\overline{UB}$ , or  $\overline{LB} = V_{IL}$ .
3. Address is valid prior to or coincident with  $\overline{CE}$  LOW transition.

**WRITE CYCLE SWITCHING CHARACTERISTICS<sup>(1,3)</sup>** (Over Operating Range)

| Symbol                          | Parameter                                               | -8   |      | -10  |      | Unit |
|---------------------------------|---------------------------------------------------------|------|------|------|------|------|
|                                 |                                                         | Min. | Max. | Min. | Max. |      |
| t <sub>WC</sub>                 | Write Cycle Time                                        | 8    | —    | 10   | —    | ns   |
| t <sub>SCE</sub>                | $\overline{CE}$ to Write End                            | 6.5  | —    | 8    | —    | ns   |
| t <sub>AW</sub>                 | Address Setup Time to Write End                         | 6.5  | —    | 8    | —    | ns   |
| t <sub>HA</sub>                 | Address Hold from Write End                             | 0    | —    | 0    | —    | ns   |
| t <sub>SA</sub>                 | Address Setup Time                                      | 0    | —    | 0    | —    | ns   |
| t <sub>PWB</sub>                | $\overline{LB}$ , $\overline{UB}$ Valid to End of Write | 6.5  | —    | 8    | —    | ns   |
| t <sub>PWE1</sub>               | $\overline{WE}$ Pulse Width                             | 6.5  | —    | 8    | —    | ns   |
| t <sub>PWE2</sub>               | $\overline{WE}$ Pulse Width ( $\overline{OE}$ = LOW)    | 8.0  | —    | 10   | —    | ns   |
| t <sub>SD</sub>                 | Data Setup to Write End                                 | 5    | —    | 6    | —    | ns   |
| t <sub>HD</sub>                 | Data Hold from Write End                                | 0    | —    | 0    | —    | ns   |
| t <sub>HZWE<sup>(2)</sup></sub> | $\overline{WE}$ LOW to High-Z Output                    | —    | 3.5  | —    | 5    | ns   |
| t <sub>LZWE<sup>(2)</sup></sub> | $\overline{WE}$ HIGH to Low-Z Output                    | 2    | —    | 2    | —    | ns   |

**Notes:**

1. Test conditions assume signal transition times of 3 ns or less, timing reference levels of 1.5V, input pulse levels of 0V to 3.0V and output loading specified in Figure 1.
2. Tested with the load in Figure 2. Transition is measured  $\pm 500$  mV from steady-state voltage. Not 100% tested.
3. The internal write time is defined by the overlap of  $\overline{CE}$  LOW and  $\overline{UB}$  or  $\overline{LB}$ , 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. Shaded area product in development

