



**HIGH-SPEED 3.3V 32K x 36  
SYNCHRONOUS PIPELINED  
DUAL-PORT STATIC RAM  
WITH 3.3V OR 2.5V INTERFACE**

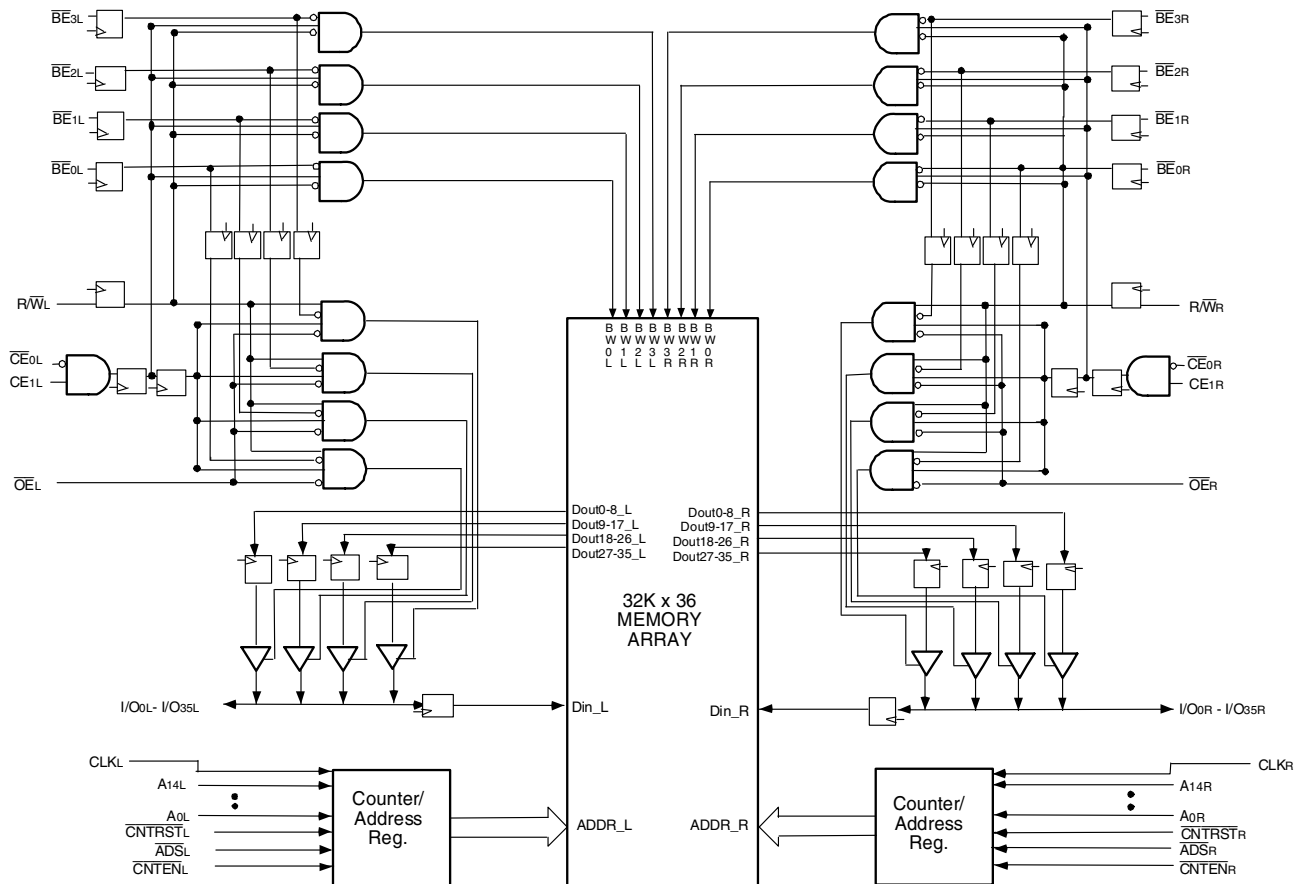
**IDT70V3579S**

**Features:**

- ◆ True Dual-Port memory cells which allow simultaneous access of the same memory location
- ◆ High-speed clock to data access
  - Commercial: 4.2/5/6ns (max.)
  - Industrial: 5ns (max)
- ◆ Pipelined output mode
- ◆ Counter enable and reset features
- ◆ Dual chip enables allow for depth expansion without additional logic
- ◆ Full synchronous operation on both ports
  - 7.5ns cycle time, 133MHz operation (9.6 Gbps bandwidth)
  - Fast 4.2ns clock to data out
  - 1.8ns setup to clock and 0.7ns hold on all control, data, and address inputs @ 133MHz

- Data input, address, byte enable and control registers
- Self-timed write allows fast cycle time
- ◆ Separate byte controls for multiplexed bus and bus matching compatibility
- ◆ LVTTTL-compatible, single 3.3V ( $\pm 150\text{mV}$ ) power supply for core
- ◆ LVTTTL compatible, selectable 3.3V ( $\pm 150\text{mV}$ )/2.5V ( $\pm 125\text{mV}$ ) power supply for I/Os and control signals on each port
- ◆ Industrial temperature range (-40°C to +85°C) is available for selected speeds
- ◆ Available in a 208-pin Plastic Quad Flatpack (PQFP) and 208-pin fine pitch Ball Grid Array, and 256-pin Ball Grid Array
- ◆ Green parts available, see ordering information

**Functional Block Diagram**



4830 tbl 01

OCTOBER 2014

## Description:

The IDT70V3579 is a high-speed 32K x 36 bit synchronous Dual-Port RAM. The memory array utilizes Dual-Port memory cells to allow simultaneous access of any address from both ports. Registers on control, data, and address inputs provide minimal setup and hold times. The timing latitude provided by this approach allows systems to be designed with very short cycle times. With an input data register, the IDT70V3579 has been optimized for applications having unidirectional or

bidirectional data flow in bursts. An automatic power down feature, controlled by CE<sub>0</sub> and CE<sub>1</sub>, permits the on-chip circuitry of each port to enter a very low standby power mode.

The 70V3579 can support an operating voltage of either 3.3V or 2.5V on one or both ports, controllable by the OPT pins. The power supply for the core of the device (V<sub>DD</sub>) remains at 3.3V.

## Pin Configuration<sup>(1,2,3,4)</sup>

12/12/01

|                       |                       |                       |                       |  |            |            |                         |                         |                        |                            |               |                        |                        |                        |                        |                        |                        |
|-----------------------|-----------------------|-----------------------|-----------------------|--|------------|------------|-------------------------|-------------------------|------------------------|----------------------------|---------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| A1<br>I/O19L          | A2<br>I/O18L          | A3<br>V <sub>SS</sub> | A4<br>NC              | A5<br>NC   | A6<br>NC   | A7<br>A12L | A8<br>A8L               | A9<br>BE <sub>1</sub> L | A10<br>V <sub>DD</sub> | A11<br>CLKL                | A12<br>CNTENL | A13<br>A4L             | A14<br>A0L             | A15<br>OPTL            | A16<br>I/O17L          | A17<br>V <sub>SS</sub> |                        |
| B1<br>I/O20R          | B2<br>V <sub>SS</sub> | B3<br>I/O18R          | B4<br>V <sub>SS</sub> | B5<br>NC   | B6<br>A13L | B7<br>A9L  | B8<br>BE <sub>2</sub> L | B9<br>CE <sub>0</sub> L | B10<br>V <sub>SS</sub> | B11<br>ADSL                | B12<br>A5L    | B13<br>A1L             | B14<br>V <sub>SS</sub> | B15<br>VDDQR           | B16<br>I/O16L          | B17<br>I/O15R          |                        |
| C1<br>VDDQL           | C2<br>I/O19R          | C3<br>VDDQR           | C4<br>V <sub>DD</sub> | C5<br>NC   | C6<br>A14L | C7<br>A10L | C8<br>BE <sub>3</sub> L | C9<br>CE <sub>1</sub> L | C10<br>V <sub>SS</sub> | C11<br>R/WL                | C12<br>A6L    | C13<br>A2L             | C14<br>V <sub>DD</sub> | C15<br>I/O16R          | C16<br>I/O15L          | C17<br>V <sub>SS</sub> |                        |
| D1<br>I/O22L          | D2<br>V <sub>SS</sub> | D3<br>I/O21L          | D4<br>I/O20L          | D5<br>NC   | D6<br>A11L | D7<br>A7L  | D8<br>BE <sub>0</sub> L | D9<br>V <sub>DD</sub>   | D10<br>OE <sub>L</sub> | D11<br>CNT <sub>RSTL</sub> | D12<br>A3L    | D13<br>V <sub>DD</sub> | D14<br>I/O17R          | D15<br>VDDQL           | D16<br>I/O14L          | D17<br>I/O14R          |                        |
| E1<br>I/O23L          | E2<br>I/O22R          | E3<br>VDDQR           | E4<br>I/O21R          | <b>70V3579BF</b><br><b>BF-208<sup>(5)</sup></b><br><br><b>208-Pin fpBGA</b><br><b>Top View<sup>(6)</sup></b> |            |            |                         |                         |                        |                            |               |                        |                        | E14<br>I/O12L          | E15<br>I/O13R          | E16<br>V <sub>SS</sub> | E17<br>I/O13L          |
| F1<br>VDDQL           | F2<br>I/O23R          | F3<br>I/O24L          | F4<br>V <sub>SS</sub> |  |            |            |                         |                         |                        |                            |               |                        |                        | F14<br>V <sub>SS</sub> | F15<br>I/O12R          | F16<br>I/O11L          | F17<br>VDDQR           |
| G1<br>I/O26L          | G2<br>V <sub>SS</sub> | G3<br>I/O25L          | G4<br>I/O24R          |  |            |            |                         |                         |                        |                            |               |                        |                        | G14<br>I/O9L           | G15<br>VDDQL           | G16<br>I/O10L          | G17<br>I/O11R          |
| H1<br>V <sub>DD</sub> | H2<br>I/O26R          | H3<br>VDDQR           | H4<br>I/O25R          |  |            |            |                         |                         |                        |                            |               |                        |                        | H14<br>V <sub>DD</sub> | H15<br>I/O9R           | H16<br>V <sub>SS</sub> | H17<br>I/O10R          |
| J1<br>VDDQL           | J2<br>V <sub>DD</sub> | J3<br>V <sub>SS</sub> | J4<br>V <sub>SS</sub> |  |            |            |                         |                         |                        |                            |               |                        |                        | J14<br>V <sub>SS</sub> | J15<br>V <sub>DD</sub> | J16<br>V <sub>SS</sub> | J17<br>VDDQR           |
| K1<br>I/O28R          | K2<br>V <sub>SS</sub> | K3<br>I/O27R          | K4<br>V <sub>SS</sub> |  |            |            |                         |                         |                        |                            |               |                        |                        | K14<br>I/O7R           | K15<br>VDDQL           | K16<br>I/O8R           | K17<br>V <sub>SS</sub> |
| L1<br>I/O29R          | L2<br>I/O28L          | L3<br>VDDQR           | L4<br>I/O27L          |  |            |            |                         |                         |                        |                            |               |                        |                        | L14<br>I/O6R           | L15<br>I/O7L           | L16<br>V <sub>SS</sub> | L17<br>I/O8L           |
| M1<br>VDDQL           | M2<br>I/O29L          | M3<br>I/O30R          | M4<br>V <sub>SS</sub> |  |            |            |                         |                         |                        |                            |               |                        |                        | M14<br>V <sub>SS</sub> | M15<br>I/O6L           | M16<br>I/O5R           | M17<br>VDDQR           |
| N1<br>I/O31L          | N2<br>V <sub>SS</sub> | N3<br>I/O31R          | N4<br>I/O30L          |  |            |            |                         |                         |                        |                            |               |                        |                        | N14<br>I/O3R           | N15<br>VDDQL           | N16<br>I/O4R           | N17<br>I/O5L           |
| P1<br>I/O32R          | P2<br>I/O32L          | P3<br>VDDQR           | P4<br>I/O35R          |  |            |            |                         |                         |                        |                            |               |                        |                        | P5<br>NC               | P6<br>NC               | P7<br>A12R             | P8<br>A8R              |
| R1<br>V <sub>SS</sub> | R2<br>I/O33L          | R3<br>I/O34R          | R4<br>NC              | R5<br>NC   | R6<br>A13R | R7<br>A9R  | R8<br>BE <sub>2</sub> R | R9<br>CE <sub>0</sub> R | R10<br>V <sub>SS</sub> | R11<br>ADSR                | R12<br>A5R    | R13<br>A1R             | R14<br>V <sub>SS</sub> | R15<br>VDDQL           | R16<br>I/O1R           | R17<br>VDDQR           |                        |
| T1<br>I/O33R          | T2<br>I/O34L          | T3<br>VDDQL           | T4<br>V <sub>SS</sub> | T5<br>NC   | T6<br>A14R | T7<br>A10R | T8<br>BE <sub>3</sub> R | T9<br>CE <sub>1</sub> R | T10<br>V <sub>SS</sub> | T11<br>R/WR                | T12<br>A6R    | T13<br>A2R             | T14<br>V <sub>SS</sub> | T15<br>I/O0R           | T16<br>V <sub>SS</sub> | T17<br>I/O2R           |                        |
| U1<br>V <sub>SS</sub> | U2<br>I/O35L          | U3<br>V <sub>DD</sub> | U4<br>NC              | U5<br>NC   | U6<br>A11R | U7<br>A7R  | U8<br>BE <sub>0</sub> R | U9<br>V <sub>DD</sub>   | U10<br>OE <sub>R</sub> | U11<br>CNT <sub>RSTR</sub> | U12<br>A3R    | U13<br>A0R             | U14<br>V <sub>DD</sub> | U15<br>OPTR            | U16<br>I/O0L           | U17<br>I/O1L           |                        |

