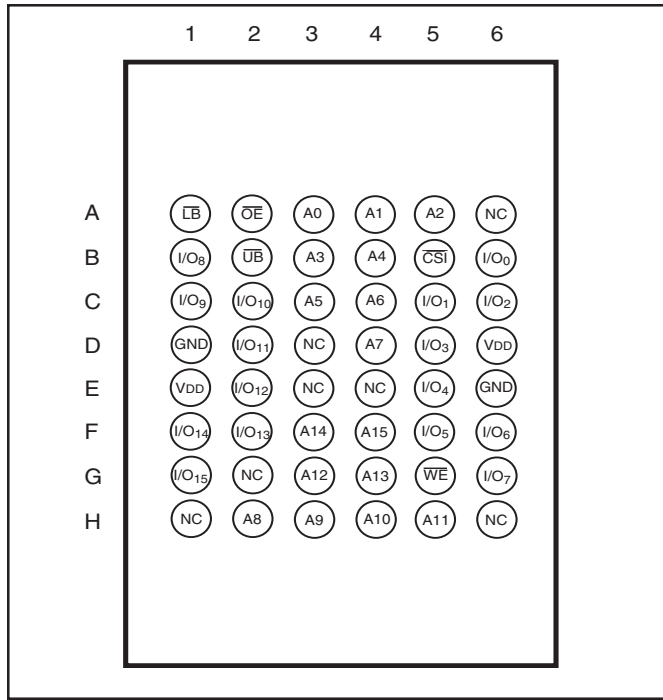
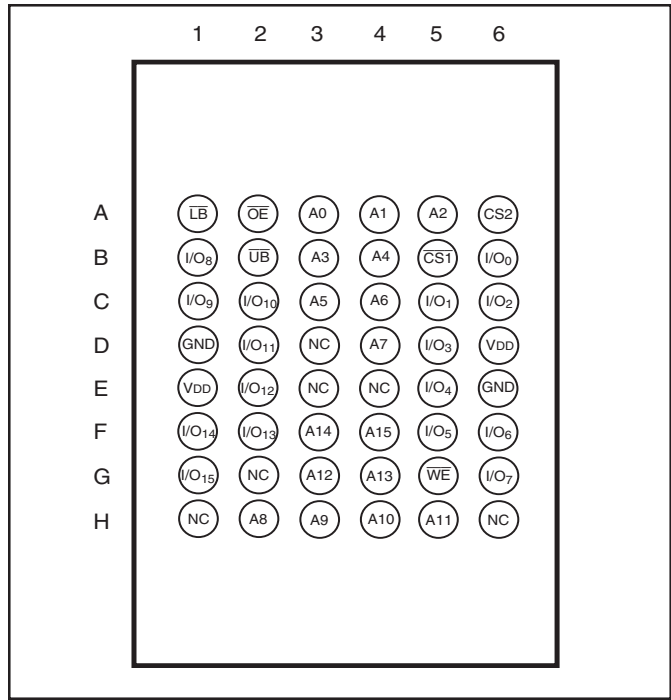


PIN CONFIGURATIONS

**48-Pin mini BGA (6mm x 8mm)
(Package Code B)**



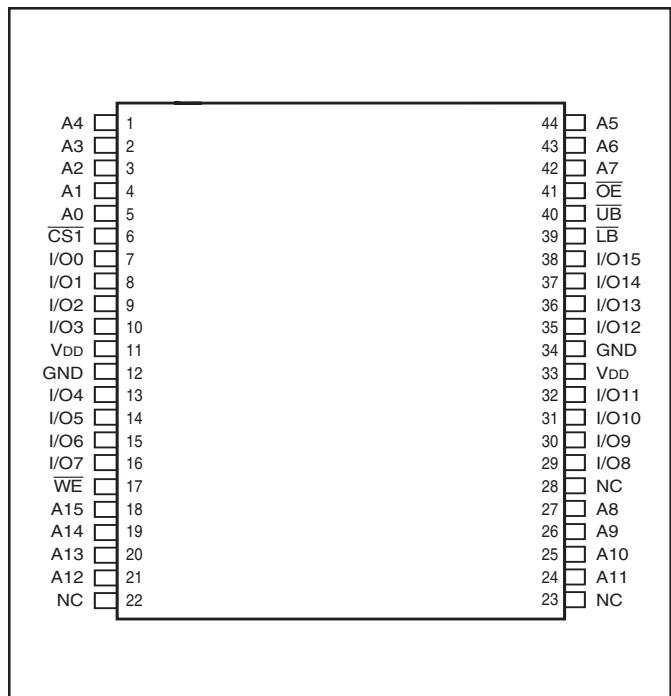
**48-Pin mini BGA (6mm x 8mm)
2 CS Option (Package Code B2)**



PIN DESCRIPTIONS

| | |
|------------|---------------------------------|
| A0-A15 | Address Inputs |
| I/O0-I/O15 | Data Inputs/Outputs |
| CS1, CS2 | Chip Enable Input |
| OE | Output Enable Input |
| WE | Write Enable Input |
| LB | Lower-byte Control (I/O0-I/O7) |
| UB | Upper-byte Control (I/O8-I/O15) |
| NC | No Connection |
| VDD | Power |
| GND | Ground |

**44-Pin mini TSOP (Type II)
(Package Code T)**



TRUTH TABLE

| Mode | \overline{WE} | $\overline{CS1}$ | CS2 | \overline{OE} | \overline{LB} | \overline{UB} | I/O PIN | | V _{DD} Current |
|-----------------|-----------------|------------------|-----|-----------------|-----------------|-----------------|-----------|------------|-------------------------|
| | | | | | | | I/O0-I/O7 | I/O8-I/O15 | |
| Not Selected | X | H | X | X | X | X | High-Z | High-Z | ISB1, ISB2 |
| | X | X | L | X | X | X | High-Z | High-Z | ISB1, ISB2 |
| | X | X | X | X | H | H | High-Z | High-Z | ISB1, ISB2 |
| Output Disabled | H | L | H | H | L | X | High-Z | High-Z | I _{CC} |
| | H | L | H | H | X | L | High-Z | High-Z | I _{CC} |
| Read | H | L | H | L | L | H | DOUT | High-Z | I _{CC} |
| | H | L | H | L | H | L | High-Z | DOUT | |
| | H | L | H | L | L | L | DOUT | DOUT | |
| Write | L | L | H | X | L | H | DIN | High-Z | I _{CC} |
| | L | L | H | X | H | L | High-Z | DIN | |
| | L | L | H | X | L | L | DIN | DIN | |

OPERATING RANGE (V_{DD})

| Range | Ambient Temperature | IS62WV6416ALL | IS62WV6416BLL |
|------------|---------------------|---------------|---------------|
| Commercial | 0°C to +70°C | 1.7V - 2.2V | 2.5V - 3.6V |
| Industrial | -40°C to +85°C | 1.7V - 2.2V | 2.5V - 3.6V |

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

| Symbol | Parameter | Value | Unit |
|-------------------|--------------------------------------|------------------------------|------|
| V _{TERM} | Terminal Voltage with Respect to GND | -0.2 to V _{DD} +0.3 | V |
| V _{DD} | V _{DD} Related to GND | -0.2 to +3.8 | V |
| T _{STG} | Storage Temperature | -65 to +150 | °C |
| P _T | Power Dissipation | 1.0 | W |

Note:

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.

DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

| Symbol | Parameter | Test Conditions | V _{DD} | Min. | Max. | Unit |
|--------------------------------|---------------------|-------------------------------------------------------------|-----------------|------|-----------------------|------|
| V _{OH} | Output HIGH Voltage | I _{OH} = -0.1 mA | 1.7-2.2V | 1.4 | — | V |
| | | I _{OH} = -1 mA | 2.5-3.6V | 2.2 | — | V |
| V _{OL} | Output LOW Voltage | I _{OL} = 0.1 mA | 1.7-2.2V | — | 0.2 | V |
| | | I _{OL} = 2.1 mA | 2.5-3.6V | — | 0.4 | V |
| V _{IH} | Input HIGH Voltage | | 1.7-2.2V | 1.4 | V _{DD} + 0.2 | V |
| | | | 2.5-3.6V | 2.2 | V _{DD} + 0.3 | V |
| V _{IL} ⁽¹⁾ | Input LOW Voltage | | 1.7-2.2V | -0.2 | 0.4 | V |
| | | | 2.5-3.6V | -0.2 | 0.6 | V |
| I _{LI} | Input Leakage | GND ≤ V _{IN} ≤ V _{DD} | | -1 | 1 | μA |
| I _{LO} | Output Leakage | GND ≤ V _{OUT} ≤ V _{DD} , Outputs Disabled | | -1 | 1 | μA |

Notes:

1. V_{IL} (min.) = -1.0V for pulse width less than 10 ns.

CAPACITANCE⁽¹⁾

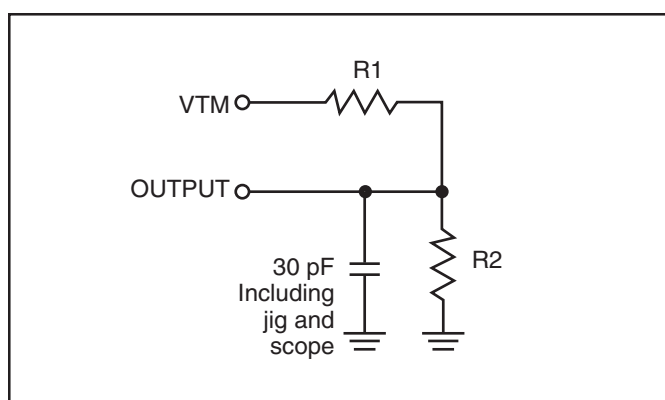
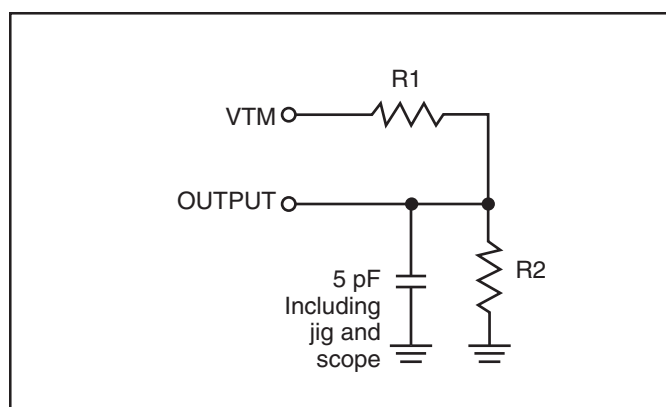
| Symbol | Parameter | Conditions | Max. | Unit |
|------------------|--------------------------|-----------------------|------|------|
| C _{IN} | Input Capacitance | V _{IN} = 0V | 8 | pF |
| C _{OUT} | Input/Output Capacitance | V _{OUT} = 0V | 10 | pF |

Note:

1. Tested initially and after any design or process changes that may affect these parameters.

AC TEST CONDITIONS

| Parameter | 62WV6416ALL (Unit) | 62WV6416BLL (Unit) |
|---------------------------------------------|-----------------------|-----------------------|
| Input Pulse Level | 0.4V to $V_{DD}-0.2V$ | 0.4V to $V_{DD}-0.3V$ |
| Input Rise and Fall Times | 5 ns | 5ns |
| Input and Output Timing and Reference Level | V_{REF} | V_{REF} |
| Output Load | See Figures 1 and 2 | See Figures 1 and 2 |

AC TEST LOADS

Figure 1

Figure 2

| | 1.7-2.2V | 2.5V - 3.6V |
|--------------------------------|----------|-------------|
| R1(Ω) | 3070 | 3070 |
| R2(Ω) | 3150 | 3150 |
| V_{REF} | 0.9V | 1.5V |
| V_{TM} | 1.8V | 2.8V |

IS62WV6416ALL, POWER SUPPLY CHARACTERISTICS⁽¹⁾ (Over Operating Range)

| Symbol | Parameter | Test Conditions | | Max. 55 | Unit |
|------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|------|
| I _{CC} | V _{DD} Dynamic Operating Supply Current | V _{DD} =Max., | Com. | 10 | mA |
| | | I _{OUT} =0 mA, f=f _{MAX} | Ind. | 10 | |
| | | | typ. ⁽¹⁾ | 6 | |
| I _{CC1} | Operating Supply Current | V _{DD} =Max., | Com. | 5 | mA |
| | | I _{OUT} =0 mA, f=0 | Ind. | 5 | |
| I _{SB1} | TTL Standby Current (TTL Inputs) | V _{DD} =Max., | Com. | 1.2 | mA |
| | | V _{IN} =V _{IH} or V _{IL} | Ind. | 1.2 | |
| | | $\overline{CS1}=V_{IH}, CS2=V_{IL},$ f=1 MHz | OR | | |
| | ULB Control | V _{DD} =Max., V _{IN} =V _{IH} or V _{IL} $\overline{CS1}=V_{IL}, f=0, \overline{UB}=V_{IH}, \overline{LB}=V_{IH}$ | | | |
| I _{SB2} | CMOS Standby Current (CMOS Inputs) | V _{DD} =Max., | Com. | 10 | μA |
| | | $\overline{CS1} \geq V_{DD}-0.2V,$ | Ind. | 10 | |
| | | CS2 ≤ 0.2V, V _{IN} ≥ V _{DD} -0.2V, or V _{IN} ≤ 0.2V, f=0 | typ. ⁽¹⁾ | 4 | |
| | ULB Control | V _{DD} = Max., $\overline{CS1} = V_{IL}, CS2=V_{IH}$ V _{IN} ≤ 0.2V, f=0; $\overline{UB}/\overline{LB}=V_{DD}-0.2V$ | | | |