## WRITE CYCLE SWITCHING CHARACTERISTICS<sup>(1,2)</sup> (Over Operating Range)

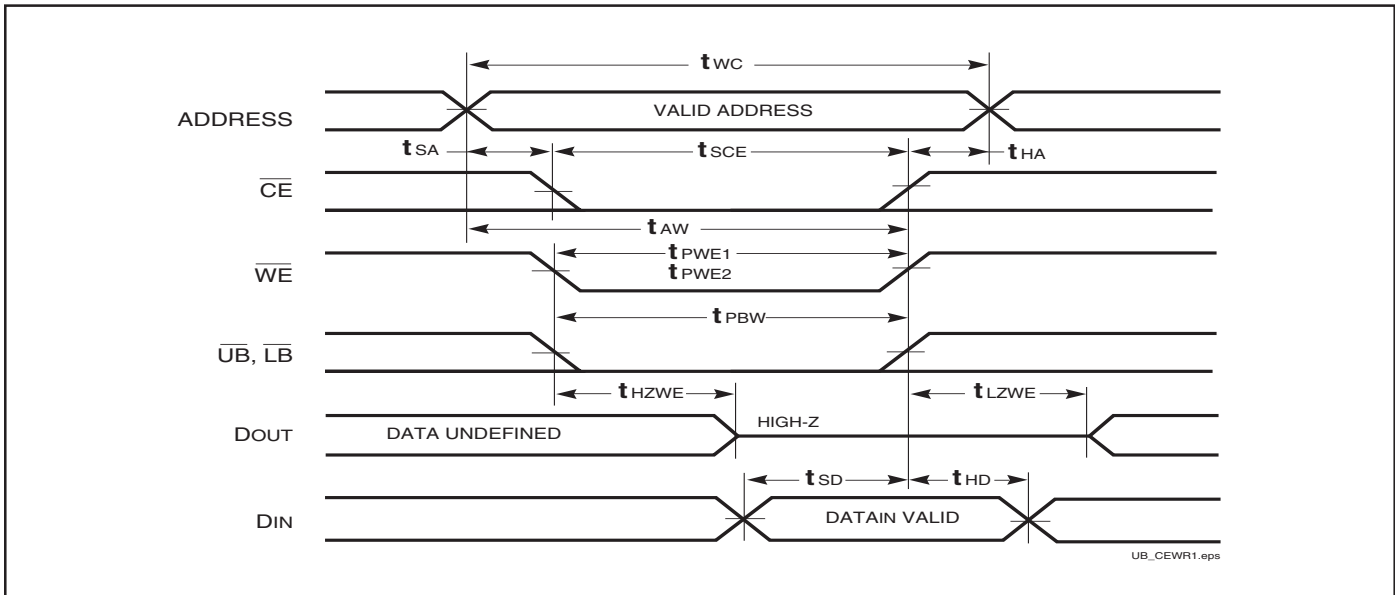
| Symbol                           | Parameter                                               | -20 ns |      | -25 ns |      | -35 ns |      | -45 ns |      | Unit |
|----------------------------------|---------------------------------------------------------|--------|------|--------|------|--------|------|--------|------|------|
|                                  |                                                         | Min.   | Max. | Min.   | Max. | Min.   | Max. | Min.   | Max. |      |
| t <sub>WC</sub>                  | Write Cycle Time                                        | 20     | —    | 25     | —    | 35     | —    | 45     | —    | ns   |
| t <sub>SCE</sub>                 | $\overline{CE}$ to Write End                            | 12     | —    | 18     | —    | 25     | —    | 35     | —    | ns   |
| t <sub>AW</sub>                  | Address Setup Time to Write End                         | 12     | —    | 15     | —    | 25     | —    | 35     | —    | ns   |
| t <sub>HA</sub>                  | Address Hold from Write End                             | 0      | —    | 0      | —    | 0      | —    | 0      | —    | ns   |
| t <sub>SA</sub>                  | Address Setup Time                                      | 0      | —    | 0      | —    | 0      | —    | 0      | —    | ns   |
| t <sub>PWB</sub>                 | $\overline{LB}$ , $\overline{UB}$ Valid to End of Write | 12     | —    | 18     | —    | 30     | —    | 35     | —    | ns   |
| t <sub>PWE1</sub>                | $\overline{WE}$ Pulse Width ( $\overline{OE}$ = HIGH)   | 12     | —    | 18     | —    | 30     | —    | 35     | —    | ns   |
| t <sub>PWE2</sub>                | $\overline{WE}$ Pulse Width ( $\overline{OE}$ = LOW)    | 17     | —    | 20     | —    | 30     | —    | 35     | —    | ns   |
| t <sub>SD</sub>                  | Data Setup to Write End                                 | 9      | —    | 12     | —    | 15     | —    | 20     | —    | ns   |
| t <sub>HD</sub>                  | Data Hold from Write End                                | 0      | —    | 0      | —    | 0      | —    | 0      | —    | ns   |
| t <sub>HZWE</sub> <sup>(3)</sup> | $\overline{WE}$ LOW to High-Z Output                    | —      | 9    | —      | 12   | —      | 20   | —      | 20   | ns   |
| t <sub>LZWE</sub> <sup>(3)</sup> | $\overline{WE}$ HIGH to Low-Z Output                    | 3      | —    | 5      | —    | 5      | —    | 5      | —    | ns   |

### Notes:

1. Test conditions assume signal transition times of 1.5ns or less, timing reference levels of 1.25V, input pulse levels of 0.4V to V<sub>DD</sub>-0.3V and output loading specified in Figure 1a.
2. Tested with the load in Figure 1b. Transition is measured  $\pm 500$  mV from steady-state voltage. Not 100% tested.
3. The internal write time is defined by the overlap of  $\overline{CE}$  LOW and  $\overline{UB}$  or  $\overline{LB}$ , 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.

## AC WAVEFORMS

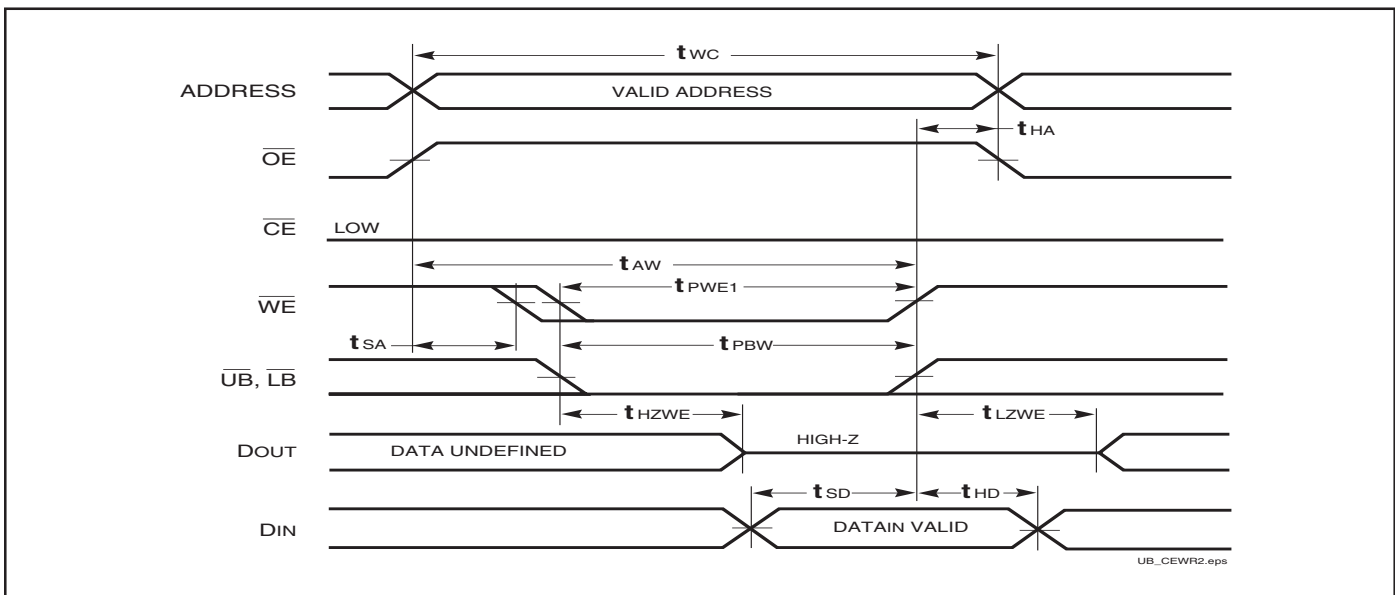
### WRITE CYCLE NO. 1 ( $\overline{CE}$ Controlled, $\overline{OE}$ is HIGH or LOW) <sup>(1)</sup>