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### NOTES:

1. All V<sub>DD</sub> pins must be connected to 3.3V power supply.
2. All V<sub>DDQ</sub> pins must be connected to appropriate power supply: 3.3V if OPT pin for that port is set to V<sub>IH</sub> (3.3V), and 2.5V if OPT pin for that port is set to V<sub>IL</sub> (0V).
3. All V<sub>SS</sub> pins must be connected to ground supply.
4. Package body is approximately 15mm x 15mm x 1.4mm, with 0.8mm ball-pitch.
5. This package code is used to reference the package diagram.
6. This text does not indicate orientation of the actual part-marking.

Pin Configuration<sup>(1,2,3,4)</sup> (con't.)

70V3579BC  
BC-256<sup>(5)</sup>

256-Pin BGA  
Top View<sup>(6)</sup>

12/12/01

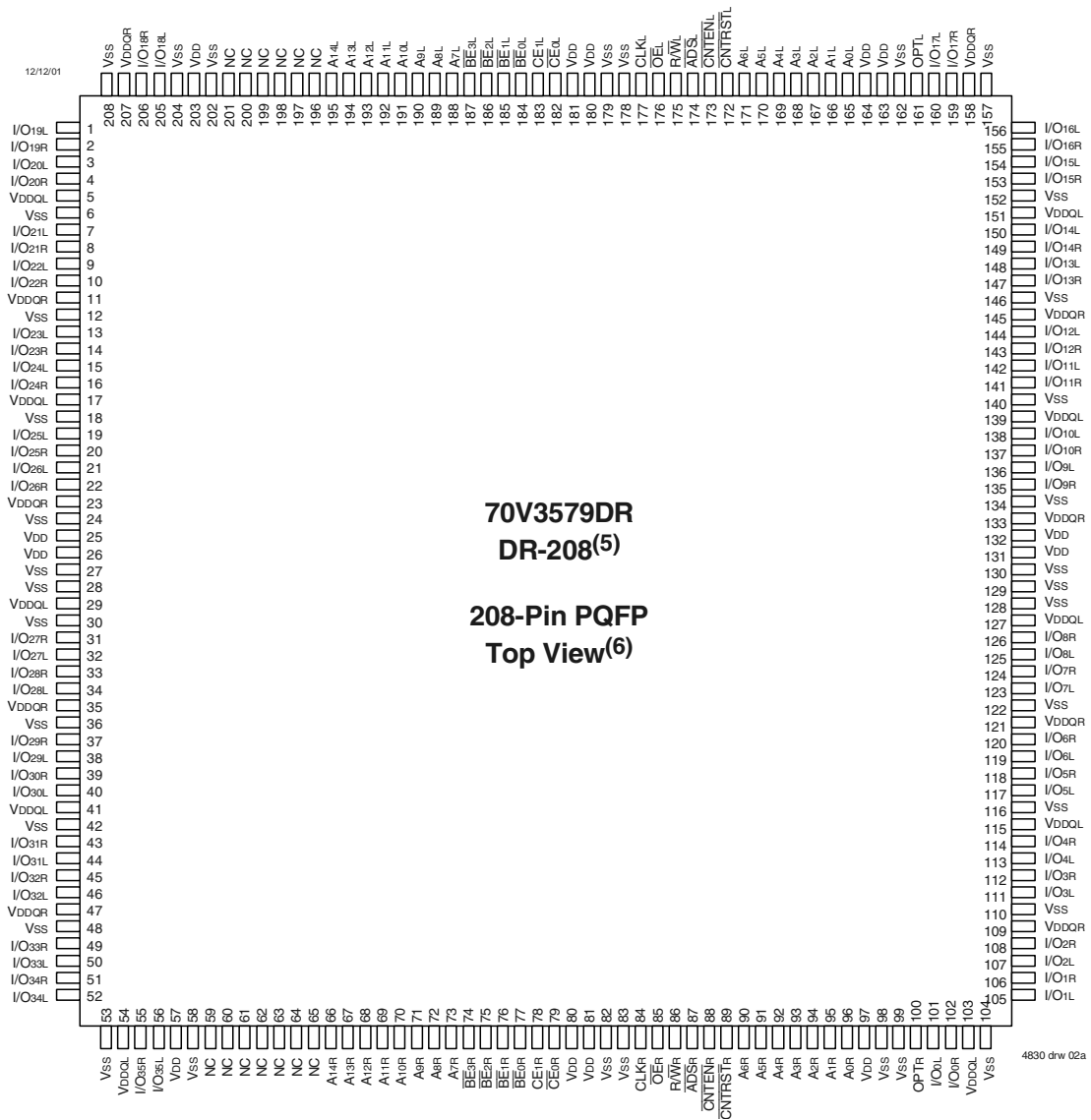
|              |              |              |             |             |             |             |                         |                         |                         |                             |              |              |               |               |               |
|--------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------------------|-------------------------|-------------------------|-----------------------------|--------------|--------------|---------------|---------------|---------------|
| A1<br>NC     | A2<br>NC     | A3<br>NC     | A4<br>NC    | A5<br>A14L  | A6<br>A11L  | A7<br>A8L   | A8<br>$\overline{BE}2L$ | A9<br>CE1L              | A10<br>$\overline{OE}L$ | A11<br>$\overline{CNTEN}L$  | A12<br>A5L   | A13<br>A2L   | A14<br>A0L    | A15<br>NC     | A16<br>NC     |
| B1<br>I/O18L | B2<br>NC     | B3<br>NC     | B4<br>NC    | B5<br>NC    | B6<br>A12L  | B7<br>A9L   | B8<br>$\overline{BE}3L$ | B9<br>$\overline{CE}0L$ | B10<br>R/WL             | B11<br>$\overline{CNTRST}L$ | B12<br>A4L   | B13<br>A1L   | B14<br>VDD    | B15<br>I/O17L | B16<br>NC     |
| C1<br>I/O18R | C2<br>I/O19L | C3<br>VSS    | C4<br>NC    | C5<br>A13L  | C6<br>A10L  | C7<br>A7L   | C8<br>$\overline{BE}1L$ | C9<br>$\overline{BE}0L$ | C10<br>CLKL             | C11<br>$\overline{ADS}L$    | C12<br>A6L   | C13<br>A3L   | C14<br>OPTL   | C15<br>I/O17R | C16<br>I/O16L |
| D1<br>I/O20R | D2<br>I/O19R | D3<br>I/O20L | D4<br>VDD   | D5<br>VDDQL | D6<br>VDDQL | D7<br>VDDQR | D8<br>VDDQR             | D9<br>VDDQL             | D10<br>VDDQL            | D11<br>VDDQR                | D12<br>VDDQR | D13<br>VDD   | D14<br>I/O15R | D15<br>I/O15L | D16<br>I/O16R |
| E1<br>I/O21R | E2<br>I/O21L | E3<br>I/O22L | E4<br>VDDQL | E5<br>VDD   | E6<br>VDD   | E7<br>VSS   | E8<br>VSS               | E9<br>VSS               | E10<br>VSS              | E11<br>VDD                  | E12<br>VDD   | E13<br>VDDQR | E14<br>I/O13L | E15<br>I/O14L | E16<br>I/O14R |
| F1<br>I/O23L | F2<br>I/O22R | F3<br>I/O23R | F4<br>VDDQL | F5<br>VDD   | F6<br>VSS   | F7<br>VSS   | F8<br>VSS               | F9<br>VSS               | F10<br>VSS              | F11<br>VSS                  | F12<br>VDD   | F13<br>VDDQR | F14<br>I/O12R | F15<br>I/O13R | F16<br>I/O12L |
| G1<br>I/O24R | G2<br>I/O24L | G3<br>I/O25L | G4<br>VDDQR | G5<br>VSS   | G6<br>VSS   | G7<br>VSS   | G8<br>VSS               | G9<br>VSS               | G10<br>VSS              | G11<br>VSS                  | G12<br>VSS   | G13<br>VDDQL | G14<br>I/O10L | G15<br>I/O11L | G16<br>I/O11R |
| H1<br>I/O26L | H2<br>I/O25R | H3<br>I/O26R | H4<br>VDDQR | H5<br>VSS   | H6<br>VSS   | H7<br>VSS   | H8<br>VSS               | H9<br>VSS               | H10<br>VSS              | H11<br>VSS                  | H12<br>VSS   | H13<br>VDDQL | H14<br>I/O9R  | H15<br>I/O9L  | H16<br>I/O10R |
| J1<br>I/O27L | J2<br>I/O28R | J3<br>I/O27R | J4<br>VDDQL | J5<br>VSS   | J6<br>VSS   | J7<br>VSS   | J8<br>VSS               | J9<br>VSS               | J10<br>VSS              | J11<br>VSS                  | J12<br>VSS   | J13<br>VDDQR | J14<br>I/O8R  | J15<br>I/O7R  | J16<br>I/O8L  |
| K1<br>I/O29R | K2<br>I/O29L | K3<br>I/O28L | K4<br>VDDQL | K5<br>VSS   | K6<br>VSS   | K7<br>VSS   | K8<br>VSS               | K9<br>VSS               | K10<br>VSS              | K11<br>VSS                  | K12<br>VSS   | K13<br>VDDQR | K14<br>I/O6R  | K15<br>I/O6L  | K16<br>I/O7L  |
| L1<br>I/O30L | L2<br>I/O31R | L3<br>I/O30R | L4<br>VDDQR | L5<br>VDD   | L6<br>VSS   | L7<br>VSS   | L8<br>VSS               | L9<br>VSS               | L10<br>VSS              | L11<br>VSS                  | L12<br>VDD   | L13<br>VDDQL | L14<br>I/O5L  | L15<br>I/O4R  | L16<br>I/O5R  |
| M1<br>I/O32R | M2<br>I/O32L | M3<br>I/O31L | M4<br>VDDQR | M5<br>VDD   | M6<br>VDD   | M7<br>VSS   | M8<br>VSS               | M9<br>VSS               | M10<br>VSS              | M11<br>VDD                  | M12<br>VDD   | M13<br>VDDQL | M14<br>I/O3R  | M15<br>I/O3L  | M16<br>I/O4L  |
| N1<br>I/O33L | N2<br>I/O34R | N3<br>I/O33R | N4<br>VDD   | N5<br>VDDQR | N6<br>VDDQR | N7<br>VDDQL | N8<br>VDDQL             | N9<br>VDDQR             | N10<br>VDDQR            | N11<br>VDDQL                | N12<br>VDDQL | N13<br>VDD   | N14<br>I/O2L  | N15<br>I/O1R  | N16<br>I/O2R  |
| P1<br>I/O35R | P2<br>I/O34L | P3<br>NC     | P4<br>NC    | P5<br>A13R  | P6<br>A10R  | P7<br>A7R   | P8<br>$\overline{BE}1R$ | P9<br>$\overline{BE}0R$ | P10<br>CLKR             | P11<br>$\overline{ADS}R$    | P12<br>A6R   | P13<br>A3R   | P14<br>I/O0L  | P15<br>I/O0R  | P16<br>I/O1L  |
| R1<br>I/O35L | R2<br>NC     | R3<br>NC     | R4<br>NC    | R5<br>NC    | R6<br>A12R  | R7<br>A9R   | R8<br>$\overline{BE}3R$ | R9<br>$\overline{CE}0R$ | R10<br>R/WR             | R11<br>$\overline{CNTRST}R$ | R12<br>A4R   | R13<br>A1R   | R14<br>OPTR   | R15<br>NC     | R16<br>NC     |
| T1<br>NC     | T2<br>NC     | T3<br>NC     | T4<br>NC    | T5<br>A14R  | T6<br>A11R  | T7<br>A8R   | T8<br>$\overline{BE}2R$ | T9<br>CE1R              | T10<br>$\overline{OE}R$ | T11<br>$\overline{CNTEN}R$  | T12<br>A5R   | T13<br>A2R   | T14<br>A0R    | T15<br>NC     | T16<br>NC     |