Note:

1. Typical values are measured at V_{DD}=1.8V, T_A=25°C. Not 100% tested.

IS62WV6416BLL, POWER SUPPLY CHARACTERISTICS⁽¹⁾ (Over Operating Range)

| Symbol | Parameter | Test Conditions | | Max. | Max. | Unit |
|------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|
| | | | | 45 | 55 | |
| I _{CC} | V _{DD} Dynamic Operating Supply Current | V _{DD} =Max., I _{OUT} =0 mA, f=f _{MAX} | Com. | 17 | 15 | mA |
| | | | Ind. | 17 | 15 | |
| | | | typ. ⁽²⁾ | 12 | 10 | |
| I _{CC1} | Operating Supply Current | V _{DD} =Max., I _{OUT} =0 mA, f=0 | Com. | 5 | 5 | mA |
| | | | Ind. | 5 | 5 | |
| I _{SB1} | TTL Standby Current (TTL Inputs) | V _{DD} =Max., V _{IN} =V _{IH} or V _{IL} , $\overline{CS1}$ =V _{IH} , CS2=V _{IL} , f=1 MHz | Com. | 1.2 | 1.2 | mA |
| | | | Ind. | 1.2 | 1.2 | |
| OR | | | | | | |
| | ULB Control | V _{DD} =Max., V _{IN} =V _{IH} or V _{IL} , $\overline{CS1}$ =V _{IL} , f=0, \overline{UB} =V _{IH} , \overline{LB} =V _{IH} | | | | |
| I _{SB2} | CMOS Standby Current (CMOS Inputs) | V _{DD} =Max., $\overline{CS1}$ ≥V _{DD} -0.2V, CS2≤0.2V, V _{IN} ≥V _{DD} -0.2V, or V _{IN} ≤0.2V, f=0 | Com. | 15 | 15 | μA |
| | | | Ind. | 15 | 15 | |
| | | | typ. ⁽²⁾ | 5 | 5 | |
| OR | | | | | | |
| | ULB Control | V _{DD} =Max., $\overline{CS1}$ =V _{IL} , CS2=V _{IH} , V _{IN} ≤0.2V, f=0; $\overline{UB}/\overline{LB}$ =V _{DD} -0.2V | | | | |

Note:

- At f = f_{MAX}, address and data inputs are cycling at the maximum frequency, f = 0 means no input lines change.
- Typical values are measured at V_{DD}=3.0V, T_A=25°C. Not 100% tested.

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

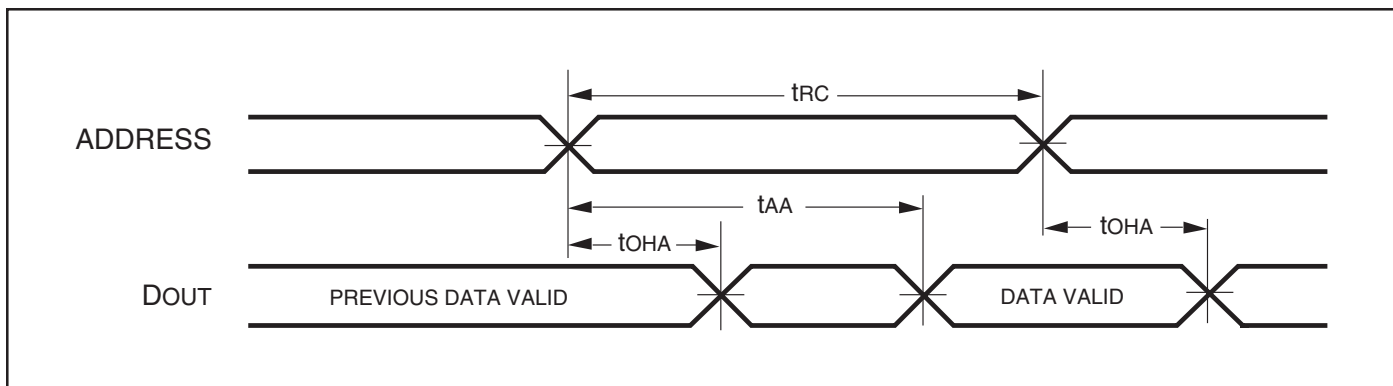
| Symbol | Parameter | 45 ns | | 55 ns | | Unit |
|-----------------------------|-------------------------------------------------|-------|------|-------|------|------|
| | | Min. | Max. | Min. | Max. | |
| t_{RC} | Read Cycle Time | 45 | — | 55 | — | ns |
| t_{AA} | Address Access Time | — | 45 | — | 55 | ns |
| t_{OHA} | Output Hold Time | 10 | — | 10 | — | ns |
| t_{ACS1}/t_{ACS2} | $\overline{CS1}/CS2$ Access Time | — | 45 | — | 55 | ns |
| t_{DOE} | \overline{OE} Access Time | — | 20 | — | 25 | ns |
| $t_{HZOE}^{(2)}$ | \overline{OE} to High-Z Output | — | 15 | — | 20 | ns |
| $t_{LZOE}^{(2)}$ | \overline{OE} to Low-Z Output | 5 | — | 5 | — | ns |
| $t_{HZCS1}/t_{HZCS2}^{(2)}$ | $\overline{CS1}/CS2$ to High-Z Output | 0 | 15 | 0 | 20 | ns |
| $t_{LZCS1}/t_{LZCS2}^{(2)}$ | $\overline{CS1}/CS2$ to Low-Z Output | 10 | — | 10 | — | ns |
| t_{BA} | $\overline{LB}, \overline{UB}$ Access Time | — | 45 | — | 55 | ns |
| t_{HZB} | $\overline{LB}, \overline{UB}$ to High-Z Output | 0 | 15 | 0 | 20 | ns |
| t_{LZB} | $\overline{LB}, \overline{UB}$ to Low-Z Output | 0 | — | 0 | — | ns |

Notes:

1. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 0.9V/1.5V, input pulse levels of 0.4 to $V_{DD}-0.2V/V_{DD}-0.3V$ 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.