#### Notes:

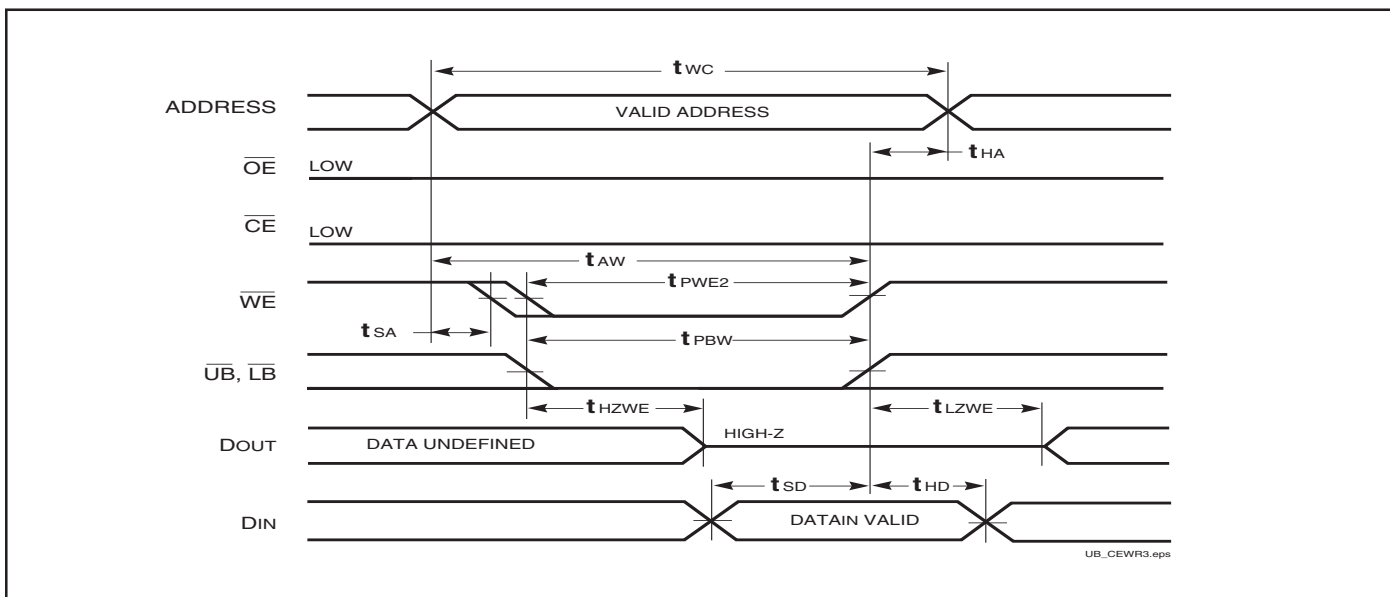
1. WRITE is an internally generated signal asserted during an overlap of the LOW states on the  $\overline{CE}$  and  $\overline{WE}$  inputs and at least one of the  $\overline{LB}$  and  $\overline{UB}$  inputs being in the LOW state.
2. WRITE = ( $\overline{CE}$ ) [ ( $\overline{LB}$ ) = ( $\overline{UB}$ ) ] ( $\overline{WE}$ ).