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NOTES:

1. All VDD pins must be connected to 3.3V power supply.
2. All VDDQ pins must be connected to appropriate power supply: 3.3V if OPT pin for that port is set to VIH (3.3V), and 2.5V if OPT pin for that port is set to VIL (0V).
3. All VSS pins must be connected to ground supply.
4. Package body is approximately 17mm x 17mm x 1.4mm, with 1.0mm ball-pitch.
5. This package code is used to reference the package diagram.
6. This text does not indicate orientation of the actual part-marking.

Pin Configuration<sup>(1,2,3,4)</sup> (con't.)



**NOTES:**

1. All V<sub>DD</sub> pins must be connected to 3.3V power supply.
2. All V<sub>DDQ</sub> pins must be connected to appropriate power supply: 3.3V if OPT pin for that port is set to V<sub>IH</sub> (3.3V), and 2.5V if OPT pin for that port is set to V<sub>IL</sub> (0V).
3. All V<sub>SS</sub> pins must be connected to ground supply.
4. Package body is approximately 28mm x 28mm x 3.5mm.
5. This package code is used to reference the package diagram.
6. This text does not indicate orientation of the actual part-marking.

## Pin Names

| Left Port                                   | Right Port                                  | Names  |
|---|---|--|
| $\overline{CE}_{0L}$ , $CE_{1L}$            | $\overline{CE}_{0R}$ , $CE_{1R}$            | Chip Enables                                     |
| $R/\overline{W}_L$                          | $R/\overline{W}_R$                          | Read/Write Enable                                |
| $\overline{OE}_L$                           | $\overline{OE}_R$                           | Output Enable                                    |
| $A_{0L}$ - $A_{14L}$                        | $A_{0R}$ - $A_{14R}$                        | Address  |
| $I/O_{0L}$ - $I/O_{35L}$                    | $I/O_{0R}$ - $I/O_{35R}$                    | Data Input/Output                                |
| $CLK_L$                                     | $CLK_R$                                     | Clock  |
| $\overline{ADS}_L$                          | $\overline{ADS}_R$                          | Address Strobe Enable                            |
| $\overline{CNTEN}_L$                        | $\overline{CNTEN}_R$                        | Counter Enable                                   |
| $\overline{CNTRST}_L$                       | $\overline{CNTRST}_R$                       | Counter Reset                                    |
| $\overline{BE}_{0L}$ - $\overline{BE}_{3L}$ | $\overline{BE}_{0R}$ - $\overline{BE}_{3R}$ | Byte Enables (9-bit bytes)                       |
| $V_{DDQ}$                                   | $V_{DDQ}$                                   | Power (I/O Bus) (3.3V or 2.5V) <sup>(1)</sup>    |
| $OPT_L$                                     | $OPT_R$                                     | Option for selecting $V_{DDQX}$ <sup>(1,2)</sup> |
| $V_{DD}$                                    |   | Power (3.3V) <sup>(1)</sup>                      |
| $V_{SS}$                                    |   | Ground (0V)                                      |

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### NOTES:

- $V_{DD}$ ,  $OPT_x$ , and  $V_{DDQ}$  must be set to appropriate operating levels prior to applying inputs on the I/Os and controls for that port.
- $OPT_x$  selects the operating voltage levels on that port. If  $OPT_x$  is set to VIH (3.3V), then that port's I/Os and controls will operate at 3.3V levels and  $V_{DDQ}$  must be supplied at 3.3V. If  $OPT_x$  is set to VIL (0V), then that port's I/Os and controls will operate at 2.5V levels and  $V_{DDQ}$  must be supplied at 2.5V. The  $OPT$  pins are independent of one another—both ports can operate at 3.3V levels, both can operate at 2.5V levels, or either can operate at 3.3V with the other at 2.5V.

## Truth Table I—Read/Write and Enable Control<sup>(1,2,3,4)</sup>

| $\overline{OE}$ | CLK | $\overline{CE}_0$ | $CE_1$ | $\overline{BE}_3$ | $\overline{BE}_2$ | $\overline{BE}_1$ | $\overline{BE}_0$ | $R/\overline{W}$ | Byte 3<br>I/O <sub>27-35</sub> | Byte 2<br>I/O <sub>18-26</sub> | Byte 1<br>I/O <sub>9-17</sub> | Byte 0<br>I/O <sub>0-8</sub> | MODE                        |
|-----------------|-----|-------------------|--------|-------------------|-------------------|-------------------|-------------------|------------------|--------------------------------|--------------------------------|-------------------------------|------------------------------|-----------------------------|
| X               | ↑   | H                 | X      | X                 | X                 | X                 | X                 | X                | High-Z                         | High-Z                         | High-Z                        | High-Z                       | Deselected—Power Down       |
| X               | ↑   | X                 | L      | X                 | X                 | X                 | X                 | X                | High-Z                         | High-Z                         | High-Z                        | High-Z                       | Deselected—Power Down       |
| X               | ↑   | L                 | H      | H                 | H                 | H                 | H                 | X                | High-Z                         | High-Z                         | High-Z                        | High-Z                       | All Bytes Deselected        |
| X               | ↑   | L                 | H      | H                 | H                 | H                 | L                 | L                | High-Z                         | High-Z                         | High-Z                        | DIN                          | Write to Byte 0 Only        |
| X               | ↑   | L                 | H      | H                 | H                 | L                 | H                 | L                | High-Z                         | High-Z                         | DIN                           | High-Z                       | Write to Byte 1 Only        |
| X               | ↑   | L                 | H      | H                 | L                 | H                 | H                 | L                | High-Z                         | DIN                            | High-Z                        | High-Z                       | Write to Byte 2 Only        |
| X               | ↑   | L                 | H      | L                 | H                 | H                 | H                 | L                | DIN                            | High-Z                         | High-Z                        | High-Z                       | Write to Byte 3 Only        |
| X               | ↑   | L                 | H      | H                 | H                 | L                 | L                 | L                | High-Z                         | High-Z                         | DIN                           | DIN                          | Write to Lower 2 Bytes Only |
| X               | ↑   | L                 | H      | L                 | L                 | H                 | H                 | L                | DIN                            | DIN                            | High-Z                        | High-Z                       | Write to Upper 2 bytes Only |
| X               | ↑   | L                 | H      | L                 | L                 | L                 | L                 | L                | DIN                            | DIN                            | DIN                           | DIN                          | Write to All Bytes          |
| L               | ↑   | L                 | H      | H                 | H                 | H                 | L                 | H                | High-Z                         | High-Z                         | High-Z                        | DOUT                         | Read Byte 0 Only            |
| L               | ↑   | L                 | H      | H                 | H                 | L                 | H                 | H                | High-Z                         | High-Z                         | DOUT                          | High-Z                       | Read Byte 1 Only            |
| L               | ↑   | L                 | H      | H                 | L                 | H                 | H                 | H                | High-Z                         | DOUT                           | High-Z                        | High-Z                       | Read Byte 2 Only            |
| L               | ↑   | L                 | H      | L                 | H                 | H                 | H                 | H                | DOUT                           | High-Z                         | High-Z                        | High-Z                       | Read Byte 3 Only            |
| L               | ↑   | L                 | H      | H                 | H                 | L                 | L                 | H                | High-Z                         | High-Z                         | DOUT                          | DOUT                         | Read Lower 2 Bytes Only     |
| L               | ↑   | L                 | H      | L                 | L                 | H                 | H                 | H                | DOUT                           | DOUT                           | High-Z                        | High-Z                       | Read Upper 2 Bytes Only     |
| L               | ↑   | L                 | H      | L                 | L                 | L                 | L                 | H                | DOUT                           | DOUT                           | DOUT                          | DOUT                         | Read All Bytes              |
| H               | ↑   | L                 | H      | L                 | L                 | L                 | L                 | X                | High-Z                         | High-Z                         | High-Z                        | High-Z                       | Outputs Disabled            |

### NOTES:

- "H" = VIH, "L" = VIL, "X" = Don't Care.
- $\overline{ADS}$ ,  $\overline{CNTEN}$ ,  $\overline{CNTRST}$  = X.
- $\overline{OE}$  is an asynchronous input signal.
- It is possible to read or write any combination of bytes during a given access. A few representative samples have been illustrated here.

