

Features

- TSOP I package configurable as 1M x 16 or 2M x 8 SRAM
- Very high speed: 45 ns
- Temperature ranges
 - Industrial: -40°C to +85°C
 - Automotive-A: -40°C to +85°C
- Wide voltage range: 2.20 V to 3.60 V
- Ultra-low standby power
 - Typical standby current: 1.5 μA
 - Maximum standby current: 12 μA
- Ultra-low active power
 - Typical active current: 2.2 mA at f = 1 MHz
- Easy memory expansion with \overline{CE}_1 , CE_2 , and \overline{OE} Features
- Automatic power-down when deselected
- CMOS for optimum speed and power
- Offered in Pb-free 48-Ball VFBGA and 48-Pin TSOP I packages

Functional Description

The CY62167EV30 is a high performance CMOS static RAM organized as 1M words by 16 bits or 2M words by 8 bits. This device features an advanced circuit design that provides an ultra low active current. Ultra low active current is ideal for providing

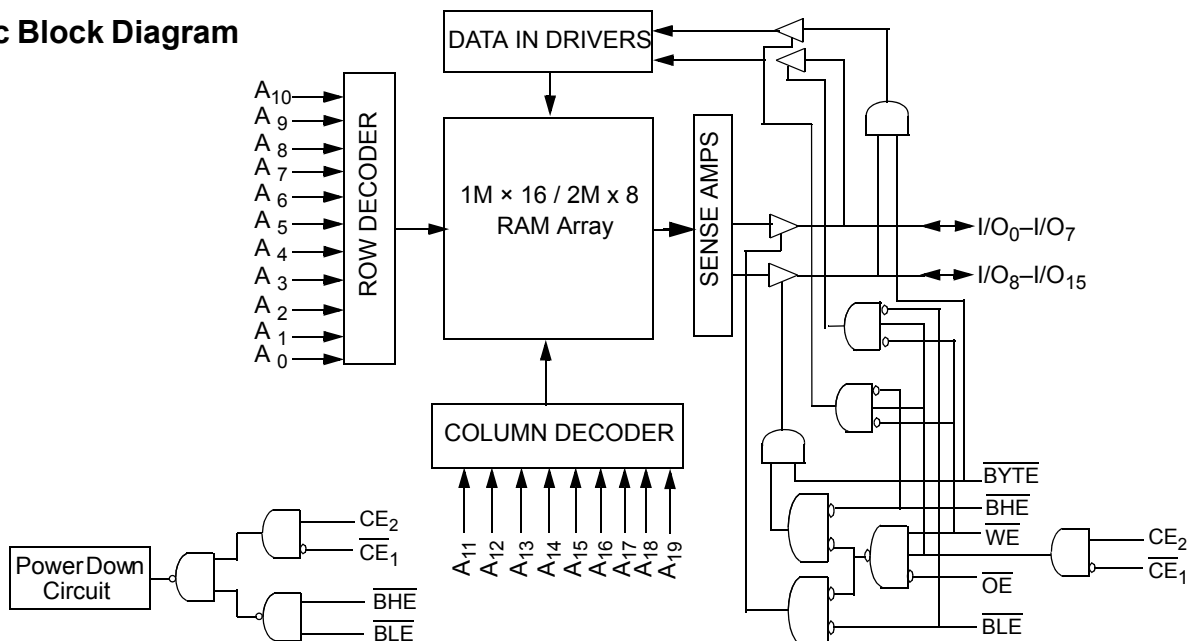
More Battery Life™ (MoBL®) in portable applications such as cellular telephones. The device also has an automatic power down feature that reduces power consumption by 99 percent when addresses are not toggling. Place the device into standby mode when deselected (\overline{CE}_1 HIGH or CE_2 LOW or both BHE and BLE are HIGH). The input and output pins (I/O₀ through I/O₁₅) are placed in a high impedance state when: the device is deselected (\overline{CE}_1 HIGH or CE_2 LOW), outputs are disabled (\overline{OE} HIGH), both Byte High Enable and Byte Low Enable are disabled (BHE, BLE HIGH), or a write operation is in progress (\overline{CE}_1 LOW, CE_2 HIGH and WE LOW).

To write to the device, take Chip Enables (\overline{CE}_1 LOW and CE_2 HIGH) and Write Enable (WE) input LOW. If Byte Low Enable (BLE) is LOW, then data from I/O pins (I/O₀ through I/O₇) is written into the location specified on the address pins (A₀ through A₁₉). If Byte High Enable (BHE) is LOW, then data from the I/O pins (I/O₈ through I/O₁₅) is written into the location specified on the address pins (A₀ through A₁₉).

To read from the device, take Chip Enables (\overline{CE}_1 LOW and CE_2 HIGH) and Output Enable (\overline{OE}) LOW while forcing the Write Enable (WE) HIGH. If Byte Low Enable (BLE) is LOW, then data from the memory location specified by the address pins appears on I/O₀ to I/O₇. If Byte High Enable (BHE) is LOW, then data from memory appears on I/O₈ to I/O₁₅. See the "Truth Table" on page 11 for a complete description of read and write modes.

For best practice recommendations, refer to the Cypress application note [AN1064, SRAM System Design Guidelines](#).

Logic Block Diagram



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Pin Configuration

Figure 1. 48-Ball VFBGA (6 x 8 x 1mm) Top View [1, 2]

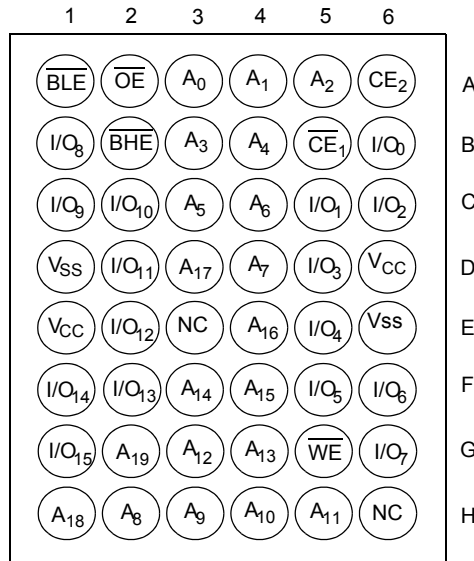
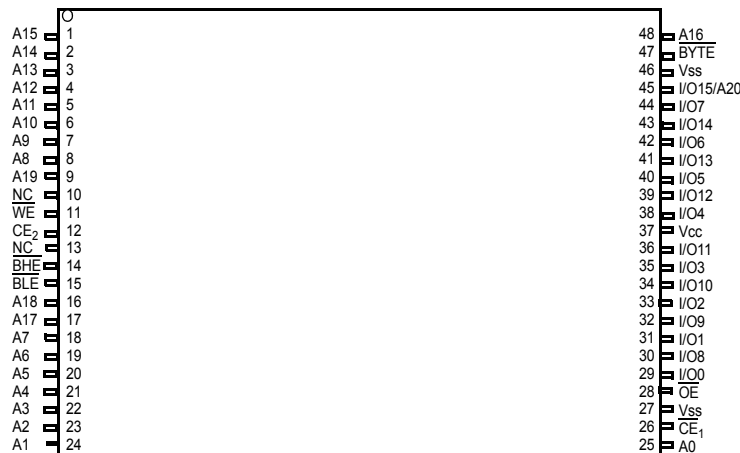