### WRITE CYCLE NO. 2 ( $\overline{WE}$ Controlled. $\overline{OE}$ is HIGH During Write Cycle) <sup>(1,2)</sup>

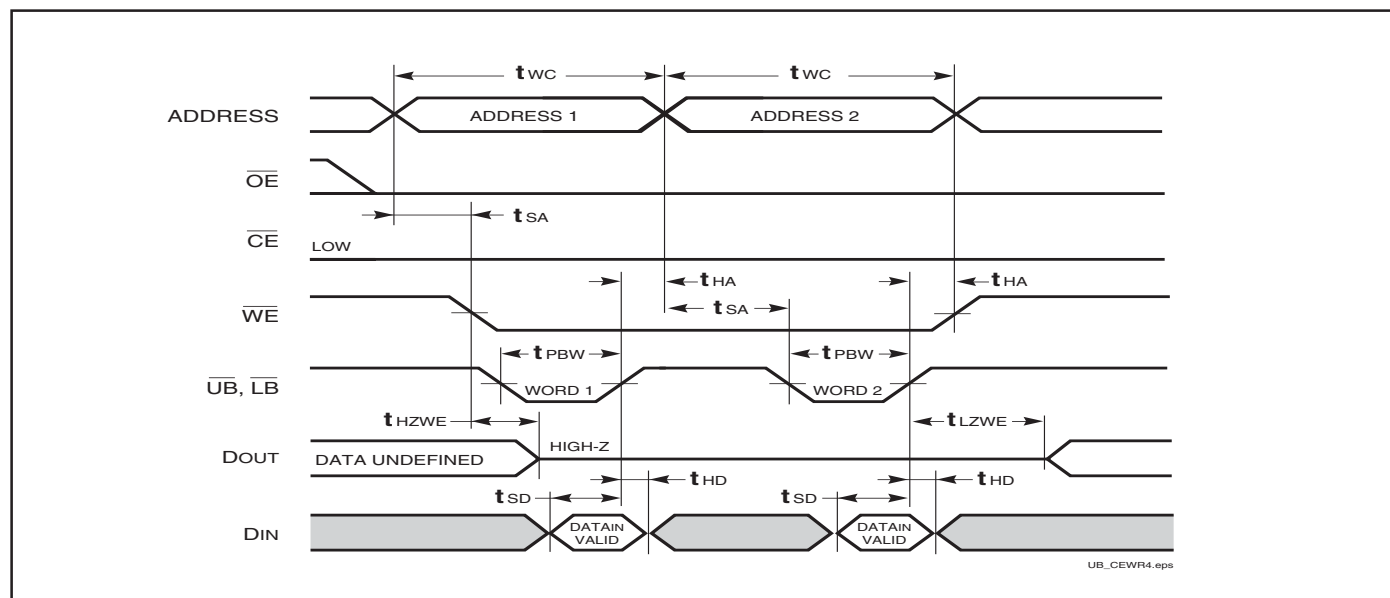


## AC WAVEFORMS

### WRITE CYCLE NO. 3 ( $\overline{WE}$ Controlled, $\overline{OE}$ is LOW During Write Cycle) <sup>(1)</sup>



### WRITE CYCLE NO. 4 ( $\overline{LB}$ , $\overline{UB}$ Controlled, Back-to-Back Write) <sup>(1,3)</sup>



#### Notes:

1. The internal Write time is defined by the overlap of  $\overline{CE} = \text{LOW}$ ,  $\overline{UB}$  and/or  $\overline{LB} = \text{LOW}$ , and  $\overline{WE} = \text{LOW}$ . All signals must be in valid states to initiate a Write, but any can be deasserted to terminate the Write. The  $t_{SA}$ ,  $t_{HA}$ ,  $t_{SD}$ , and  $t_{HD}$  timing is referenced to the rising or falling edge of the signal that terminates the Write.
2. Tested with  $\overline{OE}$  HIGH for a minimum of 4 ns before  $\overline{WE} = \text{LOW}$  to place the I/O in a HIGH-Z state.
3.  $\overline{WE}$  may be held LOW across many address cycles and the  $\overline{LB}$ ,  $\overline{UB}$  pins can be used to control the Write function.

## HIGH SPEED (IS61WV25616ALL/BLL)

### DATA RETENTION SWITCHING CHARACTERISTICS (2.4V-3.6V)

| Symbol           | Parameter                          | Test Condition                                             | Options               | Min.            | Typ. <sup>(1)</sup> | Max.         | Unit |
|------------------|------------------------------------|------------------------------------------------------------|-----------------------|-----------------|---------------------|--------------|------|
| V <sub>DR</sub>  | V <sub>DD</sub> for Data Retention | See Data Retention Waveform                                |                       | 2.0             | —                   | 3.6          | V    |
| I <sub>DR</sub>  | Data Retention Current             | V <sub>DD</sub> = 2.0V, $\overline{CE} \geq V_{DD} - 0.2V$ | Com.<br>Ind.<br>Auto. | —<br>—<br>—     | 2<br>—<br>—         | 8<br>9<br>15 | mA   |
| t <sub>SDR</sub> | Data Retention Setup Time          | See Data Retention Waveform                                |                       | 0               | —                   | —            | ns   |
| t <sub>RDR</sub> | Recovery Time                      | See Data Retention Waveform                                |                       | t <sub>RC</sub> | —                   | —            | ns   |