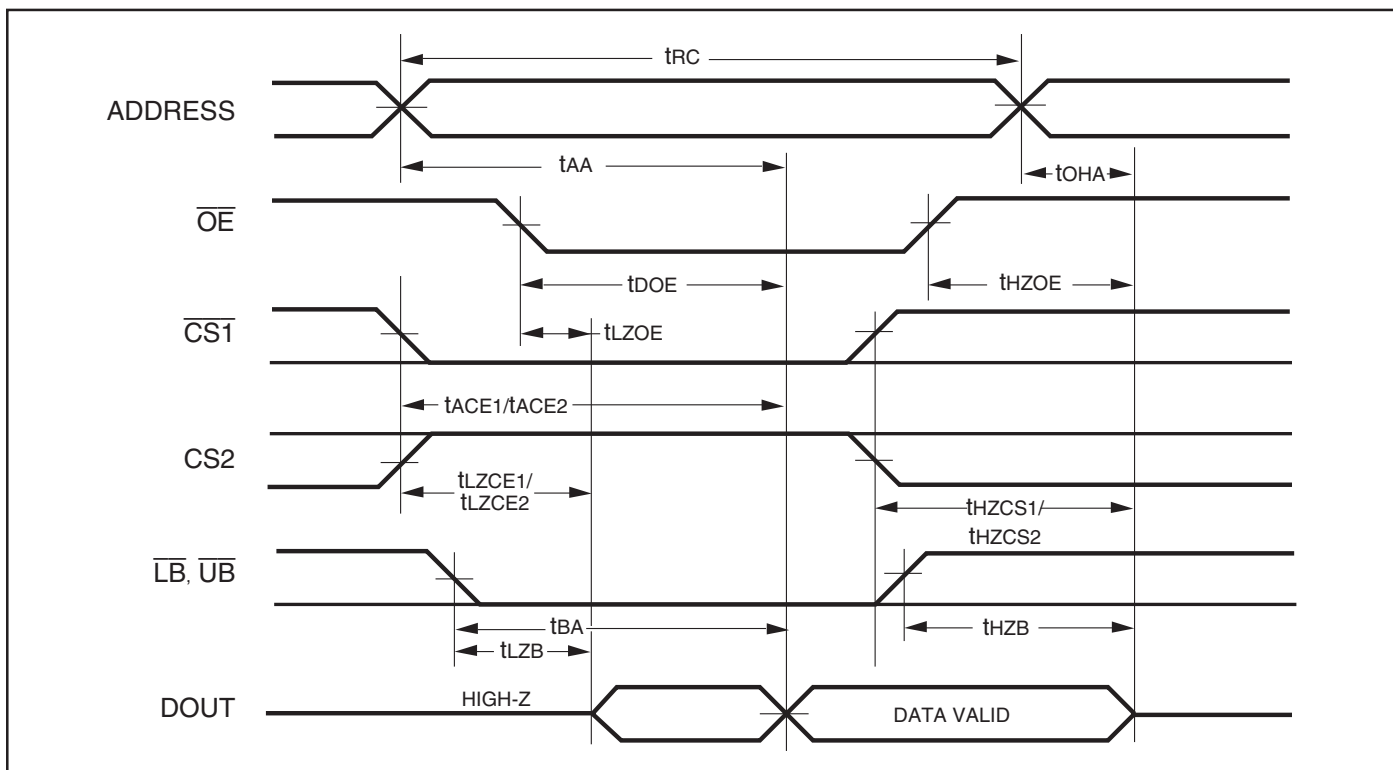
AC WAVEFORMS

READ CYCLE NO. 1^(1,2) (Address Controlled) ($\overline{CS1} = \overline{OE} = V_{IL}$, $CS2 = \overline{WE} = V_{IH}$, \overline{UB} or $\overline{LB} = V_{IL}$)



AC WAVEFORMS

READ CYCLE NO. 2^(1,3) ($\overline{CS1}$, $CS2$, \overline{OE} , AND $\overline{UB/LB}$ Controlled)



Notes:

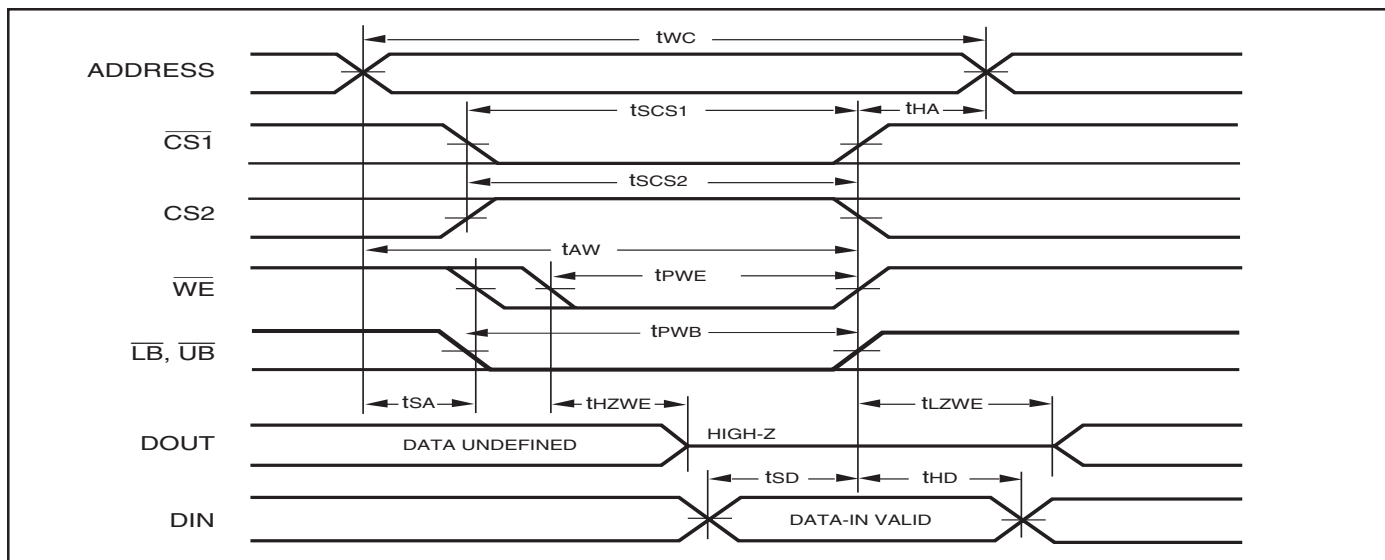
1. \overline{WE} is HIGH for a Read Cycle.
2. The device is continuously selected. \overline{OE} , $\overline{CS1}$, \overline{UB} , or $\overline{LB} = V_{IL}$. $CS2 = \overline{WE} = V_{IH}$.
3. Address is valid prior to or coincident with $\overline{CS1}$ LOW transition.