Figure 2. 48-Pin TSOP I Top View [2, 3]



Product Portfolio

| Product | Range | V _{CC} Range (V) | | Speed (ns) | Power Dissipation | | | | | | |
|---------------|--------------------|---------------------------|--------------------|------------|--------------------------------|-----|----------------------|-----|-------------------------------|-----|----|
| | | | | | Operating I _{CC} (mA) | | | | Standby I _{SB2} (μA) | | |
| | | | | | f = 1 MHz | | f = f _{max} | | | | |
| Min | Typ ^[4] | Max | Typ ^[4] | Max | Typ ^[4] | Max | Typ ^[4] | Max | | | |
| CY62167EV30LL | Industrial/Auto-A | 2.2 | 3.0 | 3.6 | 45 | 2.2 | 4.0 | 25 | 30 | 1.5 | 12 |

Notes

- Ball H6 for the VFBGA package can be used to upgrade to a 32M density.
- NC pins are not connected on the die.
- The BYTE pin in the 48-pin TSOP I package has to be tied to V_{CC} to use the device as a 1M X 16 SRAM. The 48-pin TSOP I package can also be used as a 2M X 8 SRAM by tying the BYTE signal to V_{SS}. In the 2M x 8 configuration, Pin 45 is A20, while BHE, BLE and I/O₈ to I/O₁₄ pins are not used.
- Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at V_{CC} = V_{CC}(typ), T_A = 25 °C.

Maximum Ratings

Exceeding maximum ratings may shorten the useful life of the device. User guidelines are not tested.

Storage temperature -65 °C to + 150 °C

Ambient temperature with power applied -55 °C to + 125 °C

Supply voltage to ground potential -0.3 V to 3.9 V $V_{CC(max)} + 0.3$ V

DC voltage applied to outputs in High Z state^[5, 6] -0.3 V to 3.9 V $V_{CC(max)} + 0.3$ V

DC input voltage^[5, 6] -0.3 V to 3.9 V ($V_{CC(max)} + 0.3$ V)

Output current into outputs (LOW) 20 mA

Static discharge voltage >2001 V (MIL-STD-883, Method 3015)

Latch-up current >200 mA

Operating Range

| Device | Range | Ambient Temperature | V_{CC} ^[7] |
|---------------|--------------------|---------------------|-------------------------|
| CY62167EV30LL | Industrial/ Auto-A | -40 °C to +85 °C | 2.2 V to 3.6 V |

Electrical Characteristics

Over the Operating Range

| Parameter | Description | Test Conditions | 45 ns (Industrial/Auto-A) | | | Unit | |
|----------------------------------|--|--|--|--------------------|-----|-------------------------|----|
| | | | Min | Typ ^[8] | Max | | |
| V _{OH} | Output HIGH voltage | 2.2 ≤ V _{CC} ≤ 2.7 | I _{OH} = -0.1 mA | 2.0 | - | - | V |
| | | 2.7 ≤ V _{CC} ≤ 3.6 | I _{OH} = -1.0 mA | 2.4 | - | - | V |
| V _{OL} | Output LOW voltage | 2.2 ≤ V _{CC} ≤ 2.7 | I _{OL} = 0.1 mA | - | - | 0.4 | V |
| | | 2.7 ≤ V _{CC} ≤ 3.6 | I _{OL} = 2.1 mA | - | - | 0.4 | V |
| V _{IH} | Input HIGH voltage | 2.2 ≤ V _{CC} ≤ 2.7 | | 1.8 | - | V _{CC} + 0.3 V | V |
| | | 2.7 ≤ V _{CC} ≤ 3.6 | | 2.2 | - | V _{CC} + 0.3 V | V |
| V _{IL} | Input LOW voltage | 2.2 ≤ V _{CC} ≤ 2.7 | | -0.3 | - | 0.6 | V |
| | | 2.7 ≤ V _{CC} ≤ 3.6 | For VFBGA package | -0.3 | - | 0.8 | V |
| | | | For TSOP I package | -0.3 | - | 0.7 ^[9] | V |
| I _{IX} | Input leakage current | GND ≤ V _I ≤ V _{CC} | | -1 | - | +1 | μA |
| I _{OZ} | Output leakage current | GND ≤ V _O ≤ V _{CC} , Output disabled | | -1 | - | +1 | μA |
| I _{CC} | V _{CC} operating supply current | f = f _{max} = 1/t _{RC} | V _{CC} = V _{CC(max)} | - | 25 | 30 | mA |
| | | f = 1 MHz | I _{OUT} = 0 mA CMOS levels | - | 2.2 | 4.0 | mA |
| I _{SB1} | Automatic power down current—CMOS inputs | CE ₁ ≥ V _{CC} - 0.2 V or CE ₂ ≤ 0.2 V or (BHE and BLE) ≥ V _{CC} - 0.2 V, V _{IN} ≥ V _{CC} - 0.2V, V _{IN} ≤ 0.2 V) f = f _{max} (address and data only), f = 0 (OE, and WE), V _{CC} = V _{CC} (max) | | - | 1.5 | 12 | μA |
| I _{SB2} ^[10] | Automatic power down current—CMOS inputs | CE ₁ ≥ V _{CC} - 0.2V or CE ₂ ≤ 0.2 V or (BHE and BLE) ≥ V _{CC} - 0.2 V, V _{IN} ≥ V _{CC} - 0.2 V or V _{IN} ≤ 0.2 V, f = 0, V _{CC} = V _{CC} (max) | | - | 1.5 | 12 | μA |

Capacitance

| Parameter ^[11] | Description | Test Conditions | Max | Unit |
|---------------------------|--------------------|--|-----|------|
| C _{IN} | Input capacitance | T _A = 25 °C, f = 1 MHz, | 10 | pF |
| C _{OUT} | Output capacitance | V _{CC} = V _{CC(typ)} | 10 | pF |