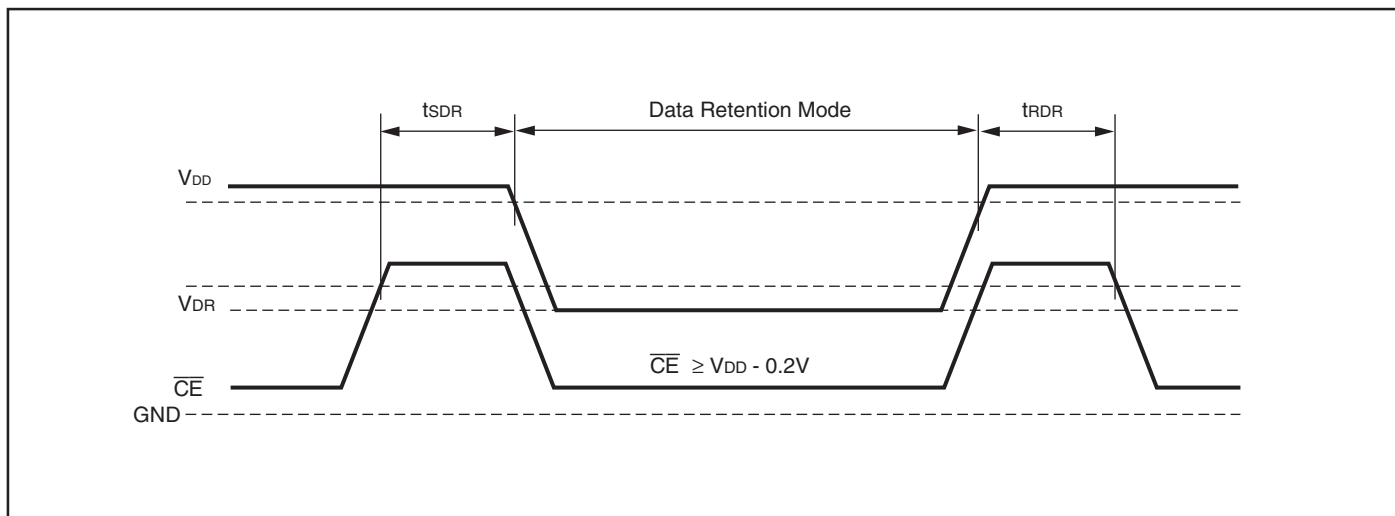
**Note 1:** Typical values are measured at V<sub>DD</sub> = 3.0V, T<sub>A</sub> = 25°C and not 100% tested.

### DATA RETENTION SWITCHING CHARACTERISTICS (1.65V-2.2V)

| Symbol           | Parameter                          | Test Condition                                             | Options      | Min.            | Typ. <sup>(1)</sup> | Max.     | Unit |
|------------------|------------------------------------|------------------------------------------------------------|--------------|-----------------|---------------------|----------|------|
| V <sub>DR</sub>  | V <sub>DD</sub> for Data Retention | See Data Retention Waveform                                |              | 1.2             | —                   | 3.6      | V    |
| I <sub>DR</sub>  | Data Retention Current             | V <sub>DD</sub> = 1.2V, $\overline{CE} \geq V_{DD} - 0.2V$ | Com.<br>Ind. | —<br>—          | 5<br>—              | 10<br>15 | mA   |
| t <sub>SDR</sub> | Data Retention Setup Time          | See Data Retention Waveform                                |              | 0               | —                   | —        | ns   |
| t <sub>RDR</sub> | Recovery Time                      | See Data Retention Waveform                                |              | t <sub>RC</sub> | —                   | —        | ns   |

**Note 1:** Typical values are measured at V<sub>DD</sub> = 1.8V, T<sub>A</sub> = 25°C and not 100% tested.

### DATA RETENTION WAVEFORM ( $\overline{CE}$ Controlled)



## LOW POWER (IS61WV25616ALS/BLS)

### DATA RETENTION SWITCHING CHARACTERISTICS (2.4V-3.6V)

| Symbol           | Parameter                          | Test Condition                                             | Options               | Min.            | Typ. <sup>(1)</sup> | Max.         | Unit |
|------------------|------------------------------------|------------------------------------------------------------|-----------------------|-----------------|---------------------|--------------|------|
| V <sub>DR</sub>  | V <sub>DD</sub> for Data Retention | See Data Retention Waveform                                |                       | 2.0             | —                   | 3.6          | V    |
| I <sub>DR</sub>  | Data Retention Current             | V <sub>DD</sub> = 2.0V, $\overline{CE} \geq V_{DD} - 0.2V$ | Com.<br>Ind.<br>Auto. | —<br>—<br>—     | 0.2<br>—<br>—       | 1<br>2<br>10 | mA   |
| t <sub>SDR</sub> | Data Retention Setup Time          | See Data Retention Waveform                                |                       | 0               | —                   | —            | ns   |
| t <sub>RDR</sub> | Recovery Time                      | See Data Retention Waveform                                |                       | t <sub>RC</sub> | —                   | —            | ns   |