4830 tbl 02

Truth Table II—Address Counter Control<sup>(1,2)</sup>

| Address | Previous Address | Addr Used | CLK <sup>(6)</sup> | $\overline{\text{ADS}}$ | $\overline{\text{CNTEN}}$ | $\overline{\text{CNRST}}$ | I/O <sup>(3)</sup>    | MODE  |
|---------|------------------|-----------|--------------------|-------------------------|---------------------------|---------------------------|-----------------------|---|
| X       | X                | 0         | ↑                  | X                       | X                         | L <sup>(4)</sup>          | D <sub>IO</sub> (0)   | Counter Reset to Address 0                            |
| An      | X                | An        | ↑                  | L <sup>(4)</sup>        | X                         | H                         | D <sub>IO</sub> (n)   | External Address Used                                 |
| An      | Ap               | Ap        | ↑                  | H                       | H                         | H                         | D <sub>IO</sub> (p)   | External Address Blocked—Counter disabled (Ap reused) |
| X       | Ap               | Ap + 1    | ↑                  | H                       | L <sup>(5)</sup>          | H                         | D <sub>IO</sub> (p+1) | Counter Enabled—Internal Address generation           |

## NOTES:

- "H" = V<sub>IH</sub>, "L" = V<sub>IL</sub>, "X" = Don't Care.
- Read and write operations are controlled by the appropriate setting of R $\overline{\text{W}}$ ,  $\overline{\text{CE0}}$ , CE<sub>1</sub>,  $\overline{\text{BEn}}$  and  $\overline{\text{OE}}$ .
- Outputs are in Pipelined mode: the data out will be delayed by one cycle.
- $\overline{\text{ADS}}$  and  $\overline{\text{CNRST}}$  are independent of all other memory control signals including  $\overline{\text{CE0}}$ , CE<sub>1</sub> and  $\overline{\text{BEn}}$ .
- The address counter advances if  $\overline{\text{CNTEN}} = \text{VIL}$  on the rising edge of CLK, regardless of all other memory control signals including  $\overline{\text{CE0}}$ , CE<sub>1</sub>,  $\overline{\text{BEn}}$ .

4830 tbl 03

Recommended Operating Temperature and Supply Voltage<sup>(1)</sup>

| Grade      | Ambient Temperature | GND | V <sub>DD</sub> |
|------------|---------------------|-----|-----------------|
| Commercial | 0°C to +70°C        | 0V  | 3.3V ± 150mV    |
| Industrial | -40°C to +85°C      | 0V  | 3.3V ± 150mV    |

## NOTE:

- Industrial temperature: for specific speeds, packages and powers contact your sales office.

4830 tbl 04

Recommended DC Operating Conditions with V<sub>DDQ</sub> at 2.5V

| Symbol           | Parameter   | Min.                | Typ. | Max.                                    | Unit |
|------------------|---|---------------------|------|---|------|
| V <sub>DD</sub>  | Core Supply Voltage   | 3.15                | 3.3  | 3.45                                    | V    |
| V <sub>DDQ</sub> | I/O Supply Voltage <sup>(3)</sup>                               | 2.375               | 2.5  | 2.625                                   | V    |
| V <sub>SS</sub>  | Ground  | 0                   | 0    | 0                                       | V    |
| V <sub>IH</sub>  | Input High Voltage <sup>(3)</sup><br>(Address & Control Inputs) | 1.7                 | —    | V <sub>DDQ</sub> + 125mV <sup>(2)</sup> | V    |
| V <sub>IH</sub>  | Input High Voltage - I/O <sup>(3)</sup>                         | 1.7                 | —    | V <sub>DDQ</sub> + 125mV <sup>(2)</sup> | V    |
| V <sub>IL</sub>  | Input Low Voltage   | -0.3 <sup>(1)</sup> | —    | 0.7                                     | V    |

## NOTES:

- V<sub>IL</sub> ≥ -1.5V for pulse width less than 10 ns.
- V<sub>TERM</sub> must not exceed V<sub>DDQ</sub> + 125mV.
- To select operation at 2.5V levels on the I/Os and controls of a given port, the OPT pin for that port must be set to V<sub>IL</sub> (0V), and V<sub>DDQX</sub> for that port must be supplied as indicated above.

4830 tbl 05a

Absolute Maximum Ratings<sup>(1)</sup>

| Symbol                           | Rating                               | Commercial & Industrial | Unit |
|----------------------------------|--------------------------------------|-------------------------|------|
| V <sub>TERM</sub> <sup>(2)</sup> | Terminal Voltage with Respect to GND | -0.5 to +4.6            | V    |
| T <sub>BIAS</sub>                | Temperature Under Bias               | -55 to +125             | °C   |
| T <sub>STG</sub>                 | Storage Temperature                  | -65 to +150             | °C   |
| I <sub>OUT</sub>                 | DC Output Current                    | 50                      | mA   |

## NOTES:

- Stresses 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.
- V<sub>TERM</sub> must not exceed V<sub>DD</sub> + 150mV for more than 25% of the cycle time or 4ns maximum, and is limited to ≤ 20mA for the period of V<sub>TERM</sub> ≥ V<sub>DD</sub> + 150mV.

4830 tbl 06

Recommended DC Operating Conditions with V<sub>DDQ</sub> at 3.3V

| Symbol           | Parameter   | Min.                | Typ. | Max.                                    | Unit |
|------------------|---|---------------------|------|---|------|
| V <sub>DD</sub>  | Core Supply Voltage   | 3.15                | 3.3  | 3.45                                    | V    |
| V <sub>DDQ</sub> | I/O Supply Voltage <sup>(3)</sup>                               | 3.15                | 3.3  | 3.45                                    | V    |
| V <sub>SS</sub>  | Ground  | 0                   | 0    | 0                                       | V    |
| V <sub>IH</sub>  | Input High Voltage<br>(Address & Control Inputs) <sup>(3)</sup> | 2.0                 | —    | V <sub>DDQ</sub> + 150mV <sup>(2)</sup> | V    |
| V <sub>IH</sub>  | Input High Voltage - I/O <sup>(3)</sup>                         | 2.0                 | —    | V <sub>DDQ</sub> + 150mV <sup>(2)</sup> | V    |
| V <sub>IL</sub>  | Input Low Voltage   | -0.3 <sup>(1)</sup> | —    | 0.8                                     | V    |

## NOTES:

- V<sub>IL</sub> ≥ -1.5V for pulse width less than 10 ns.
- V<sub>TERM</sub> must not exceed V<sub>DDQ</sub> + 150mV.
- To select operation at 3.3V levels on the I/Os and controls of a given port, the OPT pin for that port must be set to V<sub>IH</sub> (3.3V), and V<sub>DDQX</sub> for that port must be supplied as indicated above.

4830 tbl 05b

## Capacitance<sup>(1)</sup>

( $T_A = +25^\circ\text{C}$ ,  $F = 1.0\text{MHz}$ ) PQFP ONLY

| Symbol          | Parameter          | Conditions <sup>(2)</sup> | Max. | Unit |
|-----------------|--------------------|---------------------------|------|------|
| $C_{IN}$        | Input Capacitance  | $V_{IN} = 3\text{dV}$     | 8    | pF   |
| $C_{OUT}^{(3)}$ | Output Capacitance | $V_{OUT} = 3\text{dV}$    | 10.5 | pF   |

4830 tbl 07

### NOTES:

- These parameters are determined by device characterization, but are not production tested.
- 3dV references the interpolated capacitance when the input and output switch from 0V to 3V or from 3V to 0V.
- $C_{OUT}$  also references  $C_{IO}$ .

## DC Electrical Characteristics Over the Operating Temperature and Supply Voltage Range ( $V_{DD} = 3.3\text{V} \pm 150\text{mV}$ )

| Symbol                 | Parameter                            | Test Conditions  | 70V3579S |      | Unit          |
|------------------------|--------------------------------------|--|----------|------|---------------|
|                        |                                      |  | Min.     | Max. |               |
| $ I_{L1} $             | Input Leakage Current <sup>(1)</sup> | $V_{DDQ} = \text{Max.}, V_{IN} = 0\text{V to } V_{DDQ}$                        | —        | 10   | $\mu\text{A}$ |
| $ I_{L0} $             | Output Leakage Current               | $\overline{CE_0} = V_{IH}$ or $CE_1 = V_{IL}, V_{OUT} = 0\text{V to } V_{DDQ}$ | —        | 10   | $\mu\text{A}$ |
| $V_{OL} (3.3\text{V})$ | Output Low Voltage <sup>(2)</sup>    | $I_{OL} = +4\text{mA}, V_{DDQ} = \text{Min.}$                                  | —        | 0.4  | V             |
| $V_{OH} (3.3\text{V})$ | Output High Voltage <sup>(2)</sup>   | $I_{OH} = -4\text{mA}, V_{DDQ} = \text{Min.}$                                  | 2.4      | —    | V             |
| $V_{OL} (2.5\text{V})$ | Output Low Voltage <sup>(2)</sup>    | $I_{OL} = +2\text{mA}, V_{DDQ} = \text{Min.}$                                  | —        | 0.4  | V             |
| $V_{OH} (2.5\text{V})$ | Output High Voltage <sup>(2)</sup>   | $I_{OH} = -2\text{mA}, V_{DDQ} = \text{Min.}$                                  | 2.0      | —    | V             |

4830 tbl 08

### NOTES:

- At  $V_{DD} \leq -2.0\text{V}$  input leakages are undefined.
- $V_{DDQ}$  is selectable (3.3V/2.5V) via OPT pins. Refer to p.4 for details.

## DC Electrical Characteristics Over the Operating Temperature and Supply Voltage Range<sup>(3)</sup> ( $V_{DD} = 3.3V \pm 150mV$ )

| Symbol | Parameter   | Test Condition  | Version | 70V3579S4<br>Com'l Only |      | 70V3579S5<br>Com'l & Ind |      | 70V3579S6<br>Com'l Only |      | Unit |    |
|--------|---|---|---------|-------------------------|------|--------------------------|------|-------------------------|------|------|----|
|        |   |   |         | Typ. <sup>(4)</sup>     | Max. | Typ. <sup>(4)</sup>      | Max. | Typ. <sup>(4)</sup>     | Max. |      |    |
| IDD    | Dynamic Operating Current (Both Ports Active)         | $\overline{CE}_L$ and $\overline{CE}_R = V_{IL}$ ,<br>Outputs Disabled,<br>$f = f_{MAX}^{(1)}$  | COM'L   | S                       | 375  | 460                      | 285  | 360                     | 245  | 310  | mA |
|        |   |   | IND     | S                       | —    | —                        | 285  | 415                     | 245  | 360  |    |
| ISB1   | Standby Current (Both Ports - TTL Level Inputs)       | $\overline{CE}_L = \overline{CE}_R = V_{IH}$<br>$f = f_{MAX}^{(1)}$   | COM'L   | S                       | 145  | 190                      | 105  | 145                     | 95   | 125  | mA |
|        |   |   | IND     | S                       | —    | —                        | 105  | 175                     | 95   | 150  |    |
| ISB2   | Standby Current (One Port - TTL Level Inputs)         | $\overline{CE}^*A^* = V_{IL}$ and $\overline{CE}^*B^* = V_{IH}^{(5)}$<br>Active Port Outputs Disabled,<br>$f = f_{MAX}^{(1)}$   | COM'L   | S                       | 265  | 325                      | 190  | 260                     | 175  | 225  | mA |
|        |   |   | IND     | S                       | —    | —                        | 190  | 300                     | 175  | 260  |    |
| ISB3   | Full Standby Current (Both Ports - CMOS Level Inputs) | Both Ports $\overline{CE}_L$ and<br>$\overline{CE}_R \geq V_{DD0} - 0.2V$ ,<br>$V_{IN} \geq V_{DD0} - 0.2V$ or $V_{IN} \leq 0.2V$ ,<br>$f = 0^{(2)}$  | COM'L   | S                       | 6    | 15                       | 6    | 15                      | 6    | 15   | mA |
|        |   |   | IND     | S                       | —    | —                        | 6    | 30                      | 6    | 30   |    |
| ISB4   | Full Standby Current (One Port - CMOS Level Inputs)   | $\overline{CE}^*A^* \leq 0.2V$ and<br>$\overline{CE}^*B^* \geq V_{DD0} - 0.2V^{(5)}$<br>$V_{IN} \geq V_{DD0} - 0.2V$ or $V_{IN} \leq 0.2V$ ,<br>Active Port, Outputs Disabled,<br>$f = f_{MAX}^{(1)}$ | COM'L   | S                       | 265  | 325                      | 180  | 260                     | 170  | 225  | mA |
|        |   |   | IND     | S                       | —    | —                        | 180  | 300                     | 170  | 260  |    |

