

SN74ACT7814

64 × 18 STROBED FIRST-IN, FIRST-OUT MEMORY

SCAS209C – APRIL 1992 – REVISED APRIL 1998

- Member of the Texas Instruments Widebus™ Family
- Load Clock and Unload Clock Can Be Asynchronous or Coincident
- 64 Words by 18 Bits
- Low-Power Advanced CMOS Technology
- Full, Empty, and Half-Full Flags
- Programmable Almost-Full/Almost-Empty Flag
- Fast Access Times of 15 ns With a 50-pF Load and All Data Outputs Switching Simultaneously
- Data Rates up to 50 MHz
- 3-State Outputs
- Pin-to-Pin Compatible With SN74ACT7804 and SN74ACT7806
- Packaged in Shrink Small-Outline 300-mil Package Using 25-mil Center-to-Center Spacing

description

A FIFO memory is a storage device that allows data to be written into and read from its array at independent data rates. The SN74ACT7814 is a 64-word by 18-bit FIFO for high speed and fast access times. It processes data at rates up to 50 MHz and access times of 15 ns in a bit-parallel format.

Data is written into memory on a low-to-high transition at the load clock (LDCK) input and is read out on a low-to-high transition at the unload clock (UNCK) input. The memory is full when the number of words clocked in exceeds the number of words clocked out by 64. When the memory is full, LDCK signals have no effect on the data residing in memory. When the memory is empty, UNCK signals have no effect.

Status of the FIFO memory is monitored by the full ($\overline{\text{FULL}}$), empty ($\overline{\text{EMPTY}}$), half-full (HF), and almost-full/almost-empty (AF/AE) flags. The $\overline{\text{FULL}}$ output is low when the memory is full and high when the memory is not full. The $\overline{\text{EMPTY}}$ output is low when the memory is empty and high when it is not empty. The HF output is high when the FIFO contains 32 or more words and is low when it contains 31 or fewer words. The AF/AE status flag is a programmable flag. The first one or two low-to-high transitions of LDCK after reset are used to program the almost-empty offset value (X) and the almost-full offset value (Y) if program enable ($\overline{\text{PEN}}$) is low. The AF/AE flag is high when the FIFO contains X or fewer words or (64 – Y) or more words. The AF/AE flag is low when the FIFO contains between (X + 1) and (63 – Y) words.

DL PACKAGE
(TOP VIEW)

| | | | |
|-------------------------|----|----|-----------------|
| RESET | 1 | 56 | OE |
| D17 | 2 | 55 | Q17 |
| D16 | 3 | 54 | Q16 |
| D15 | 4 | 53 | Q15 |
| D14 | 5 | 52 | GND |
| D13 | 6 | 51 | Q14 |
| D12 | 7 | 50 | V _{CC} |
| D11 | 8 | 49 | Q13 |
| D10 | 9 | 48 | Q12 |
| V _{CC} | 10 | 47 | Q11 |
| D9 | 11 | 46 | Q10 |
| D8 | 12 | 45 | Q9 |
| GND | 13 | 44 | GND |
| D7 | 14 | 43 | Q8 |
| D6 | 15 | 42 | Q7 |
| D5 | 16 | 41 | Q6 |
| D4 | 17 | 40 | Q5 |
| D3 | 18 | 39 | V _{CC} |
| D2 | 19 | 38 | Q4 |
| D1 | 20 | 37 | Q3 |
| D0 | 21 | 36 | Q2 |
| HF | 22 | 35 | GND |
| $\overline{\text{PEN}}$ | 23 | 34 | Q1 |
| AF/AE | 24 | 33 | Q0 |
| LDCK | 25 | 32 | UNCK |
| NC | 26 | 31 | NC |
| NC | 27 | 30 | NC |
| FULL | 28 | 29 | EMPTY |



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

Widebus is a trademark of Texas Instruments Incorporated.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1998, Texas Instruments Incorporated