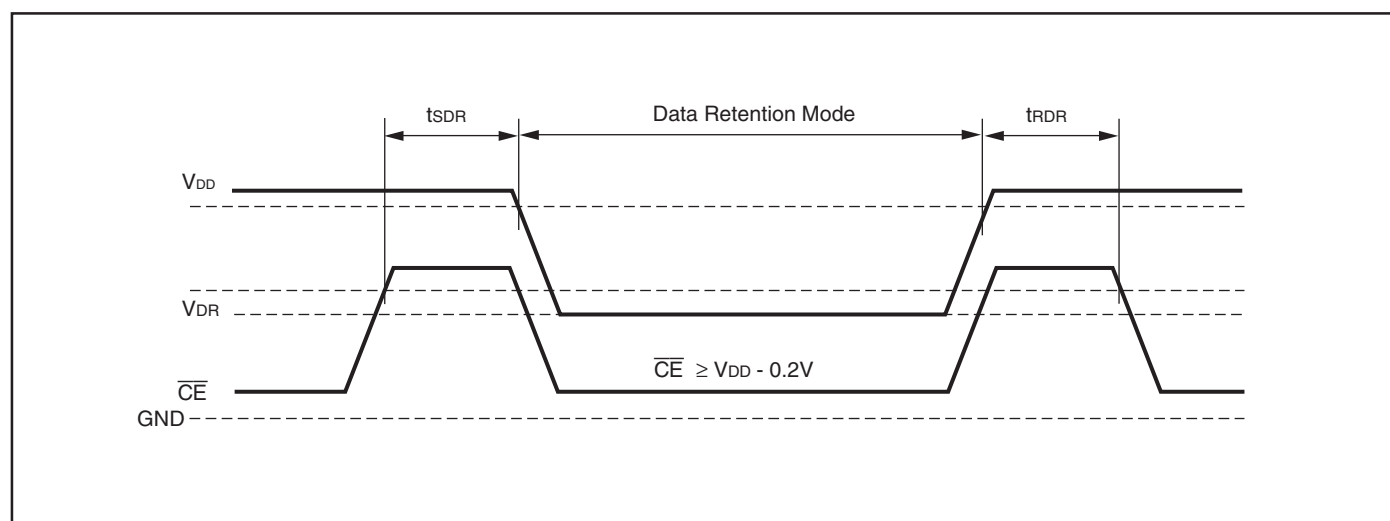
**Note 1:** Typical values are measured at V<sub>DD</sub> = 3.0V, T<sub>A</sub> = 25°C and not 100% tested.

### DATA RETENTION SWITCHING CHARACTERISTICS (1.65V-2.2V)

| Symbol           | Parameter                          | Test Condition                                             | Options      | Min.            | Typ. <sup>(1)</sup> | Max.   | Unit |
|------------------|------------------------------------|------------------------------------------------------------|--------------|-----------------|---------------------|--------|------|
| V <sub>DR</sub>  | V <sub>DD</sub> for Data Retention | See Data Retention Waveform                                |              | 1.2             | —                   | 3.6    | V    |
| I <sub>DR</sub>  | Data Retention Current             | V <sub>DD</sub> = 1.2V, $\overline{CE} \geq V_{DD} - 0.2V$ | Com.<br>Ind. | —<br>—          | 0.2<br>—            | 1<br>2 | mA   |
| t <sub>SDR</sub> | Data Retention Setup Time          | See Data Retention Waveform                                |              | 0               | —                   | —      | ns   |
| t <sub>RDR</sub> | Recovery Time                      | See Data Retention Waveform                                |              | t <sub>RC</sub> | —                   | —      | ns   |

: Typical values are measured at V<sub>DD</sub> = 1.8V, T<sub>A</sub> = 25°C and not 100% tested.

### DATA RETENTION WAVEFORM ( $\overline{CE}$ Controlled)



## ORDERING INFORMATION (HIGH SPEED)

**Commercial Range: 0°C to +70°C**

**Voltage Range: 2.4V to 3.6V**

| Speed (ns)           | Order Part No.      | Package                   |
|----------------------|---------------------|---------------------------|
| 10 (8 <sup>1</sup> ) | IS61WV25616BLL-10TL | TSOP (Type II), Lead-free |

**Note:**

1. Speed = 8ns for  $V_{DD} = 3.3V \pm 5\%$ . Speed = 10ns for  $V_{DD} = 2.4V$  to 3.6V.

**Industrial Range: -40°C to +85°C**

**Voltage Range: 2.4V to 3.6V**

| Speed (ns)           | Order Part No.       | Package                            |
|----------------------|----------------------|------------------------------------|
| 10 (8 <sup>1</sup> ) | IS61WV25616BLL-10BI  | 48 mini BGA (6mm x 8mm)            |
|                      | IS61WV25616BLL-10BLI | 48 mini BGA (6mm x 8mm), Lead-free |
|                      | IS61WV25616BLL-10TI  | TSOP (Type II)                     |
|                      | IS61WV25616BLL-10TLI | TSOP (Type II), Lead-free          |

**Note:**

1. Speed = 8ns for  $V_{DD} = 3.3V \pm 5\%$ . Speed = 10ns for  $V_{DD} = 2.4V$  to 3.6V.

**Industrial Range: -40°C to +85°C**

**Voltage Range: 1.65V to 2.2V**

| Speed (ns) | Order Part No.       | Package                   |
|------------|----------------------|---------------------------|
| 20         | IS61WV25616ALL-20BI  | 48 mini BGA (6mm x 8mm)   |
|            | IS61WV25616ALL-20TI  | TSOP (Type II)            |
|            | IS61WV25616ALL-20TLI | TSOP (Type II), Lead-free |