WRITE CYCLE SWITCHING CHARACTERISTICS^(1,2) (Over Operating Range)

| Symbol | Parameter | 45ns | | 55 ns | | Unit |
|---------------------|------------------------------------------------------|------|------|-------|------|------|
| | | Min. | Max. | Min. | Max. | |
| t_{WC} | Write Cycle Time | 45 | — | 55 | — | ns |
| t_{SCS1}/t_{SCS2} | $\overline{CS1}/CS2$ to Write End | 35 | — | 45 | — | ns |
| t_{AW} | Address Setup Time to Write End | 35 | — | 45 | — | ns |
| t_{HA} | Address Hold from Write End | 0 | — | 0 | — | ns |
| t_{SA} | Address Setup Time | 0 | — | 0 | — | ns |
| t_{PWB} | $\overline{LB}, \overline{UB}$ Valid to End of Write | 35 | — | 45 | — | ns |
| t_{PWE} | \overline{WE} Pulse Width | 35 | — | 40 | — | ns |
| t_{SD} | Data Setup to Write End | 20 | — | 25 | — | ns |
| t_{HD} | Data Hold from Write End | 0 | — | 0 | — | ns |
| $t_{HZWE}^{(3)}$ | \overline{WE} LOW to High-Z Output | — | 20 | — | 20 | ns |
| $t_{LZWE}^{(3)}$ | \overline{WE} HIGH to Low-Z Output | 5 | — | 5 | — | ns |

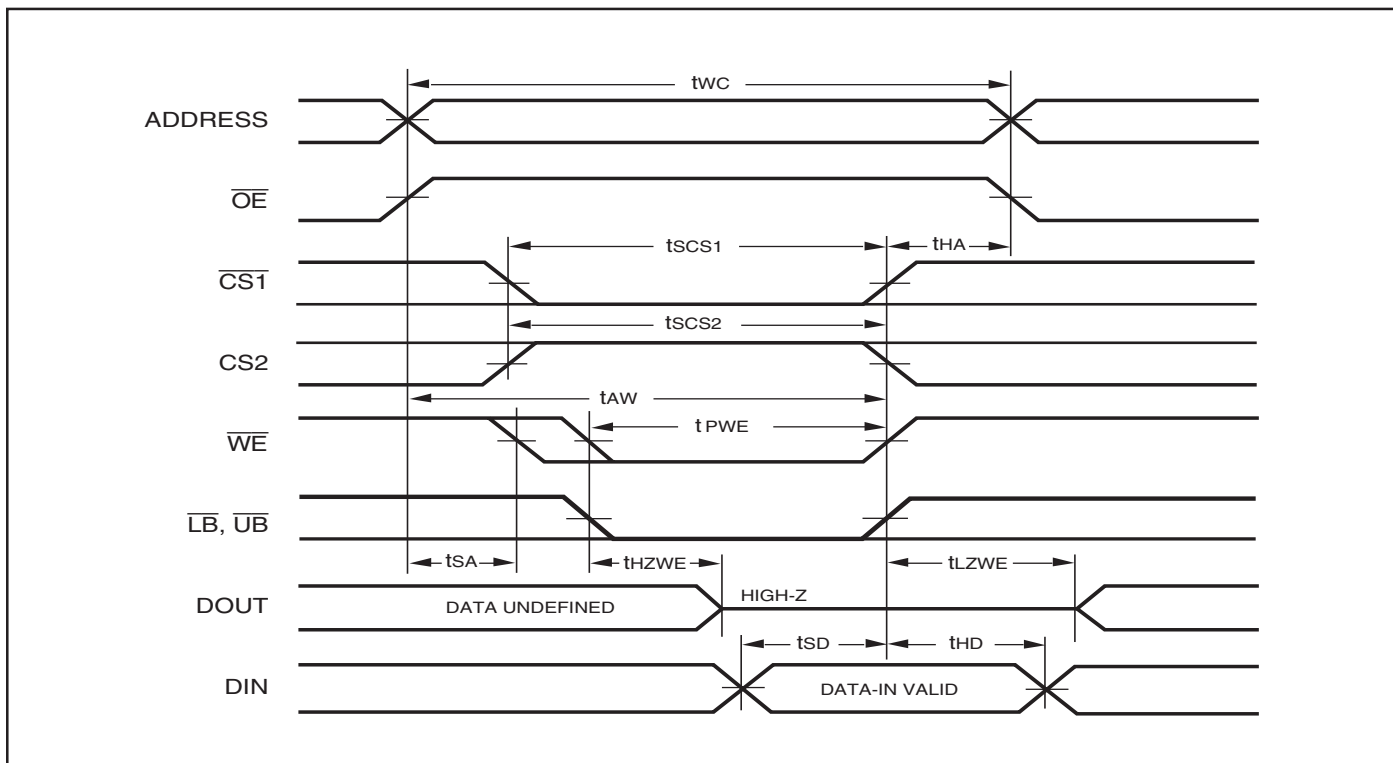
Notes:

1. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 0.9V/1.5V, input pulse levels of 0.4V to $V_{DD}-0.2V/V_{DD}-0.3V$ and output loading specified in Figure 1.
2. The internal write time is defined by the overlap of $\overline{CS1}$ LOW, CS2 HIGH 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.
3. Tested with the load in Figure 2. Transition is measured ± 500 mV from steady-state voltage. Not 100% tested.

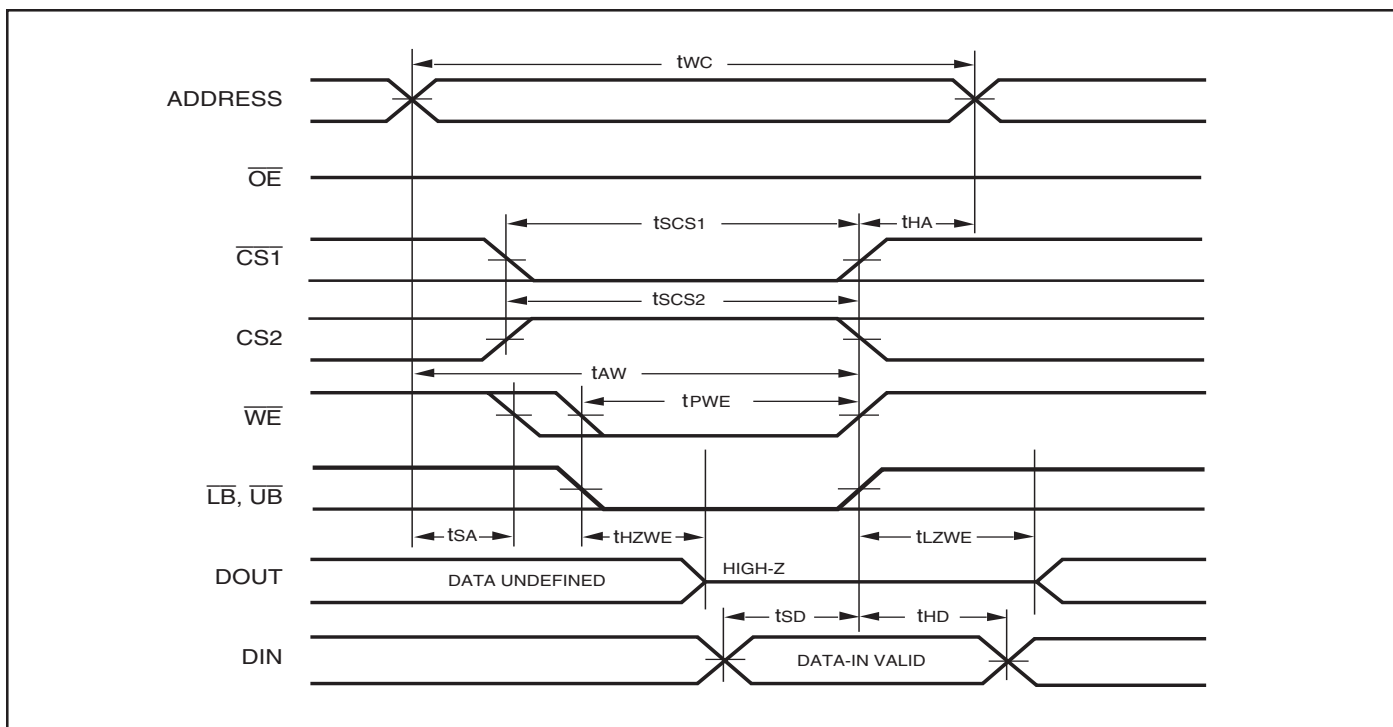
AC WAVEFORMS
WRITE CYCLE NO. 1^(1,2) ($\overline{CS1}$ Controlled, $\overline{OE} = \text{HIGH or LOW}$)