SN74ACT7814

64 × 18 STROBED FIRST-IN, FIRST-OUT MEMORY

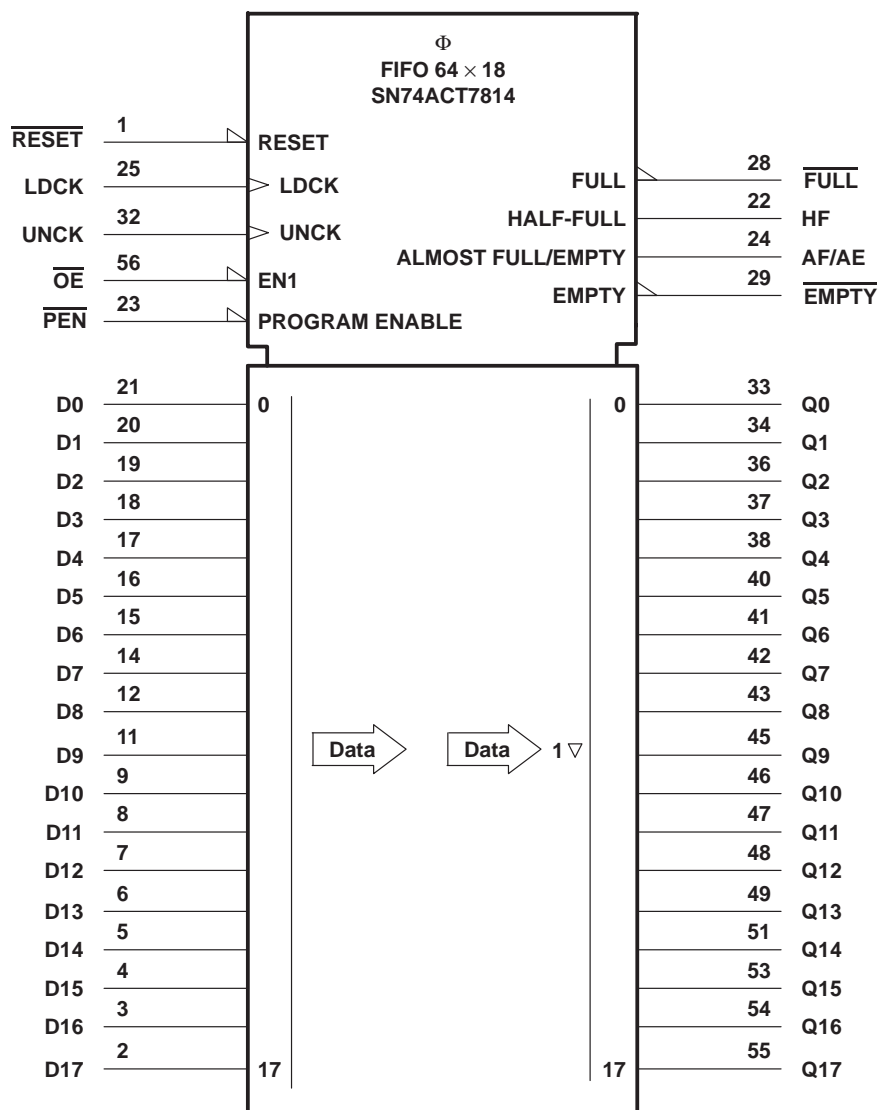
SCAS209C – APRIL 1992 – REVISED APRIL 1998

description (continued)

A low level on the reset ($\overline{\text{RESET}}$) input resets the internal stack pointers and sets $\overline{\text{FULL}}$ high, HF low, and $\overline{\text{EMPTY}}$ low. The Q outputs are not reset to any specific logic level. The FIFO must be reset upon power up. The first word loaded into empty memory causes $\overline{\text{EMPTY}}$ to go high and the data to appear on the Q outputs. It is important to note that the first word does not have to be unloaded. The data outputs are noninverting with respect to the data inputs and are in the high-impedance state when the output-enable ($\overline{\text{OE}}$) input is high.