4830 tbl 09

**NOTES:**

- At  $f = f_{MAX}$ , address and control lines (except Output Enable) are cycling at the maximum frequency clock cycle of 1/tcvc, using "AC TEST CONDITIONS" at input levels of GND to 3V.
- $f = 0$  means no address, clock, or control lines change. Applies only to input at CMOS level standby.
- Port "A" may be either left or right port. Port "B" is the opposite from port "A".
- $V_{DD} = 3.3V$ ,  $T_A = 25^\circ C$  for Typ, and are not production tested.  $I_{DD} dc(f=0) = 120mA$  (Typ).
- $\overline{CE}_X = V_{IL}$  means  $\overline{CE}_{0X} = V_{IL}$  and  $CE_{1X} = V_{IH}$   
 $\overline{CE}_X = V_{IH}$  means  $\overline{CE}_{0X} = V_{IH}$  or  $CE_{1X} = V_{IL}$   
 $\overline{CE}_X \leq 0.2V$  means  $\overline{CE}_{0X} \leq 0.2V$  and  $CE_{1X} \geq V_{DD0} - 0.2V$   
 $\overline{CE}_X \geq V_{DD0} - 0.2V$  means  $\overline{CE}_{0X} \geq V_{DD0} - 0.2V$  or  $CE_{1X} - 0.2V$   
"X" represents "L" for left port or "R" for right port.



AC Test Conditions (V<sub>DDQ</sub> - 3.3V/2.5V)

|   |                          |
|---|--------------------------|
| Input Pulse Levels (Address & Controls) | GND to 3.0V/GND to 2.35V |
| Input Pulse Levels (I/Os)               | GND to 3.0V/GND to 2.35V |
| Input Rise/Fall Times                   | 3ns                      |
| Input Timing Reference Levels           | 1.5V/1.25V               |
| Output Reference Levels                 | 1.5V/1.25V               |
| Output Load                             | Figures 1, 2, and 3      |

4830 tbl 10

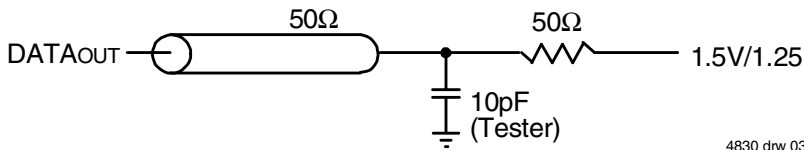
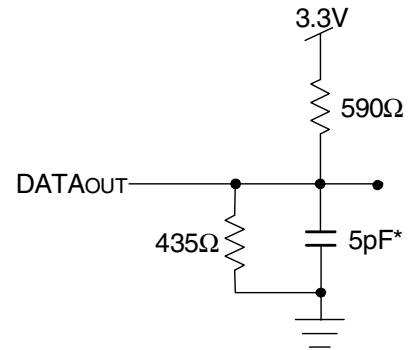
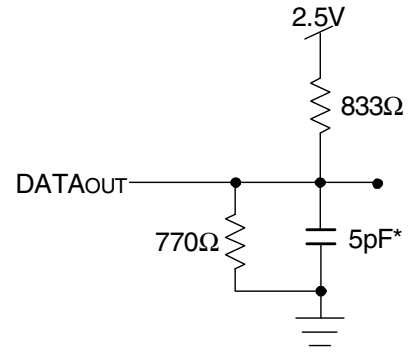


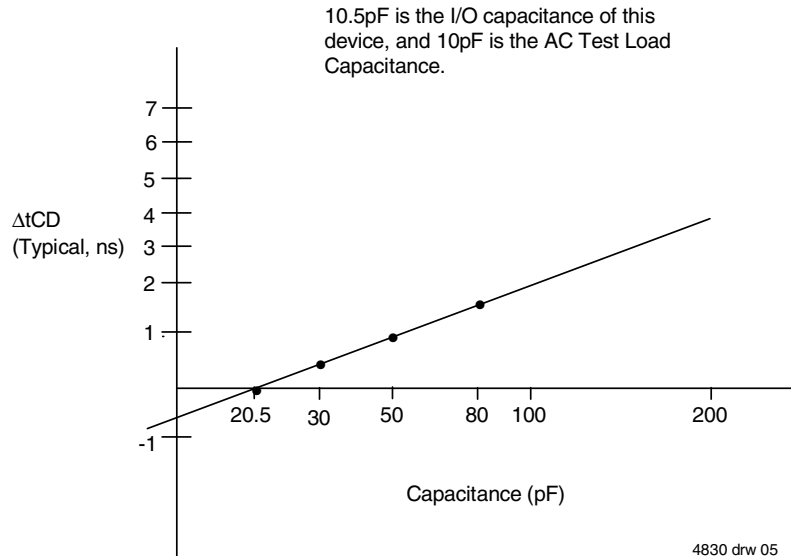
Figure 1. AC Output Test load.

4830 drw 03



4830 drw 04

Figure 2. Output Test Load  
(For t<sub>CKLZ</sub>, t<sub>CKHZ</sub>, t<sub>OLZ</sub>, and t<sub>OHZ</sub>).  
\*Including scope and jig.



4830 drw 05

Figure 3. Typical Output Derating (Lumped Capacitive Load).

## AC Electrical Characteristics Over the Operating Temperature Range (Read and Write Cycle Timing)<sup>(1,2)</sup>

(V<sub>DD</sub> = 3.3V ± 150mV, T<sub>A</sub> = 0°C to +70°C)

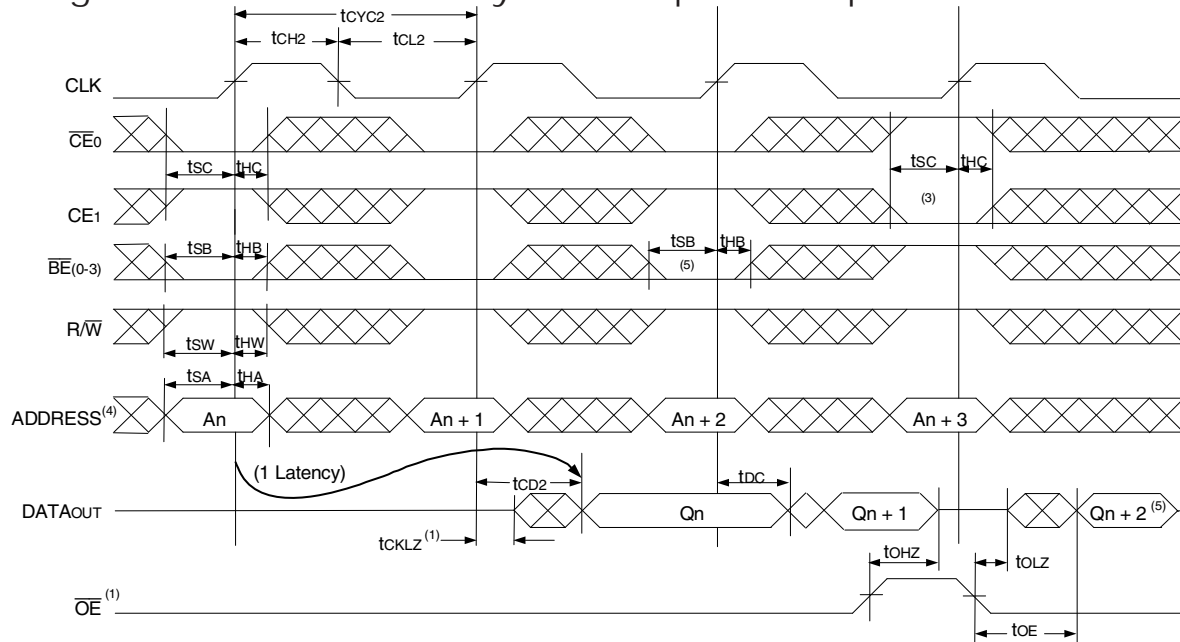
| Symbol                        | Parameter                         | 70V3579S4<br>Com'l Only |      | 70V3579S5<br>Com'l<br>& Ind |      | 70V3579S6<br>Com'l Only |      | Unit |
|-------------------------------|-----------------------------------|-------------------------|------|-----------------------------|------|-------------------------|------|------|
|                               |                                   | Min.                    | Max. | Min.                        | Max. | Min.                    | Max. |      |
| t <sub>CYC2</sub>             | Clock Cycle Time (Pipelined)      | 7.5                     | —    | 10                          | —    | 12                      | —    | ns   |
| t <sub>CH2</sub>              | Clock High Time (Pipelined)       | 3                       | —    | 4                           | —    | 5                       | —    | ns   |
| t <sub>CL2</sub>              | Clock Low Time (Pipelined)        | 3                       | —    | 4                           | —    | 5                       | —    | ns   |
| t <sub>R</sub>                | Clock Rise Time                   | —                       | 3    | —                           | 3    | —                       | 3    | ns   |
| t <sub>F</sub>                | Clock Fall Time                   | —                       | 3    | —                           | 3    | —                       | 3    | ns   |
| t <sub>SA</sub>               | Address Setup Time                | 1.8                     | —    | 2.0                         | —    | 2.0                     | —    | ns   |
| t <sub>HA</sub>               | Address Hold Time                 | 0.7                     | —    | 0.7                         | —    | 1.0                     | —    | ns   |
| t <sub>SC</sub>               | Chip Enable Setup Time            | 1.8                     | —    | 2.0                         | —    | 2.0                     | —    | ns   |
| t <sub>HC</sub>               | Chip Enable Hold Time             | 0.7                     | —    | 0.7                         | —    | 1.0                     | —    | ns   |
| t <sub>SB</sub>               | Byte Enable Setup Time            | 1.8                     | —    | 2.0                         | —    | 2.0                     | —    | ns   |
| t <sub>HB</sub>               | Byte Enable Hold Time             | 0.7                     | —    | 0.7                         | —    | 1.0                     | —    | ns   |
| t <sub>SW</sub>               | R/W Setup Time                    | 1.8                     | —    | 2.0                         | —    | 2.0                     | —    | ns   |
| t <sub>HW</sub>               | R/W Hold Time                     | 0.7                     | —    | 0.7                         | —    | 1.0                     | —    | ns   |
| t <sub>SD</sub>               | Input Data Setup Time             | 1.8                     | —    | 2.0                         | —    | 2.0                     | —    | ns   |
| t <sub>HD</sub>               | Input Data Hold Time              | 0.7                     | —    | 0.7                         | —    | 1.0                     | —    | ns   |
| t <sub>SAD</sub>              | $\overline{ADS}$ Setup Time       | 1.8                     | —    | 2.0                         | —    | 2.0                     | —    | ns   |
| t <sub>HAD</sub>              | $\overline{ADS}$ Hold Time        | 0.7                     | —    | 0.7                         | —    | 1.0                     | —    | ns   |
| t <sub>SCN</sub>              | $\overline{CNTEN}$ Setup Time     | 1.8                     | —    | 2.0                         | —    | 2.0                     | —    | ns   |
| t <sub>HCN</sub>              | $\overline{CNTEN}$ Hold Time      | 0.7                     | —    | 0.7                         | —    | 1.0                     | —    | ns   |
| t <sub>SRST</sub>             | $\overline{CNTRST}$ Setup Time    | 1.8                     | —    | 2.0                         | —    | 2.0                     | —    | ns   |
| t <sub>HRST</sub>             | $\overline{CNTRST}$ Hold Time     | 0.7                     | —    | 0.7                         | —    | 1.0                     | —    | ns   |
| t <sub>OE<sup>(1)</sup></sub> | Output Enable to Data Valid       | —                       | 4    | —                           | 5    | —                       | 6    | ns   |
| t <sub>OLZ</sub>              | Output Enable to Output Low-Z     | 0                       | —    | 0                           | —    | 0                       | —    | ns   |
| t <sub>OHZ</sub>              | Output Enable to Output High-Z    | 1                       | 4    | 1                           | 4.5  | 1                       | 5    | ns   |
| t <sub>CD2</sub>              | Clock to Data Valid (Pipelined)   | —                       | 4.2  | —                           | 5    | —                       | 6    | ns   |
| t <sub>DC</sub>               | Data Output Hold After Clock High | 1                       | —    | 1                           | —    | 1                       | —    | ns   |
| t <sub>CKHZ</sub>             | Clock High to Output High-Z       | 1                       | 3    | 1                           | 4.5  | 1.5                     | 6    | ns   |
| t <sub>CKLZ</sub>             | Clock High to Output Low-Z        | 1                       | —    | 1                           | —    | 1                       | —    | ns   |
| <b>Port-to-Port Delay</b>     |                                   |                         |      |                             |      |                         |      |      |
| t <sub>CO</sub>               | Clock-to-Clock Offset             | 6                       | —    | 8                           | —    | 10                      | —    | ns   |