Notes:

1. WRITE is an internally generated signal asserted during an overlap of the LOW states on the $\overline{CS1}$, CS2 and \overline{WE} inputs and at least one of the \overline{LB} and \overline{UB} inputs being in the LOW state.
2. $WRITE = (\overline{CS1}) [(\overline{LB}) = (\overline{UB})] (\overline{WE})$.

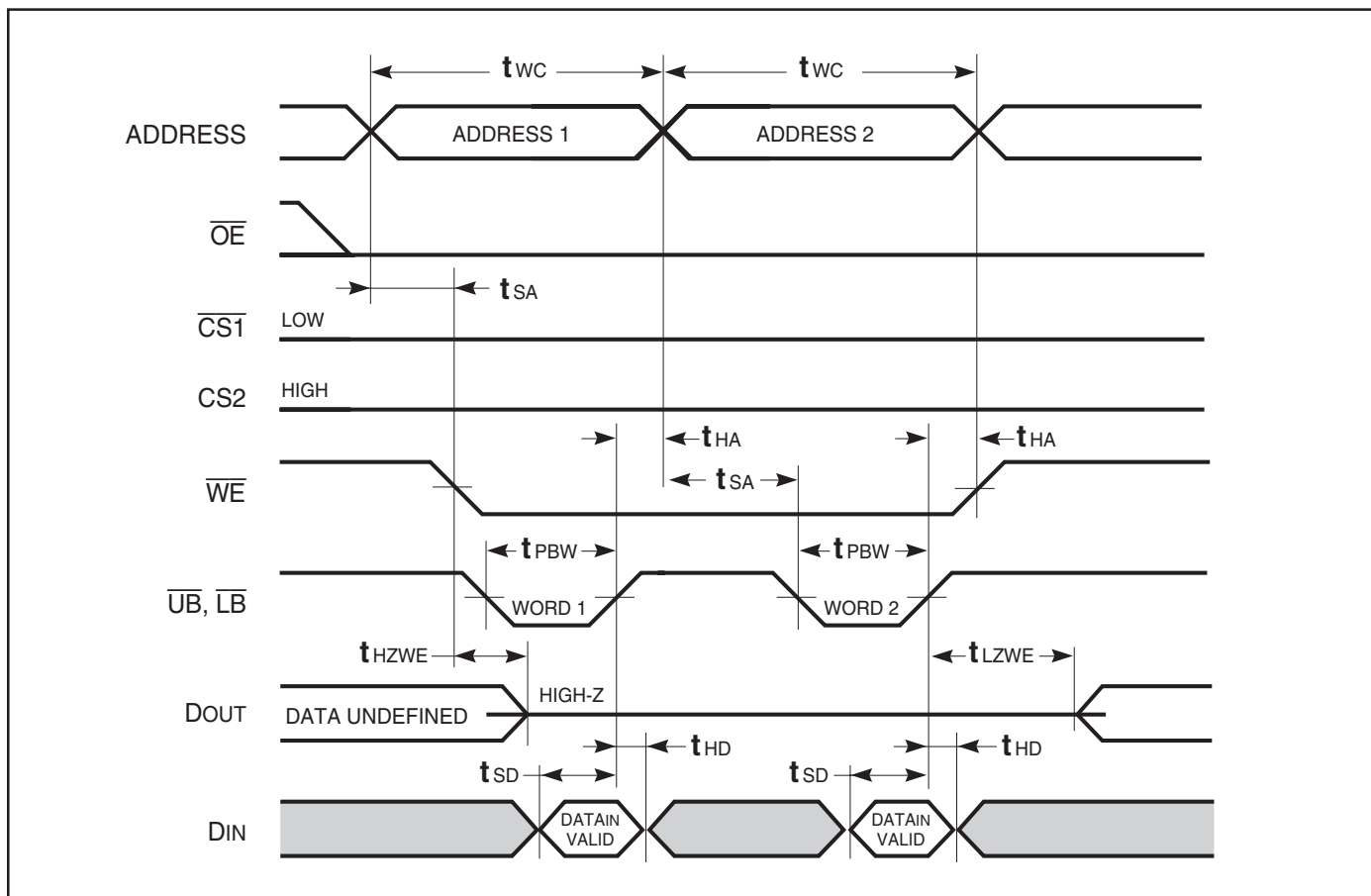
WRITE CYCLE NO. 2 (\overline{WE} Controlled: \overline{OE} is HIGH During Write Cycle)



WRITE CYCLE NO. 3 (\overline{WE} Controlled: \overline{OE} is LOW During Write Cycle)