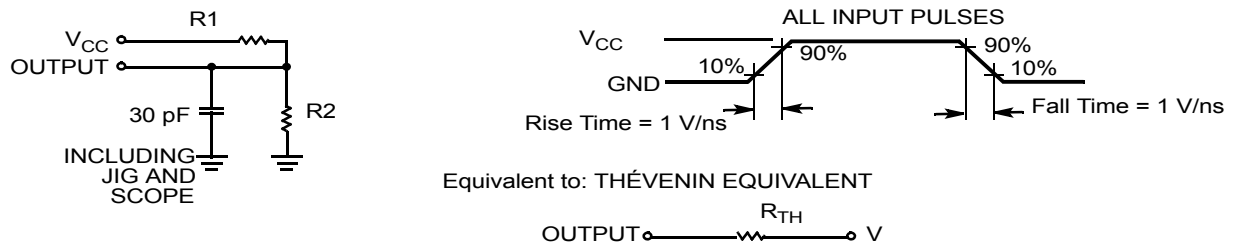
Notes

- V_{IL}(min) = -2.0 V for pulse durations less than 20 ns.
- V_{IH}(max) = V_{CC} + 0.75 V for pulse durations less than 20 ns.
- Full Device AC operation assumes a 100 μs ramp time from 0 to V_{CC} (min) and 200 μs wait time after V_{CC} stabilization.
- Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at V_{CC} = V_{CC(typ)}, T_A = 25 °C.
- Under DC conditions the device meets a V_{IL} of 0.8 V. However, in dynamic conditions Input LOW Voltage applied to the device must not be higher than 0.7 V. This is applicable to TSOP I package only.
- Chip enables ($\overline{CE_1}$ and CE₂), byte enables (\overline{BHE} and \overline{BLE}) and \overline{BYTE} must be tied to CMOS levels to meet the I_{SB2} / I_{CCDR} spec. Other inputs can be left floating.
- Tested initially and after any design or process changes that may affect these parameters.

Thermal Resistance

| Parameter ^[12] | Description | Test Conditions | VFBGA (6 x 8 x 1mm) | TSOP I | Unit |
|---------------------------|--|--|---------------------|--------|------|
| Θ_{JA} | Thermal resistance (Junction to ambient) | Still air, soldered on a 3 x 4.5 inch, two-layer printed circuit board | 55 | 60 | °C/W |
| Θ_{JC} | Thermal resistance (Junction to case) | | 16 | 4.3 | °C/W |

Figure 3. AC Test Loads and Waveforms



| Parameters | 2.2 V to 2.7 V | 2.7 V to 3.6 V | Unit |
|-----------------|----------------|----------------|----------|
| R1 | 16667 | 1103 | Ω |
| R2 | 15385 | 1554 | Ω |
| R _{TH} | 8000 | 645 | Ω |
| V _{TH} | 1.20 | 1.75 | V |

Note

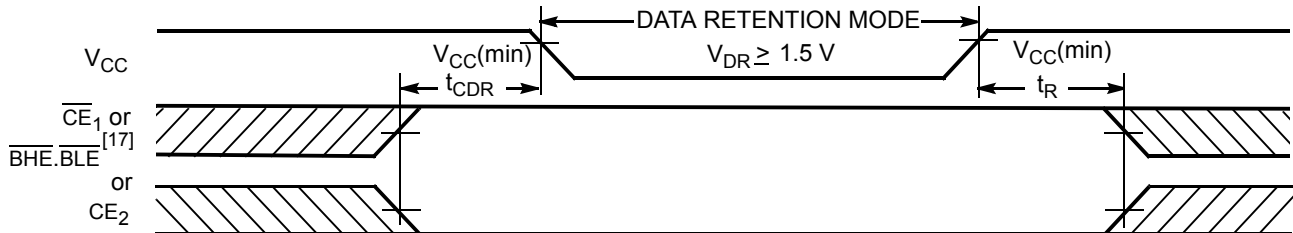
12. Tested initially and after any design or process changes that may affect these parameters.

Data Retention Characteristics

Over the Operating Range

| Parameter | Description | Conditions | Min | Typ ^[13] | Max | Unit | |
|-----------------------------------|--------------------------------------|---|------------|---------------------|-----|------|-------|
| V _{DR} | V _{CC} for data retention | | 1.5 | – | – | V | |
| I _{CCDR} ^[14] | Data retention current | V _{CC} = 1.5 V to 3.0 V, CE ₁ ≥ V _{CC} – 0.2 V or CE ₂ ≤ 0.2 V or (BHE and BLE) ≥ V _{CC} – 0.2 V, V _{IN} ≥ V _{CC} – 0.2 V or V _{IN} ≤ 0.2 V | Industrial | 48-pin TSOP I | – | – | 8 μA |
| | | V _{CC} = 1.5 V, CE ₁ ≥ V _{CC} – 0.2 V or CE ₂ ≤ 0.2 V or (BHE and BLE) ≥ V _{CC} – 0.2 V, V _{IN} ≥ V _{CC} – 0.2 V or V _{IN} ≤ 0.2 V | Industrial | Other packages | – | – | 10 μA |
| | | | Auto-A | All packages | – | – | 10 μA |
| t _{CDR} ^[15] | Chip deselect to data retention time | | 0 | – | – | – | |
| t _R ^[16] | Operation recovery time | | 45 | – | – | ns | |

Figure 4. Data Retention Waveform



Notes

- 13. Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at V_{CC} = V_{CC}(typ), T_A = 25 °C.
- 14. Chip enables (CE₁ and CE₂), byte enables (BHE and BLE) and BYTE must be tied to CMOS levels to meet the I_{SB2} / I_{CCDR} spec. Other inputs can be left floating.
- 15. Tested initially and after any design or process changes that may affect these parameters.
- 16. Full device operation requires linear V_{CC} ramp from V_{DR} to V_{CC}(min) ≥ 100 μs or stable at V_{CC}(min) ≥ 100 μs.
- 17. BHE.BLE is the AND of both BHE and BLE. Deselect the chip by either disabling the chip enable signals or by disabling both BHE and BLE.

Switching Characteristics

| Parameter ^[18, 19] | Description | 45 ns (Industrial/Auto-A) | | Unit |
|-----------------------------------|--|---------------------------|-----|------|
| | | Min | Max | |
| READ CYCLE | | | | |
| t_{RC} | Read cycle time | 45 | – | ns |
| t_{AA} | Address to data valid | – | 45 | ns |
| t_{OHA} | Data hold from address change | 10 | – | ns |
| t_{ACE} | \overline{CE}_1 LOW and CE_2 HIGH to data valid | – | 45 | ns |
| t_{DOE} | \overline{OE} LOW to data valid | – | 22 | ns |
| t_{LZOE} | \overline{OE} LOW to Low Z ^[20] | 5 | – | ns |
| t_{HZOE} | \overline{OE} HIGH to High Z ^[20, 21] | – | 18 | ns |
| t_{LZCE} | \overline{CE}_1 LOW and CE_2 HIGH to Low Z ^[20] | 10 | – | ns |
| t_{HZCE} | \overline{CE}_1 HIGH and CE_2 LOW to High Z ^[20, 21] | – | 18 | ns |
| t_{PU} | \overline{CE}_1 LOW and CE_2 HIGH to power-up | 0 | – | ns |
| t_{PD} | \overline{CE}_1 HIGH and CE_2 LOW to power-down | – | 45 | ns |
| t_{DBE} | \overline{BLE} / \overline{BHE} LOW to data valid | – | 45 | ns |
| t_{LZBE} | \overline{BLE} / \overline{BHE} LOW to Low Z ^[20] | 10 | – | ns |
| t_{HZBE} | \overline{BLE} / \overline{BHE} HIGH to HIGH Z ^[20, 21] | – | 18 | ns |
| WRITE CYCLE^[22] | | | | |
| t_{WC} | Write cycle time | 45 | – | ns |
| t_{SCE} | \overline{CE}_1 LOW and CE_2 HIGH to write end | 35 | – | ns |
| t_{AW} | Address setup to write end | 35 | – | ns |
| t_{HA} | Address hold from write end | 0 | – | ns |
| t_{SA} | Address setup to write start | 0 | – | ns |
| t_{PWE} | \overline{WE} pulse width | 35 | – | ns |
| t_{BW} | \overline{BLE} / \overline{BHE} LOW to write end | 35 | – | ns |
| t_{SD} | Data setup to write end | 25 | – | ns |
| t_{HD} | Data hold from write end | 0 | – | ns |
| t_{HZWE} | \overline{WE} LOW to High Z ^[20, 21] | – | 18 | ns |
| t_{LZWE} | \overline{WE} HIGH to Low Z ^[20] | 10 | – | ns |