**NOTES:**

1. All input signals are synchronous with respect to the clock except for the asynchronous Output Enable ( $\overline{OE}$ ).
2. These values are valid for either level of V<sub>DDO</sub> (3.3V/2.5V). See page 4 for details on selecting the desired I/O voltage levels for each port.

4830 tbl 11

### Timing Waveform of Read Cycle for Pipelined Operation<sup>(2)</sup>

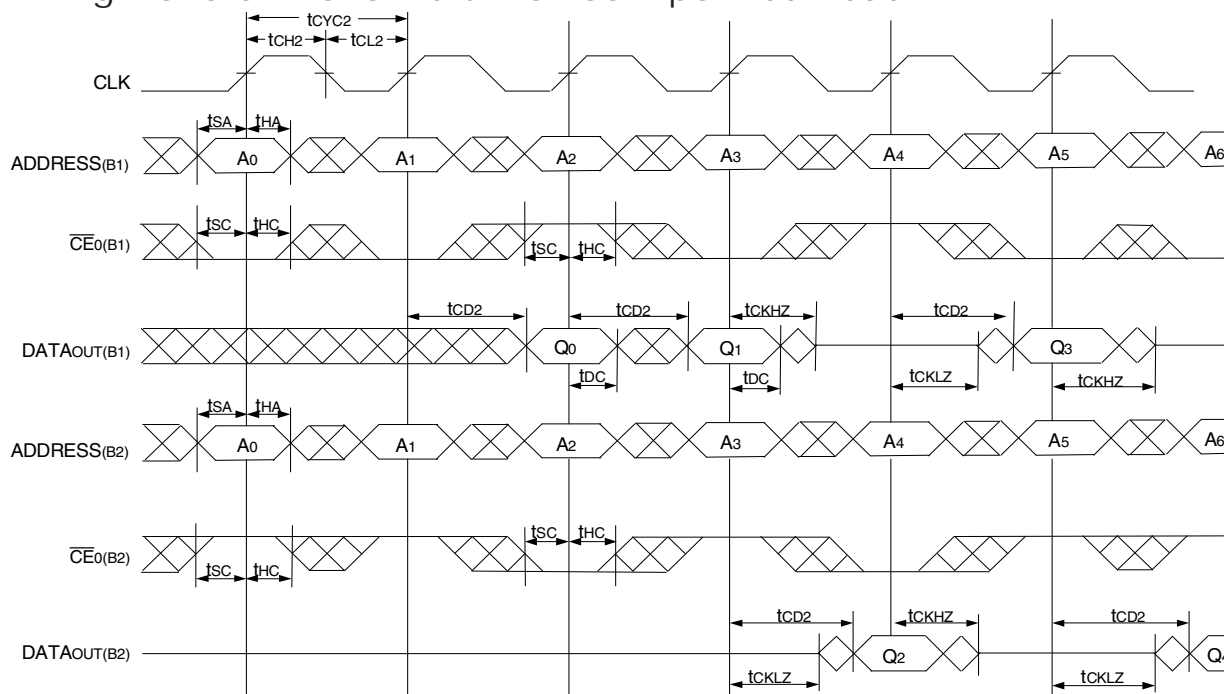


**NOTES:**

1.  $\overline{OE}$  is asynchronously controlled; all other inputs are synchronous to the rising clock edge.
2.  $\overline{ADS} = V_{IL}$ ,  $\overline{CNTEN}$  and  $\overline{CNTRST} = V_{IH}$ .
3. The output is disabled (High-Impedance state) by  $\overline{CE}_0 = V_{IH}$ ,  $CE_1 = V_{IL}$ ,  $\overline{BE}_n = V_{IH}$  following the next rising edge of the clock. Refer to Truth Table 1.
4. Addresses do not have to be accessed sequentially since  $\overline{ADS} = V_{IL}$  constantly loads the address on the rising edge of the CLK; numbers are for reference use only.
5. If  $\overline{BE}_n$  was HIGH, then the appropriate Byte of DATAout for  $Q_{n+2}$  would be disabled (High-Impedance state).

4830 drw 06

### Timing Waveform of a Multi-Device Pipelined Read<sup>(1,2)</sup>

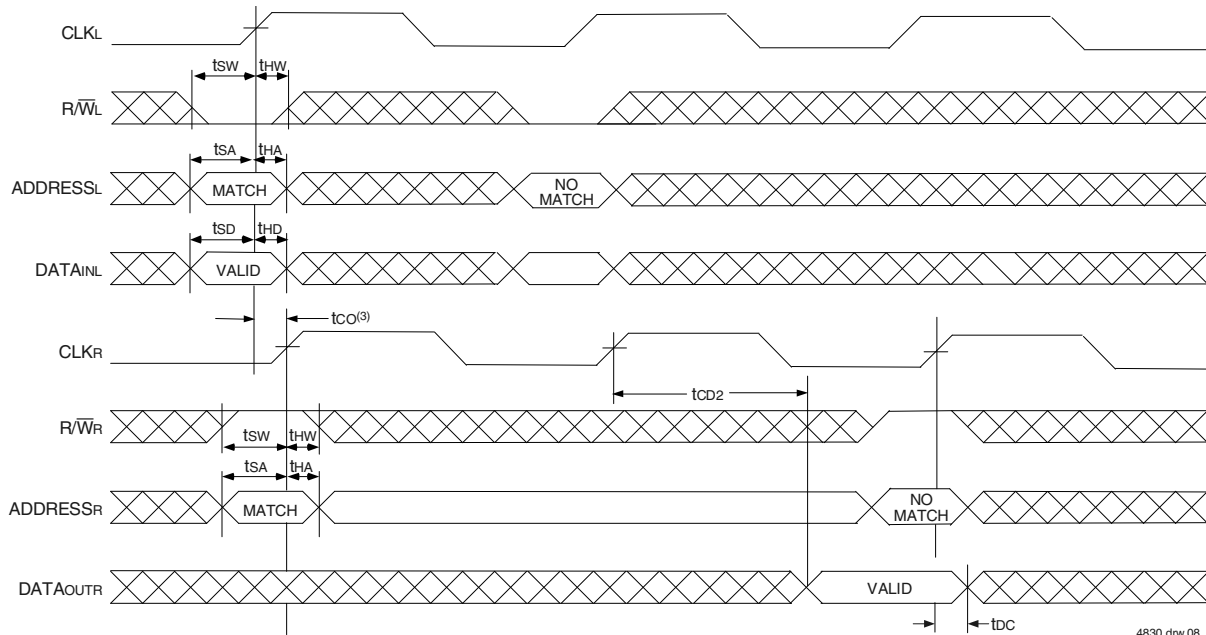


**NOTES:**

1. B1 Represents Device #1; B2 Represents Device #2. Each Device consists of one IDT70V3579 for this waveform, and are setup for depth expansion in this example.  $ADDRESS_{(B1)} = ADDRESS_{(B2)}$  in this situation.
2.  $\overline{BE}_n$ ,  $\overline{OE}$ , and  $\overline{ADS} = V_{IL}$ ;  $CE_{1(B1)}$ ,  $CE_{1(B2)}$ ,  $R/\overline{W}$ ,  $\overline{CNTEN}$ , and  $\overline{CNTRST} = V_{IH}$ .

4830 drw 07

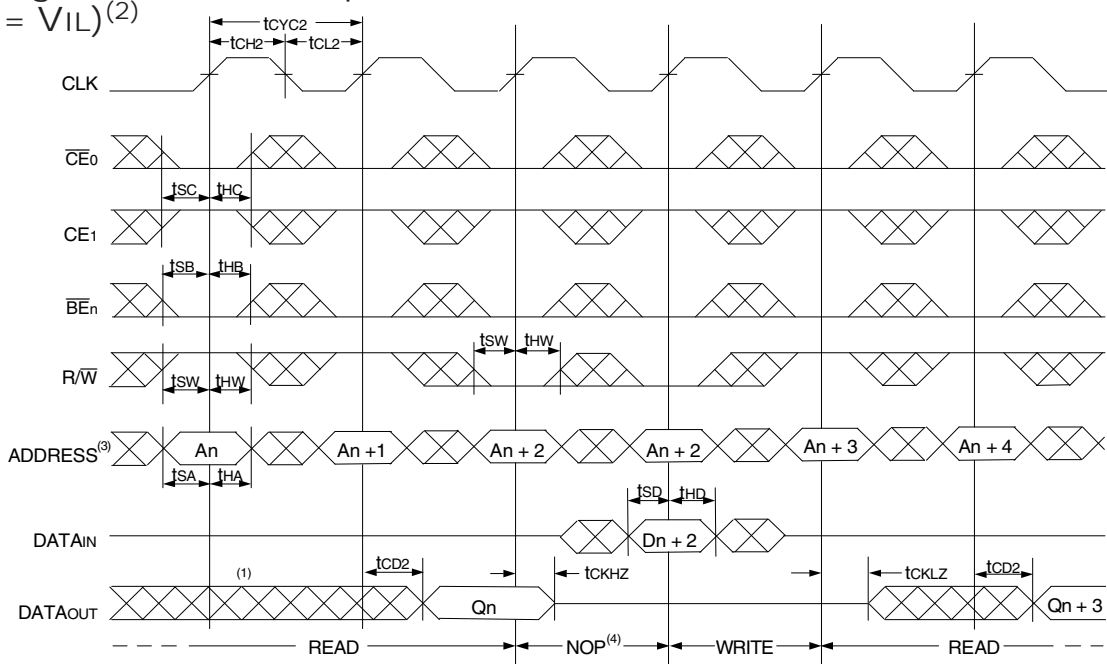
### Timing Waveform of Left Port Write to Pipelined Right Port Read<sup>(1,2)</sup>



**NOTES:**

1.  $\overline{CE}_0$ ,  $\overline{BE}_n$ , and  $\overline{ADS} = V_{IL}$ ;  $\overline{CE}_1$ ,  $\overline{CNTEN}$ , and  $\overline{CNRST} = V_{IH}$ .
2.  $\overline{OE} = V_{IL}$  for the Right Port, which is being read from.  $\overline{OE} = V_{IH}$  for the Left Port, which is being written to.
3. If  $t_{co} \leq$  minimum specified, then data from right port read is not valid until following right port clock cycle (ie, time from write to valid read on opposite port will be  $t_{co} + 2 t_{cyc2} + t_{cd2}$ ). If  $t_{co} >$  minimum, then data from right port read is available on first right port clock cycle (ie, time from write to valid read on opposite port will be  $t_{co} + t_{cyc2} + t_{cd2}$ ).