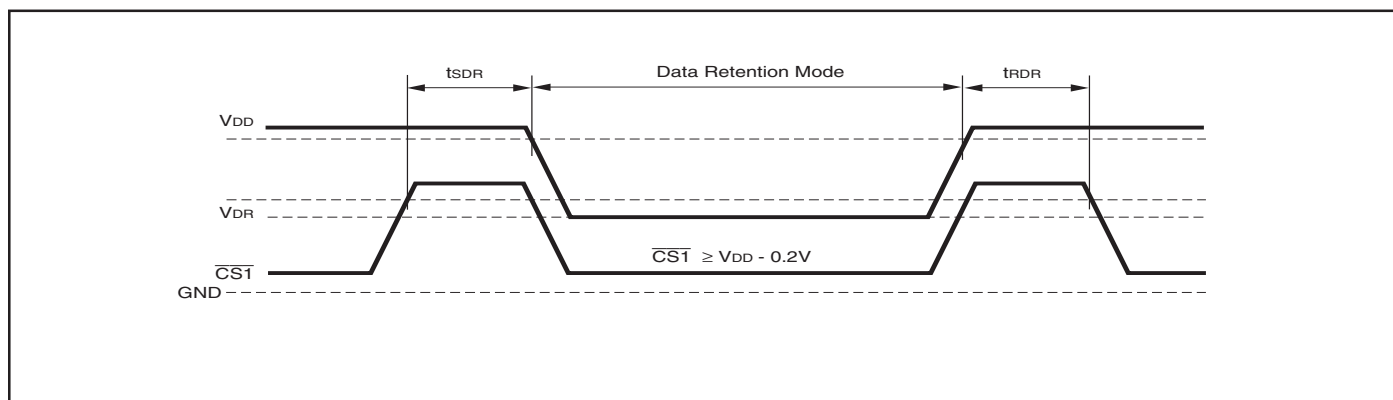
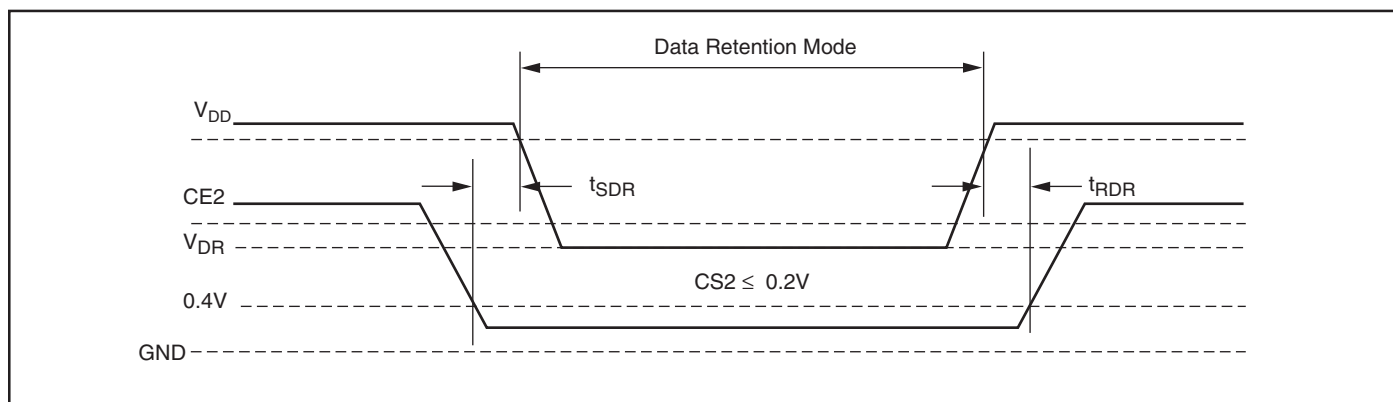


WRITE CYCLE NO. 4 ($\overline{UB}/\overline{LB}$ Controlled)



DATA RETENTION SWITCHING CHARACTERISTICS

| Symbol | Parameter | Test Condition | Min. | Max. | Unit |
|-----------|-----------------------------|----------------------------------------------------|----------|------|---------|
| V_{DR} | V_{DD} for Data Retention | See Data Retention Waveform | 1.2 | 3.6 | V |
| I_{DR} | Data Retention Current | $V_{DD} = 1.2V, \overline{CS1} \geq V_{DD} - 0.2V$ | — | 5 | 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 ($\overline{CS1}$ Controlled)

DATA RETENTION WAVEFORM ($CS2$ Controlled)


ORDERING INFORMATION**IS62WV6416ALL (1.7V - 2.2V)****Commercial Range: 0°C to +70°C**

| Speed (ns) | Order Part No. | Package |
|------------|-------------------|----------------------|
| 55 | IS62WV6416ALL-55T | TSOP-II |
| | IS62WV6416ALL-55B | mini BGA (6mm x 8mm) |

Industrial Range: -40°C to +85°C

| Speed (ns) | Order Part No. | Package |
|------------|---------------------|-----------------------------------|
| 55 | IS62WV6416ALL-55TI | TSOP-II |
| | IS62WV6416ALL-55TLI | TSOP-II, Lead-free |
| | IS62WV6416ALL-55BI | mini BGA (6mm x 8mm) |
| | IS62WV6416ALL-55BLI | mini BGA (6mm x 8mm), Lead-free |
| | IS62WV6416ALL-55B2I | mini BGA (6mm x 8mm), 2 CS Option |

ORDERING INFORMATION
IS62WV6416BLL (2.5V - 3.6V)
Commercial Range: 0°C to +70°C

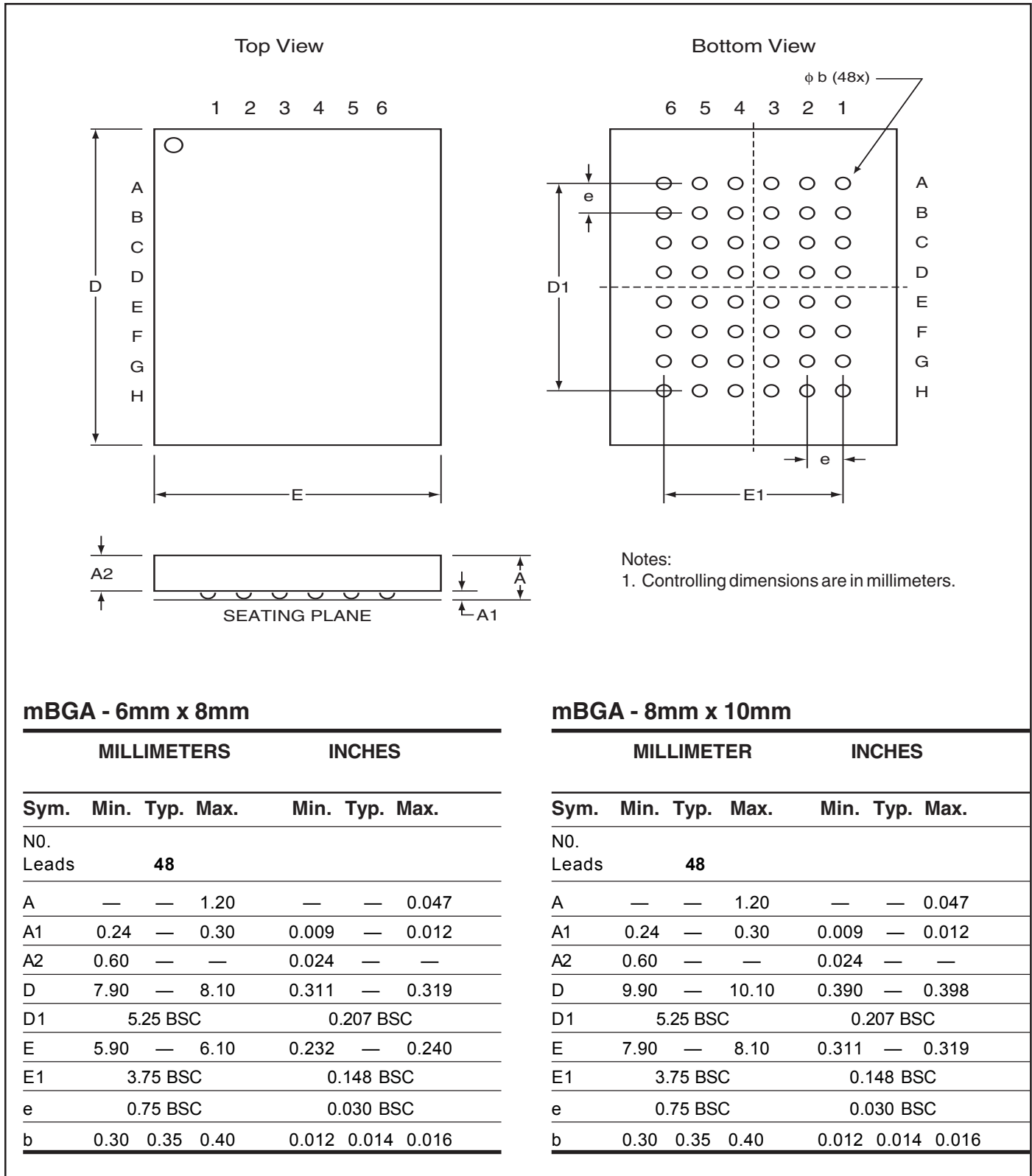
| Speed (ns) | Order Part No. | Package |
|------------|-------------------|----------------------|
| 45 | IS62WV6416BLL-45T | TSOP-II |
| | IS62WV6416BLL-45B | mini BGA (6mm x 8mm) |