Notes

18. Test conditions for all parameters other than tristate parameters assume signal transition time of 1 V/ns, timing reference levels of $V_{CC}(typ)/2$, input pulse levels of 0 to $V_{CC}(typ)$, and output loading of the specified I_{OL}/I_{OH} as shown in "AC Test Loads and Waveforms" on page 5.

19. AC timing parameters are subject to byte enable signals (\overline{BHE} or \overline{BLE}) not switching when chip is disabled. See application note AN13842 for further clarification.

20. At any temperature and voltage condition, t_{HZCE} is less than t_{LZCE} , t_{HZBE} is less than t_{LZBE} , t_{HZOE} is less than t_{LZOE} , and t_{HZWE} is less than t_{LZWE} for any device.

21. t_{HZOE} , t_{HZCE} , t_{HZBE} , and t_{HZWE} transitions are measured when the outputs enter a high impedance state.

22. The internal write time of the memory is defined by the overlap of \overline{WE} , $\overline{CE}_1 = V_{IL}$, \overline{BHE} or \overline{BLE} or both = V_{IL} , and $CE_2 = V_{IH}$. All signals must be ACTIVE to initiate a write and any of these signals can terminate a write by going INACTIVE. The data input setup and hold timing must refer to the edge of the signal that terminates the write.

Switching Waveforms

Figure 5. Read Cycle No. 1 (Address Transition Controlled)^[23, 24]

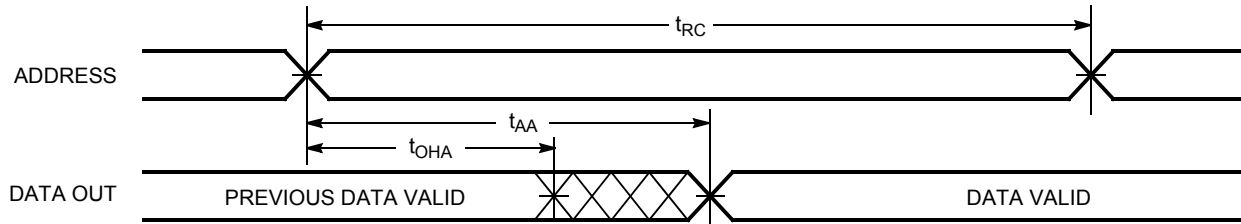
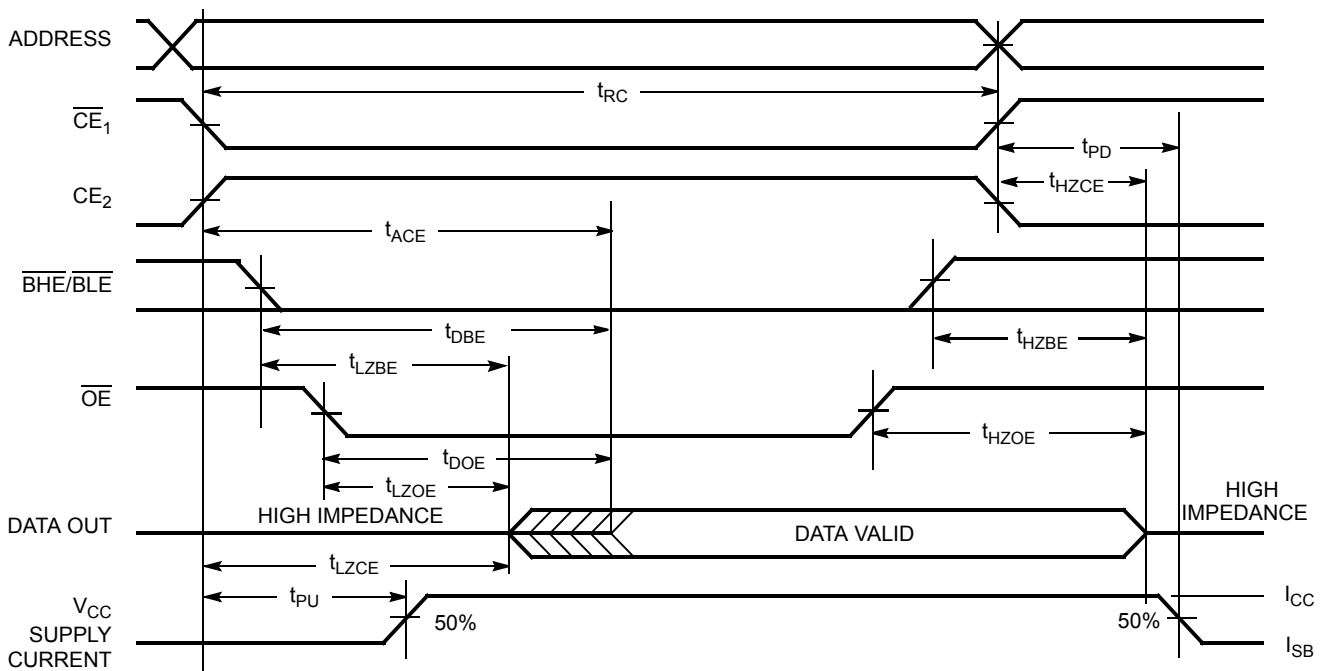


Figure 6. Read Cycle No. 2 ($\overline{\text{OE}}$ Controlled)^[24, 25]



Notes

- 23. The device is continuously selected. $\overline{\text{OE}}$, $\overline{\text{CE}}_1 = V_{IL}$, $\overline{\text{BHE}}$, $\overline{\text{BLE}}$ or both = V_{IL} , and $\text{CE}_2 = V_{IH}$.
- 24. $\overline{\text{WE}}$ is HIGH for read cycle.
- 25. Address valid before or similar to $\overline{\text{CE}}_1$, $\overline{\text{BHE}}$, $\overline{\text{BLE}}$ transition LOW and CE_2 transition HIGH.