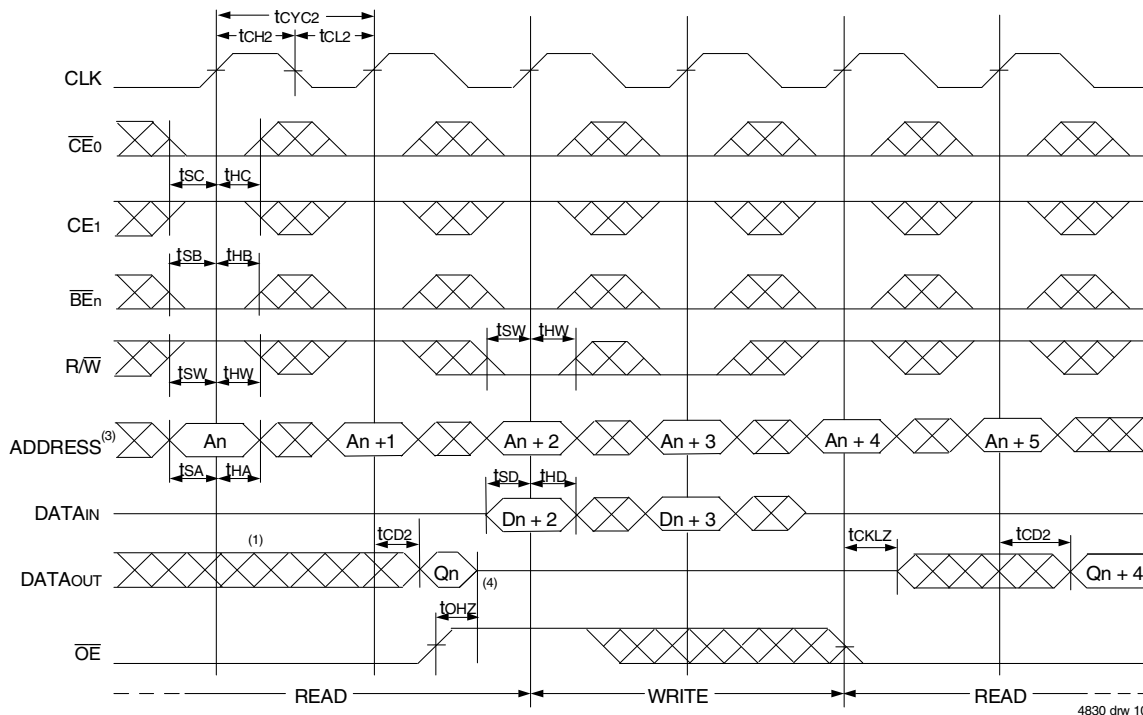
### Timing Waveform of Pipelined Read-to-Write-to-Read ( $\overline{OE} = V_{IL}$ )<sup>(2)</sup>



**NOTES:**

1. Output state (High, Low, or High-impedance) is determined by the previous cycle control signals.
2.  $\overline{CE}_0$ ,  $\overline{BE}_n$ , and  $\overline{ADS} = V_{IL}$ ;  $\overline{CE}_1$ ,  $\overline{CNTEN}$ , and  $\overline{CNRST} = V_{IH}$ . "NOP" is "No Operation".
3. Addresses do not have to be accessed sequentially since  $\overline{ADS} = V_{IL}$  constantly loads the address on the rising edge of the CLK; numbers are for reference use only.
4. "NOP" is "No Operation." Data in memory at the selected address may be corrupted and should be re-written to guarantee data integrity.

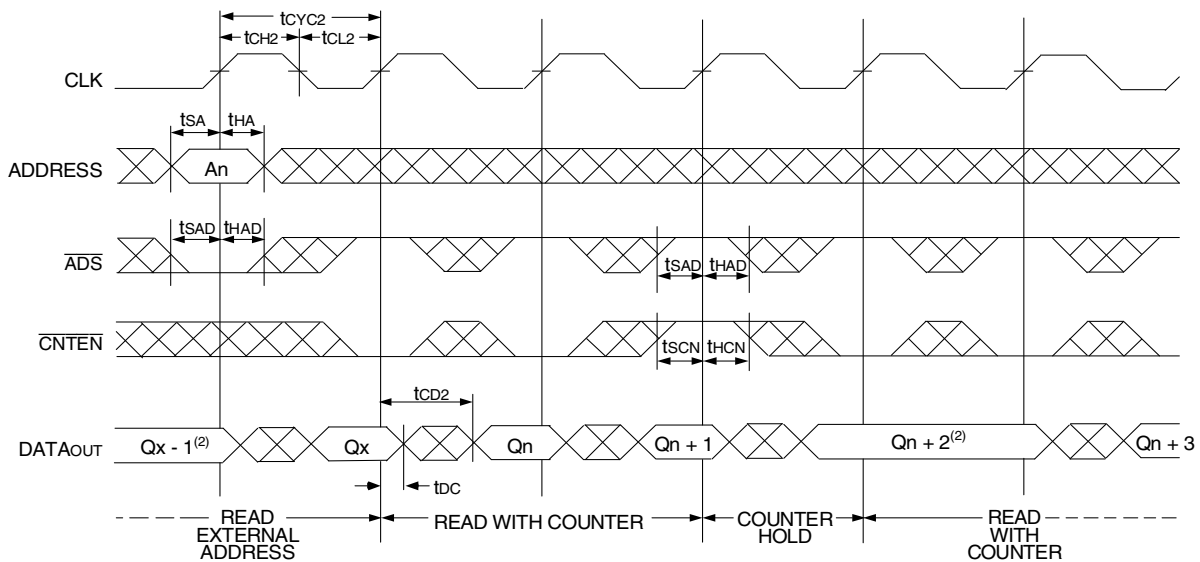
### Timing Waveform of Pipelined Read-to-Write-to-Read ( $\overline{OE}$ Controlled)<sup>(2)</sup>



**NOTES:**

1. Output state (High, Low, or High-impedance) is determined by the previous cycle control signals.
2.  $\overline{CE}_0$ ,  $\overline{BE}_n$ , and  $\overline{ADS} = V_{IL}$ ;  $\overline{CE}_1$ ,  $\overline{CNTEN}$ , and  $\overline{CNRST} = V_{IH}$ .
3. Addresses do not have to be accessed sequentially since  $\overline{ADS} = V_{IL}$  constantly loads the address on the rising edge of the CLK; numbers are for reference use only.
4. This timing does not meet requirements for fastest speed grade. This waveform indicates how logically it could be done if timing so allows.

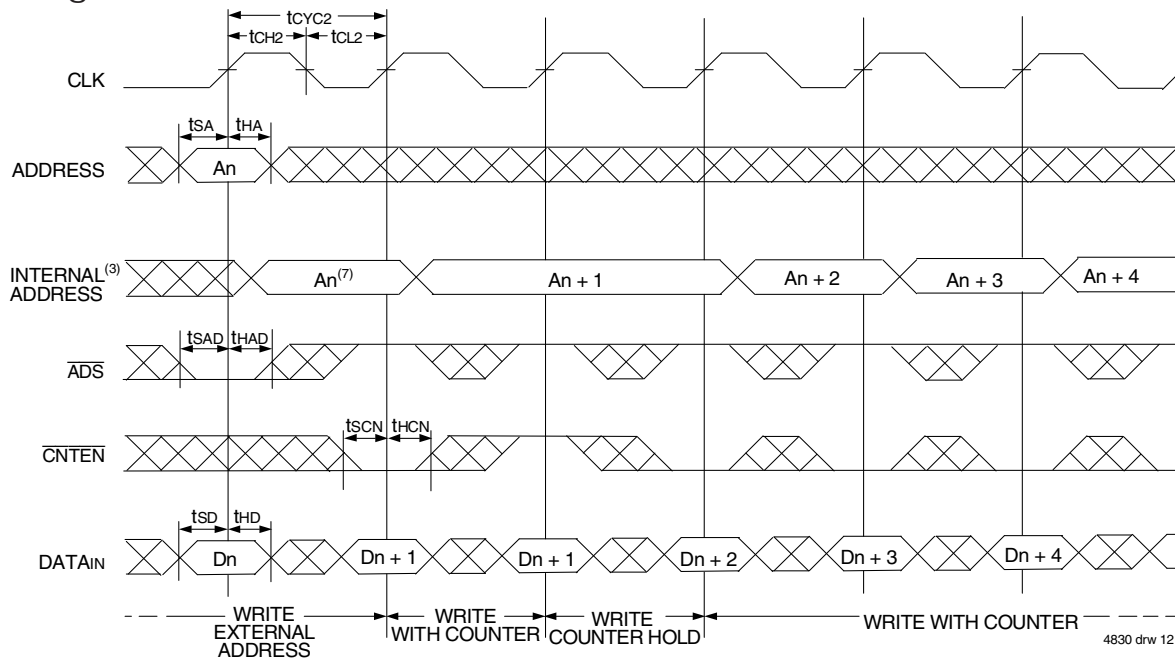
### Timing Waveform of Pipelined Read with Address Counter Advance<sup>(1)</sup>