Industrial Range: -40°C to +85°C

| Speed (ns) | Order Part No. | Package |
|------------|---------------------|-----------------------------------|
| 45 | IS62WV6416BLL-45TI | TSOP-II |
| | IS62WV6416BLL-45BI | mini BGA (6mm x 8mm) |
| | IS62WV6416BLL-45BLI | mini BGA (6mm x 8mm), Lead-free |
| 55 | IS62WV6416BLL-55TI | TSOP-II |
| | IS62WV6416BLL-55TLI | TSOP-II, Lead-free |
| | IS62WV6416BLL-55BI | mini BGA (6mm x 8mm) |
| | IS62WV6416BLL-55BLI | mini BGA (6mm x 8mm), Lead-free |
| | IS62WV6416BLL-55B2I | mini BGA (6mm x 8mm), 2 CS Option |

PACKAGING INFORMATION

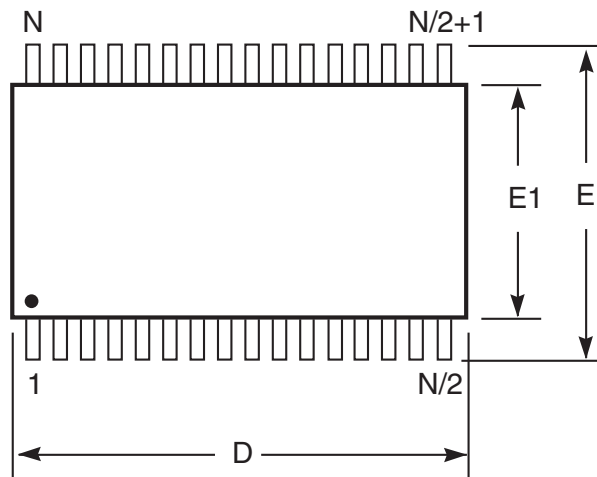
Mini Ball Grid Array Package Code: B (48-pin)



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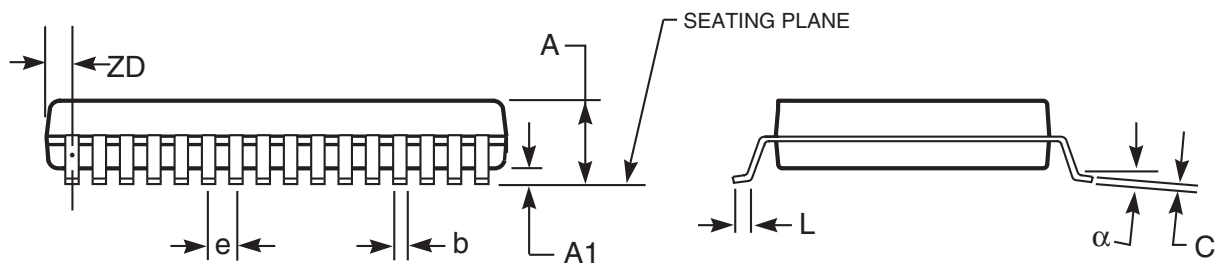
PACKAGING INFORMATION

Plastic TSOP
 Package Code: T (Type II)



Notes:

1. Controlling dimension: millimeters, 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.



Plastic TSOP (T - Type II)

| Symbol | Millimeters | | Inches | | Millimeters | | Inches | | Millimeters | | Inches | |
|---------------|-------------|-------|-----------|-------|-------------|-------|-----------|-------|-------------|-------|-----------|-------|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| Ref. Std. | | | | | | | | | | | | |
| No. Leads (N) | 32 | | | | 44 | | | | 50 | | | |
| A | — | 1.20 | — | 0.047 | — | 1.20 | — | 0.047 | — | 1.20 | — | 0.047 |
| A1 | 0.05 | 0.15 | 0.002 | 0.006 | 0.05 | 0.15 | 0.002 | 0.006 | 0.05 | 0.15 | 0.002 | 0.006 |
| b | 0.30 | 0.52 | 0.012 | 0.020 | 0.30 | 0.45 | 0.012 | 0.018 | 0.30 | 0.45 | 0.012 | 0.018 |
| C | 0.12 | 0.21 | 0.005 | 0.008 | 0.12 | 0.21 | 0.005 | 0.008 | 0.12 | 0.21 | 0.005 | 0.008 |
| D | 20.82 | 21.08 | 0.820 | 0.830 | 18.31 | 18.52 | 0.721 | 0.729 | 20.82 | 21.08 | 0.820 | 0.830 |
| E1 | 10.03 | 10.29 | 0.391 | 0.400 | 10.03 | 10.29 | 0.395 | 0.405 | 10.03 | 10.29 | 0.395 | 0.405 |
| E | 11.56 | 11.96 | 0.451 | 0.466 | 11.56 | 11.96 | 0.455 | 0.471 | 11.56 | 11.96 | 0.455 | 0.471 |
| e | 1.27 BSC | | 0.050 BSC | | 0.80 BSC | | 0.032 BSC | | 0.80 BSC | | 0.031 BSC | |
| L | 0.40 | 0.60 | 0.016 | 0.024 | 0.41 | 0.60 | 0.016 | 0.024 | 0.40 | 0.60 | 0.016 | 0.024 |
| ZD | 0.95 REF | | 0.037 REF | | 0.81 REF | | 0.032 REF | | 0.88 REF | | 0.035 REF | |
| α | 0° | 5° | 0° | 5° | 0° | 5° | 0° | 5° | 0° | 5° | 0° | 5° |

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