Switching Waveforms (continued)

Figure 7. Write Cycle No. 1 (\overline{WE} Controlled)^[26, 27, 28]

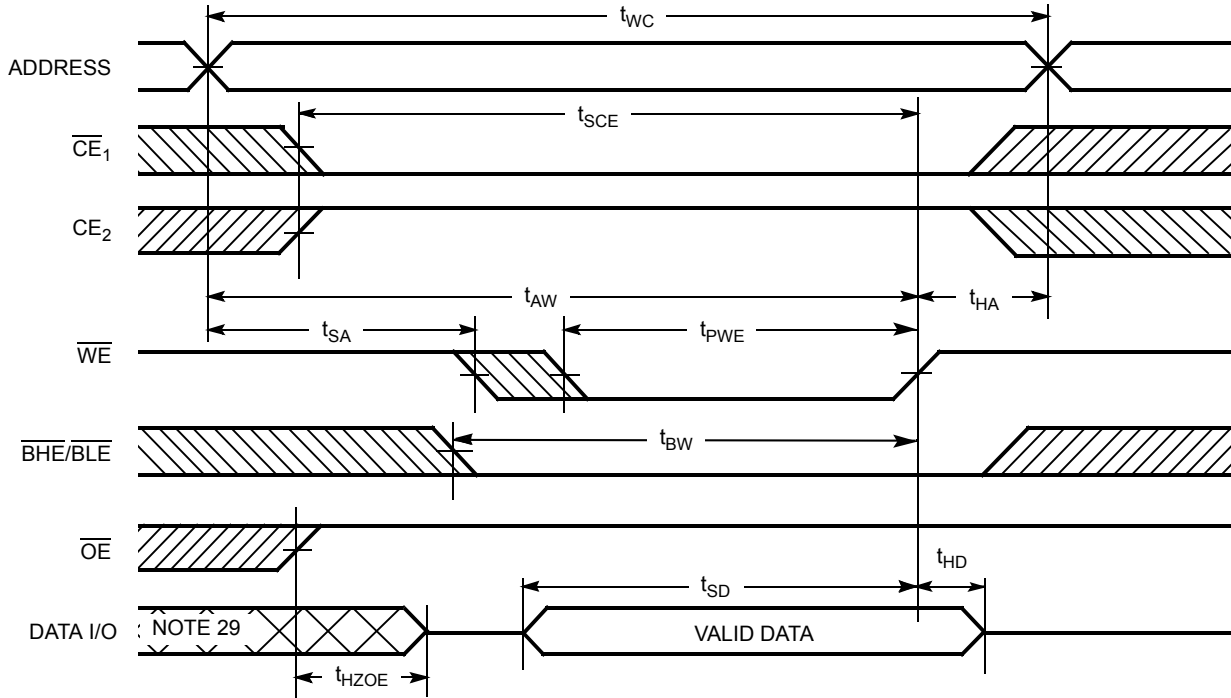
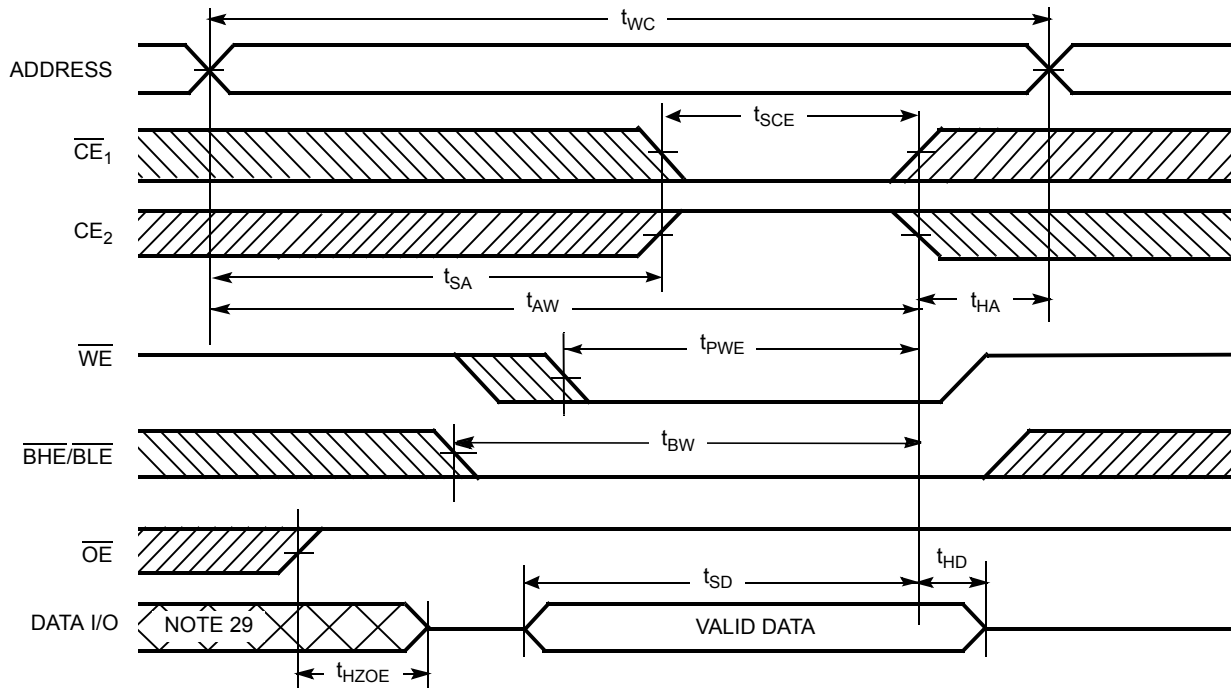


Figure 8. Write Cycle No. 2 (\overline{CE}_1 or CE_2 Controlled)^[26, 28]



Notes

- 26. The internal write time of the memory is defined by the overlap of \overline{WE} , $\overline{CE}_1 = V_{IL}$, \overline{BHE} or \overline{BLE} or both = V_{IL} , and $CE_2 = V_{IH}$. All signals must be ACTIVE to initiate a write and any of these signals can terminate a write by going INACTIVE. The data input setup and hold timing must refer to the edge of the signal that terminates the write.
- 27. Data I/O is high impedance if $\overline{OE} = V_{IH}$.
- 28. If \overline{CE}_1 goes HIGH and CE_2 goes LOW simultaneously with $\overline{WE} = V_{IH}$, the output remains in a high impedance state.
- 29. During this period the I/Os are in output state. Do not apply input signals.