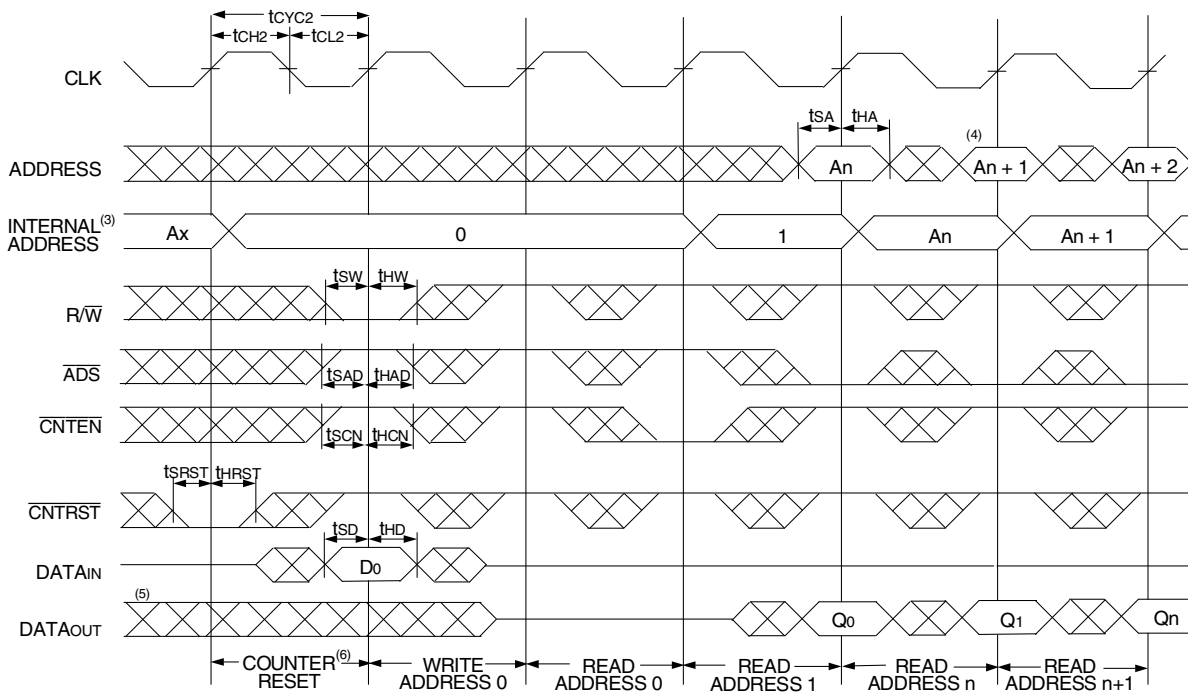
**NOTES:**

1.  $\overline{CE}_0$ ,  $\overline{OE}$ ,  $\overline{BE}_n = V_{IL}$ ;  $\overline{CE}_1$ ,  $\overline{R/W}$ , and  $\overline{CNRST} = V_{IH}$ .
2. If there is no address change via  $\overline{ADS} = V_{IL}$  (loading a new address) or  $\overline{CNTEN} = V_{IL}$  (advancing the address), i.e.  $\overline{ADS} = V_{IH}$  and  $\overline{CNTEN} = V_{IH}$ , then the data output remains constant for subsequent clocks.

### Timing Waveform of Write with Address Counter Advance<sup>(1)</sup>



### Timing Waveform of Counter Reset<sup>(2)</sup>



**NOTES:**

1.  $\overline{CE}_0$ ,  $\overline{BE}_n$ , and  $R/\overline{W} = V_{IL}$ ;  $CE_1$  and  $\overline{CNTRST} = V_{IH}$ .
2.  $\overline{CE}_0$ ,  $\overline{BE}_n = V_{IL}$ ;  $CE_1 = V_{IH}$ .
3. The "Internal Address" is equal to the "External Address" when  $\overline{ADS} = V_{IL}$  and equals the counter output when  $\overline{ADS} = V_{IH}$ .
4. Addresses do not have to be accessed sequentially since  $\overline{ADS} = V_{IL}$  constantly loads the address on the rising edge of the CLK; numbers are for reference use only.
5. Output state (High, Low, or High-impedance) is determined by the previous cycle control signals.
6. No dead cycle exists during counter reset. A READ or WRITE cycle may be coincidental with the counter reset cycle: Addr 0 will be accessed. Extra cycles are shown here simply for clarification.
7.  $\overline{CNTEN} = V_{IL}$  advances Internal Address from 'An' to 'An +1'. The transition shown indicates the time required for the counter to advance. The 'An +1' Address is written to during this cycle.

## Functional Description

The IDT70V3579 provides a true synchronous Dual-Port Static RAM interface. Registered inputs provide minimal set-up and hold times on address, data, and all critical control inputs. All internal registers are clocked on the rising edge of the clock signal, however, the self-timed internal write pulse is independent of the LOW to HIGH transition of the clock signal.

An asynchronous output enable is provided to ease asynchronous bus interfacing. Counter enable inputs are also provided to stall the operation of the address counters for fast interleaved memory applications.

A HIGH on  $\overline{CE_0}$  or a LOW on  $CE_1$  for one clock cycle will power down the internal circuitry to reduce static power consumption. Multiple chip enables allow easier banking of multiple IDT70V3579s for depth expansion configurations. Two cycles are required with  $\overline{CE_0}$  LOW and  $CE_1$  HIGH to re-activate the outputs.

## Depth and Width Expansion

The IDT70V3579 features dual chip enables (refer to Truth Table I) in order to facilitate rapid and simple depth expansion with no requirements for external logic. Figure 4 illustrates how to control the various chip enables in order to expand two devices in depth.

The IDT70V3579 can also be used in applications requiring expanded width, as indicated in Figure 4. Through combining the control signals, the devices can be grouped as necessary to accommodate applications needing 72-bits or wider.

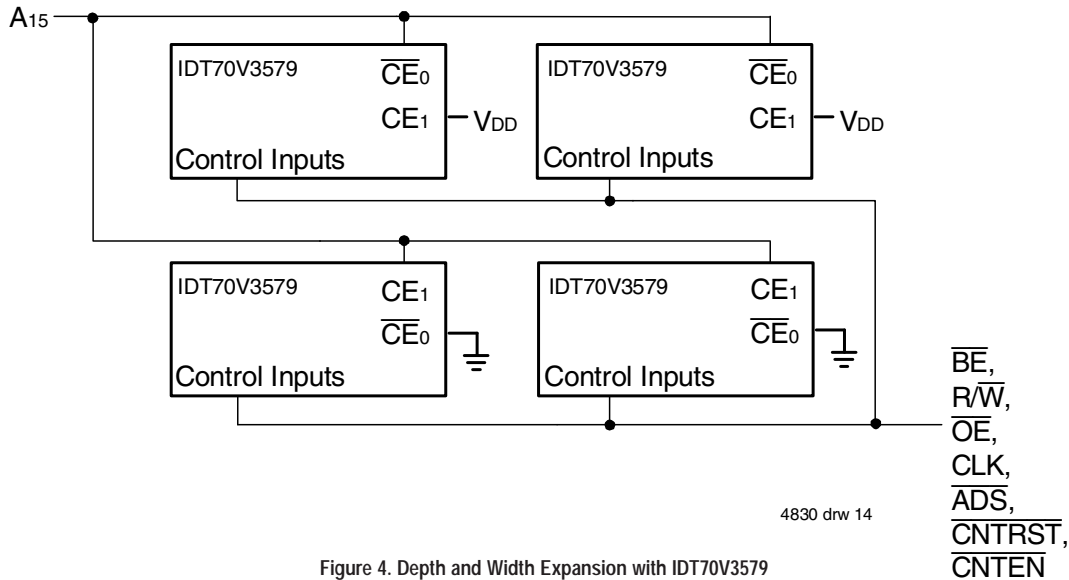
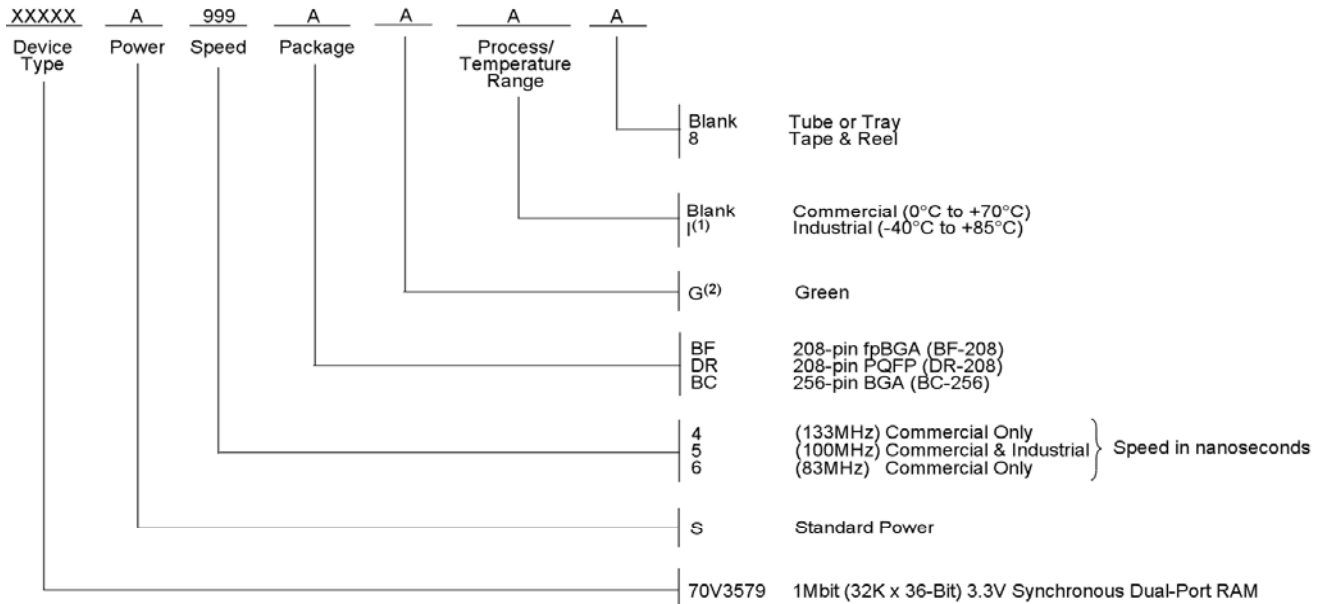


Figure 4. Depth and Width Expansion with IDT70V3579

## Ordering Information



4830 drw 15

### NOTES:

1. Contact your local sales office for Industrial temp range in other speeds, packages and powers.
2. Green parts available. For specific speeds, packages and powers contact your local sales office.

## Datasheet Document History

- 12/9/98: Initial Public Release
- 3/12/99: Added fpBGA package
- 4/28/99: Fixed typo on page 10
- 6/8/99: Changed drawing format
  - Page 2 Changed package body dimensions
- 6/15/99: Page 5 Deleted note 6 for Table II
- 8/4/99: Page 6 Improved power numbers
- 10/4/99: Upgraded speed to 133MHz, added 2.5V I/O capability
- 10/19/99: Page 4 Corrected I/O numbers in Truth Table I
- 11/12/99: Replaced IDT logo
- 4/10/00: Added new BGA package, added full 2.5V interface capability
- 1/12/01: Page 6 Updated Truth Table II
  - Increased storage temperature parameter
  - Clarified TA Parameter
- Page 8 DC Electrical parameters—changed wording from "open" to "disabled"
- Removed note 7 on DC Electrical Characteristics table
- Removed Preliminary status



## Datasheet Document History (cont'd)

- 4/10/01: Added Industrial Temperature Ranges and removed related notes
- 7/19/01: Page 3 Replaced incorrect BGA package drawing
- 12/12/01: Page 2, 3 & 4 Added date revision to pin configurations  
Page 6 Removed industrial temp footnote from table 04  
Page 8 & 10 Removed industrial temp for 6ns from DC & AC Electrical Characteristics  
Page 16 Removed industrial temp from 6ns in ordering information  
Added industrial temp footnote  
Page 1 & 17 Replaced  $\text{TM}$  logo with  $\text{®}$  logo
- 02/07/06: Page 1 Added green availability to features  
Page 5 Changed footnote 2 for Truth Table I from  $\overline{\text{ADS}}, \overline{\text{CNTEN}}, \overline{\text{CNTRST}} = V_{\text{IH}}$  to  $\overline{\text{ADS}}, \overline{\text{CNTEN}}, \overline{\text{CNTRST}} = X$   
Page 16 Added green indicator to ordering information
- 07/25/08: Page 8 Corrected a typo in the DC Chars table
- 10/23/08: Page 16 Removed "IDT" from orderable part number
- 10/10/14: Page 15 Added Tape and Reel to the Ordering Information



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