**Automotive Range: -40°C to +125°C**

**Voltage Range: 2.4V to 3.6V**

| Speed (ns) | Order Part No.         | Package                                     |
|------------|------------------------|---------------------------------------------|
| 10         | IS64WV25616BLL-10BA3   | 48 mini BGA (6mm x 8mm)                     |
|            | IS64WV25616BLL-10BLA3  | 48 mini BGA (6mm x 8mm), Lead-free          |
|            | IS64WV25616BLL-10CTA3  | TSOP (Type II), Copper Leadframe            |
|            | IS64WV25616BLL-10CTLA3 | TSOP (Type II), Lead-free, Copper Leadframe |

**ORDERING INFORMATION (LOW POWER)**

**Industrial Range: -40°C to +85°C**

**Voltage Range: 2.4V to 3.6V**

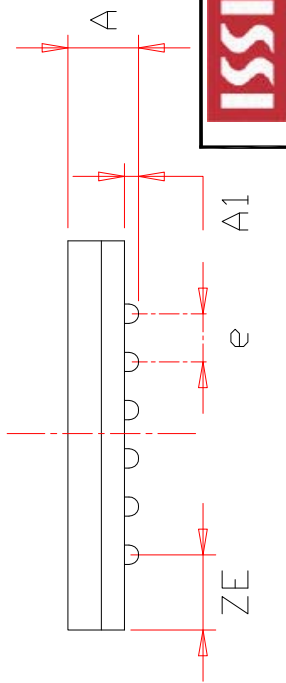
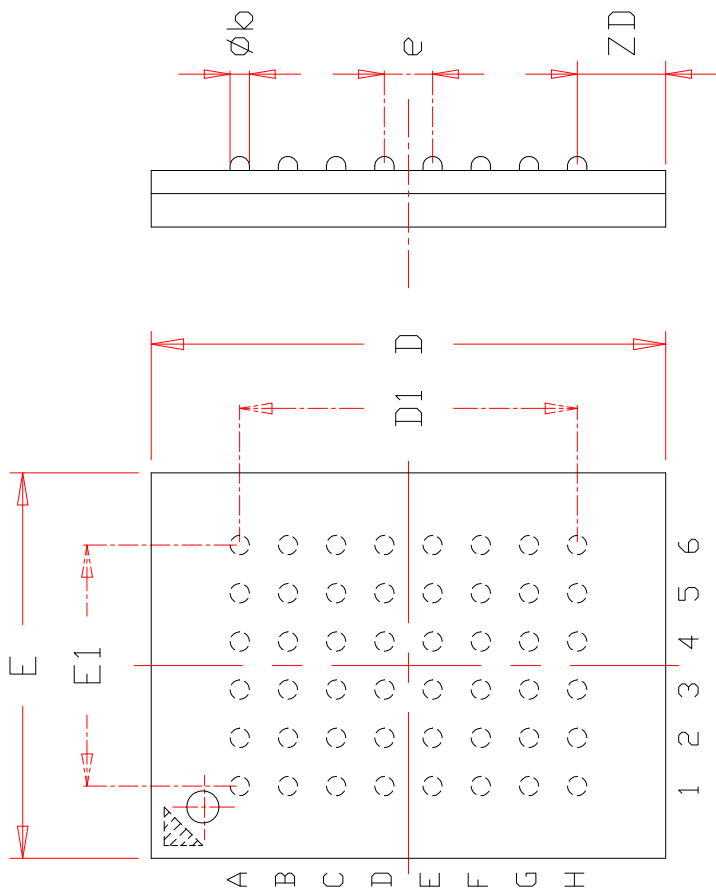
| Speed (ns) | Order Part No.       | Package                   |
|------------|----------------------|---------------------------|
| 25         | IS61WV25616BLS-25TLI | TSOP (Type II), Lead-free |

**Industrial Range: -40°C to +85°C**

**Voltage Range: 1.65V to 2.2V**

| Speed (ns) | Order Part No.       | Package                   |
|------------|----------------------|---------------------------|
| 45         | IS61WV25616ALS-45TLI | TSOP (Type II), Lead-free |