Switching Waveforms (continued)

Figure 9. Write Cycle No. 3 (\overline{WE} controlled, \overline{OE} LOW)^[30]

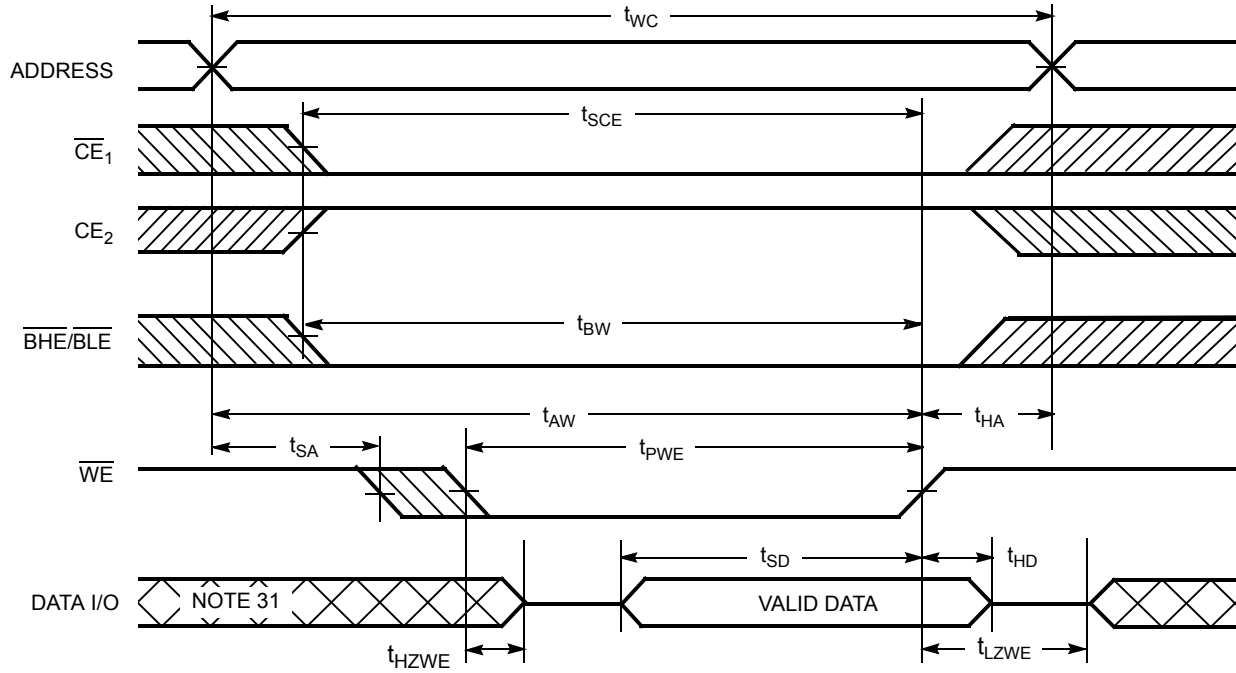
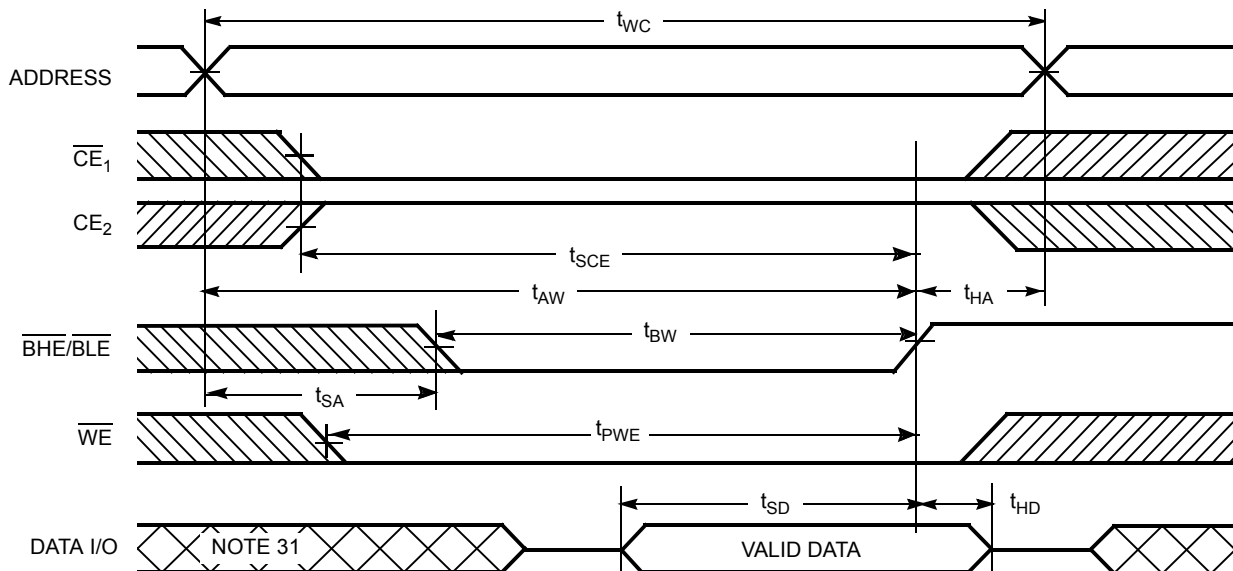


Figure 10. Write Cycle No. 4 ($\overline{BHE}/\overline{BLE}$ controlled, \overline{OE} LOW)^[30]



Notes

- 30. If \overline{CE}_1 goes HIGH and CE_2 goes LOW simultaneously with $\overline{WE} = V_{IH}$, the output remains in a high impedance state.
- 31. During this period the I/Os are in output state. Do not apply input signals.

Truth Table

| \overline{CE}_1 | \overline{CE}_2 | \overline{WE} | \overline{OE} | \overline{BHE} | \overline{BLE} | Inputs/Outputs | Mode | Power |
|-------------------|-------------------|-----------------|-----------------|------------------|------------------|--|---------------------|----------------------------|
| H | X ^[32] | X | X | X | X | High Z | Deselect/Power-down | Standby (I _{SB}) |
| X ^[32] | L | X | X | X | X | High Z | Deselect/Power-down | Standby (I _{SB}) |
| X ^[32] | X ^[32] | X | X | H | H | High Z | Deselect/Power-down | Standby (I _{SB}) |
| L | H | H | L | L | L | Data Out (I/O ₀ –I/O ₁₅) | Read | Active (I _{CC}) |
| L | H | H | L | H | L | Data Out (I/O ₀ –I/O ₇); High Z (I/O ₈ –I/O ₁₅) | Read | Active (I _{CC}) |
| L | H | H | L | L | H | High Z (I/O ₀ –I/O ₇); Data Out (I/O ₈ –I/O ₁₅) | Read | Active (I _{CC}) |
| L | H | H | H | L | H | High Z | Output disabled | Active (I _{CC}) |
| L | H | H | H | H | L | High Z | Output disabled | Active (I _{CC}) |
| L | H | H | H | L | L | High Z | Output disabled | Active (I _{CC}) |
| L | H | L | X | L | L | Data In (I/O ₀ –I/O ₁₅) | Write | Active (I _{CC}) |
| L | H | L | X | H | L | Data In (I/O ₀ –I/O ₇); High Z (I/O ₈ –I/O ₁₅) | Write | Active (I _{CC}) |
| L | H | L | X | L | H | High Z (I/O ₀ –I/O ₇); Data In (I/O ₈ –I/O ₁₅) | Write | Active (I _{CC}) |

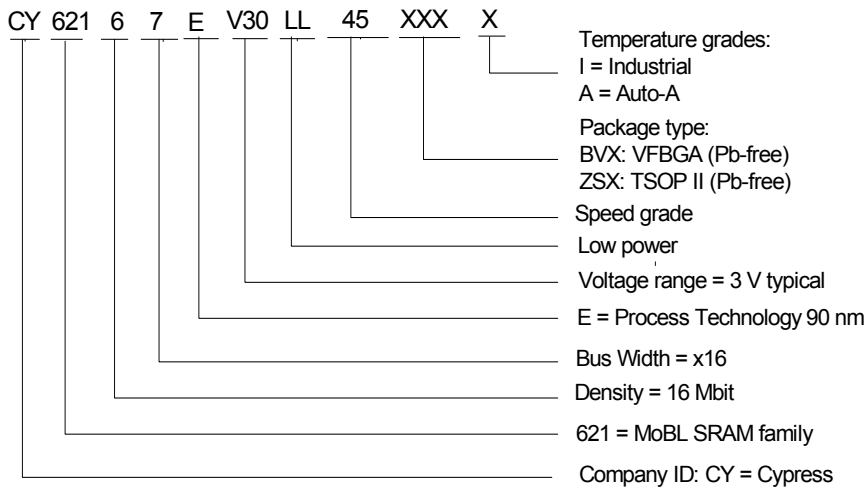
Note

32. The 'X' (Don't care) state for the chip enables in the truth table refer to the logic state (either HIGH or LOW). Intermediate voltage levels on these pins is not permitted

Ordering Information

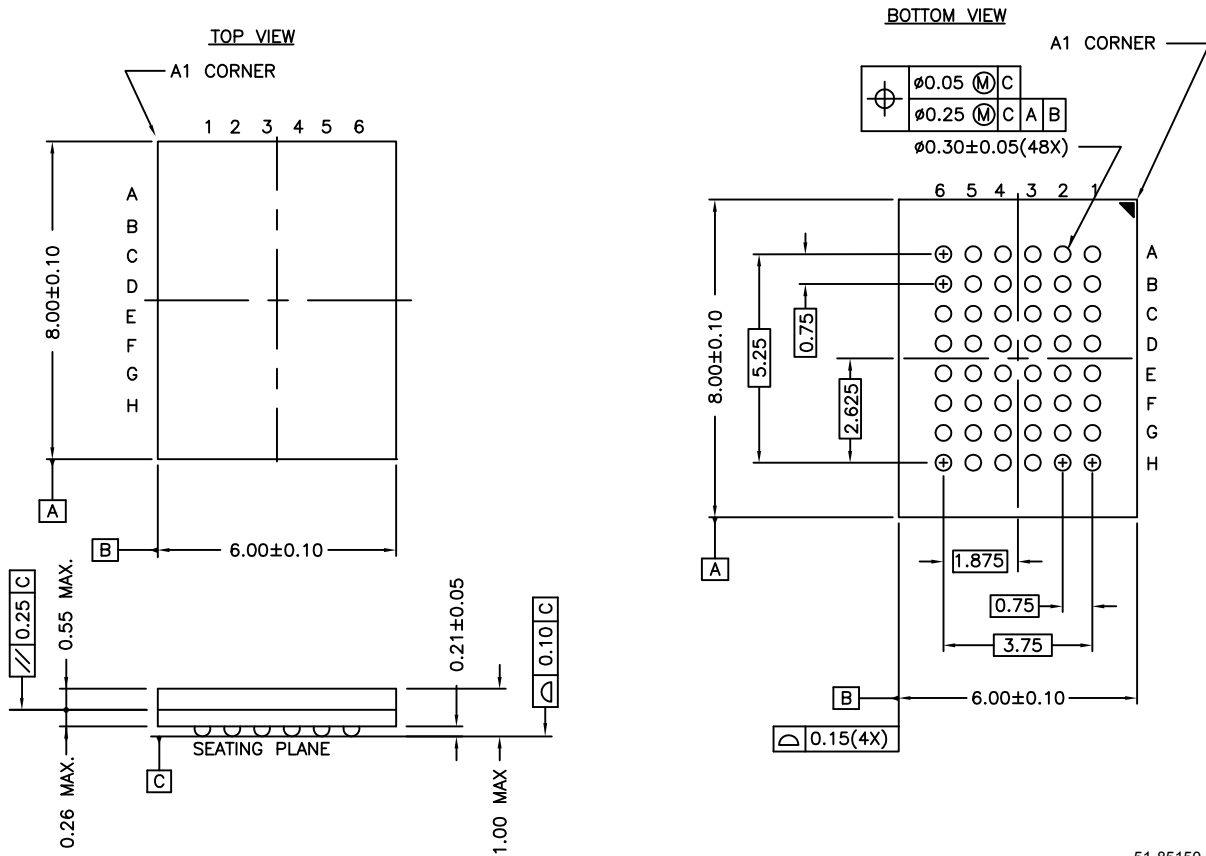
| Speed (ns) | Ordering Code | Package Diagram | Package Type | Operating Range |
|------------|----------------------|-----------------|--|-----------------|
| 45 | CY62167EV30LL-45BVI | 51-85150 | 48-ball VFBGA (6 × 8 × 1 mm) | Industrial |
| | CY62167EV30LL-45BVXI | 51-85150 | 48-ball VFBGA (6 × 8 × 1 mm) (Pb-free) | |
| | CY62167EV30LL-45ZXI | 51-85183 | 48-pin TSOP I (Pb-free) | |
| | CY62167EV30LL-45BVXA | 51-85150 | 48-ball VFBGA (6 × 8 × 1 mm) (Pb-free) | Automotive-A |
| | CY62167EV30LL-45ZXA | 51-85183 | 48-pin TSOP I (Pb-free) | |