TOP VIEW

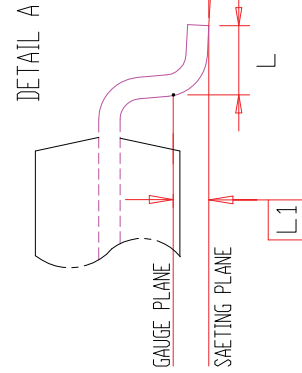
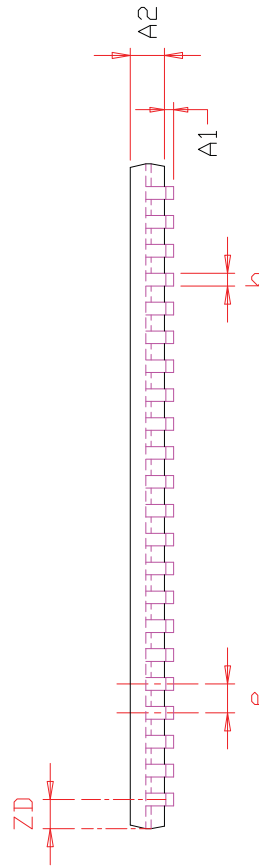
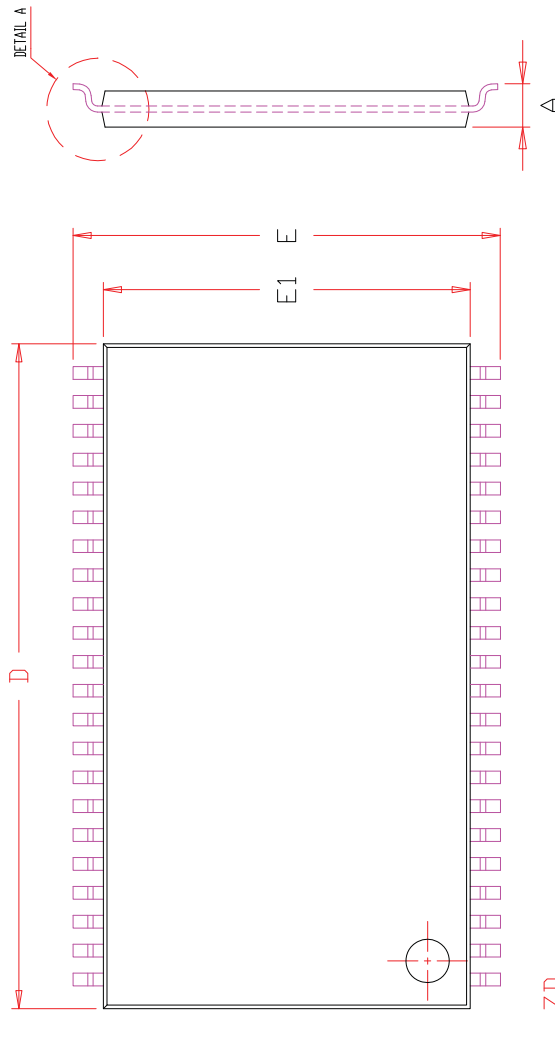


| SYMBOL | DIMENSION IN MM |            |      | DIMENSION IN INCH |            |       |
|--------|-----------------|------------|------|-------------------|------------|-------|
|        | MIN.            | NOM.       | MAX. | MIN.              | NOM.       | MAX.  |
| A      |                 |            | 1.20 |                   |            | 0.047 |
| A1     | 0.20            |            | 0.30 | 0.008             |            | 0.012 |
| øb     | 0.30            | 0.35       | 0.40 | 0.012             | 0.014      | 0.016 |
| D      | 7.90            | 8.00       | 8.10 | 0.311             | 0.315      | 0.319 |
| D1     |                 | 5.25 BSC   |      |                   | 0.207 BSC  |       |
| E      | 5.90            | 6.00       | 6.10 | 0.232             | 0.236      | 0.240 |
| E1     |                 | 3.75 BSC   |      |                   | 0.148 BSC  |       |
| e      |                 | 0.75 BSC.  |      |                   | 0.030 BSC. |       |
| ZD     |                 | 1.375 REF. |      |                   | 0.054 REF. |       |
| ZE     |                 | 1.125 REF. |      |                   | 0.044 REF. |       |

NOTE :

1. CONTROLLING DIMENSION : MM .
2. Reference document : JEDEC MO-207

|                                                                                       |       |                                     |      |   |      |            |
|---------------------------------------------------------------------------------------|-------|-------------------------------------|------|---|------|------------|
|  | TITLE | 48L 6x8mm TF-BGA<br>Package Outline | REV. | C | DATE | 08/12/2008 |
|                                                                                       |       |                                     |      |   |      |            |



**NOTE :**

1. CONTROLLING DIMENSION : MM
2. DIMENSION D AND E1 DO NOT INCLUDE MOLD PROTRUSION.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION.

| SYMBOL | DIMENSION IN MM |            |       | DIMENSION IN INCH |            |       |
|--------|-----------------|------------|-------|-------------------|------------|-------|
|        | MIN.            | NOM.       | MAX.  | MIN.              | NOM.       | MAX.  |
| A      | 1.00            |            | 1.20  | 0.039             |            | 0.047 |
| A1     | 0.05            |            | 0.15  | 0.002             |            | 0.006 |
| A2     | 0.95            | 1.00       | 1.05  | 0.037             | 0.039      | 0.041 |
| b      | 0.30            |            | 0.45  | 0.012             |            | 0.018 |
| D      | 18.28           | 18.41      | 18.54 | 0.720             | 0.725      | 0.730 |
| E      | 11.56           | 11.76      | 11.96 | 0.455             | 0.463      | 0.471 |
| E1     | 10.03           | 10.16      | 10.29 | 0.395             | 0.400      | 0.405 |
| e      |                 | 0.80 BSC.  |       |                   | 0.031 BSC. |       |
| L      | 0.40            |            | 0.69  | 0.016             |            | 0.027 |
| L1     |                 | 0.25 BSC.  |       |                   | 0.010 BSC. |       |
| ZD     |                 | 0.805 REF. |       |                   | 0.032 REF. |       |
| Θ      | 0               |            | 8°    | 0                 |            | 8°    |



TITLE

44L 400mil TSOP-2  
Package Outline

REV.

F

DATE

06/04/2008

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)