Ordering Code Definition



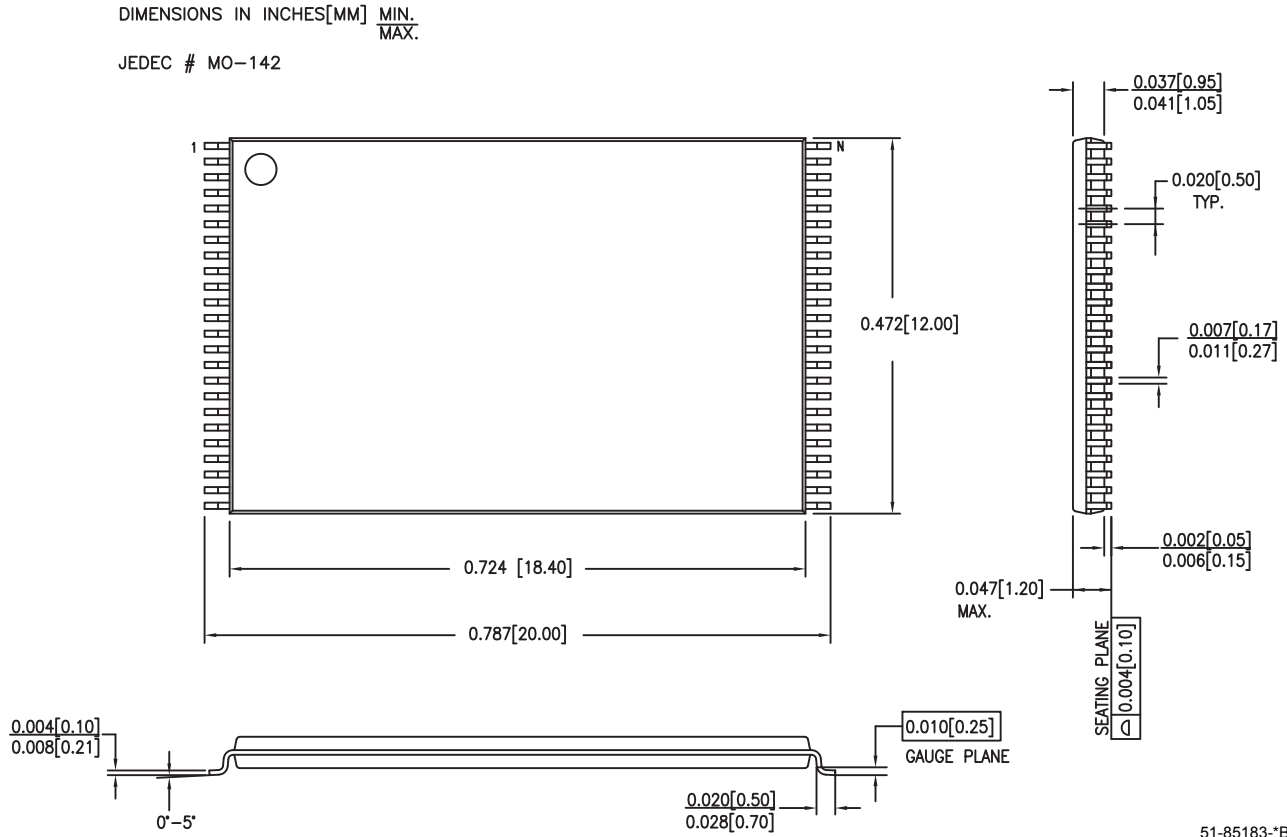
Package Diagrams

Figure 11. 48-Ball VFBGA (6 x 8 x 1 mm), 51-85150



51-85150-^{*}E

Figure 12. 48-Pin TSOP I (12 mm × 18.4 mm × 1.0 mm), 51-85183



51-85183-B

Acronyms

| Acronym | Description |
|-------------------------|---|
| $\overline{\text{BHE}}$ | byte high enable |
| $\overline{\text{BLE}}$ | byte low enable |
| CMOS | complementary metal oxide semiconductor |
| $\overline{\text{CE}}$ | chip enable |
| I/O | input/output |
| $\overline{\text{OE}}$ | output enable |
| SRAM | static random access memory |
| TSOP | thin small outline package |
| VFBGA | very fine ball grid array |
| $\overline{\text{WE}}$ | write enable |

Document History Page

| Document Title: CY62167EV30 MoBL® 16-Mbit (1M x 16 / 2M x 8) Static RAM Document Number: 38-05446 | | | | |
|--|---------|-----------------|-----------------|--|
| Rev. | ECN No. | Orig. of Change | Submission Date | Description of Change |
| ** | 202600 | AJU | 01/23/2004 | New Data Sheet |
| *A | 463674 | NXR | See ECN | Converted from Advance Information to Preliminary Removed 'L' bin and 35 ns speed bin from product offering Modified Data sheet to include x8 configurability. Changed ball E3 in FBGA pinout from DNU to NC Changed the I _{SB2(Typ)} value from 1.3 μA to 1.5 μA Changed the I _{CC(Max)} value from 40 mA to 25 mA Changed V _{cc} stabilization time in footnote #9 from 100 μs to 200 μs Changed the AC Test Load Capacitance value from 50 pF to 30 pF Corrected typo in Data Retention Characteristics (t _R) from 100 μs to t _{RC} ns Changed t _{OHA} , t _{LZCE} , t _{LZBE} , and t _{LZWE} from 6 ns to 10 ns Changed t _{LZOE} from 3 ns to 5 ns. Changed t _{HZOE} , t _{HZCE} , t _{HZBE} , and t _{HZWE} from 15 ns to 18 ns Changed t _{SCE} , t _{AW} , and t _{BW} from 40 ns to 35 ns Changed t _{PE} from 30 ns to 35 ns Changed t _{SD} from 20 ns to 25 ns Updated 48 ball FBGA Package Information. Updated the Ordering Information table |
| *B | 469169 | NSI | See ECN | Minor Change: Moved to external web |
| *C | 1130323 | VKN | See ECN | Converted from preliminary to final Changed I _{CC} max spec from 2.8 mA to 4.0 mA for f=1MHz Changed I _{CC} typ spec from 22 mA to 25 mA for f=f _{max} Changed I _{CC} max spec from 25 mA to 30 mA for f=f _{max} Added V _{IL} spec for TSOP I package and footnote# 9 Added footnote# 10 related to I _{SB2} and I _{CCDR} Changed I _{SB1} and I _{SB2} spec from 8.5 μA to 12 μA Changed I _{CCDR} spec from 8 μA to 10 μA Added footnote# 15 related to AC timing parameters |
| *D | 1323984 | VKN/AESA | See ECN | Modified I _{CCDR} spec for TSOP I package Added 48-Ball VFBGA (6 x 7 x 1mm) package Added footnote# 1 related to VFBGA (6 x 7 x 1mm) package Updated Ordering Information table |
| *E | 2678799 | VKN/PYRS | 03/25/2009 | Added Automotive-A information |
| *F | 2720234 | VKN/AESA | 06/17/2009 | Included -45BVXA part in the Ordering information table |
| *G | 2880574 | VKN | 02/18/2010 | Modified I _{CCDR} spec from 8 μA to 10 μA for Auto-A grade. Added Contents . Updated all package diagrams. Updated links in Sales , Solutions , and Legal Information . |
| *H | 2934396 | VKN | 06/03/10 | Added footnote #25 related to chip enable. Updated template. |
| *I | 3006301 | RAME | 08/12/2010 | Included BHE and BLE in I _{SB1} , I _{SB2} , and I _{CCDR} test conditions to reflect Byte power down feature. Removed 48-Ball VFBGA (6 x 7 x 1 mm) package related information. Added Acronyms and Ordering code definition. Format updates to match template. |

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