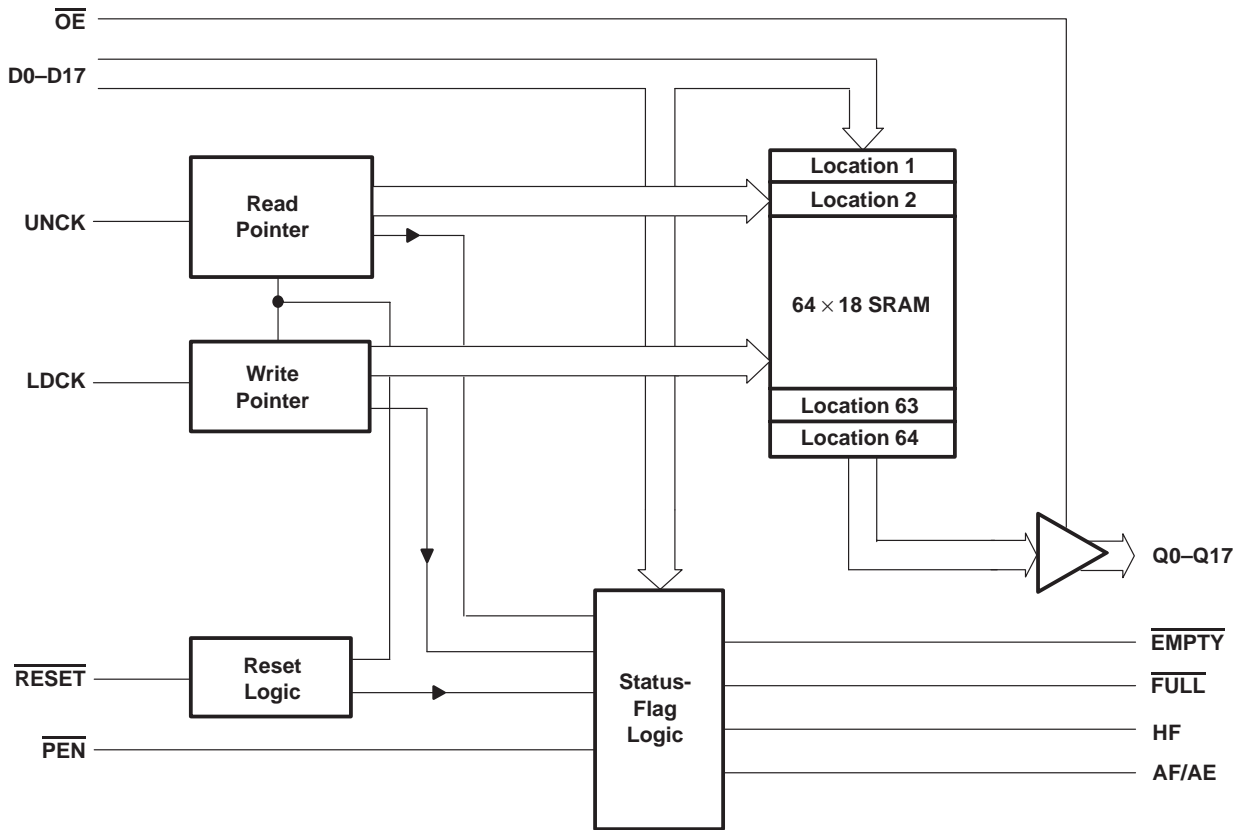
The SN74ACT7814 is characterized for operation from 0°C to 70°C.

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

functional block diagram



Terminal Functions

| TERMINAL NAME | NO. | I/O | DESCRIPTION |
|---------------------------|---|-----|--|
| AF/AE | 24 | O | Almost-full/almost-empty flag. Depth-offset values can be programmed for AF/AE, or the default value of 8 can be used for both the almost-empty offset (X) and the almost-full offset (Y). AF/AE is high when memory contains X or fewer words or (64 – Y) or more words. AF/AE is high after reset. |
| D0–D17 | 2–9, 11–12, 14–21 | I | 18-bit data input port |
| $\overline{\text{EMPTY}}$ | 29 | O | Empty flag. $\overline{\text{EMPTY}}$ is high when the FIFO memory is not empty; $\overline{\text{EMPTY}}$ is low when the FIFO memory is empty or upon assertion of $\overline{\text{RESET}}$. |
| $\overline{\text{FULL}}$ | 28 | O | Full flag. $\overline{\text{FULL}}$ is high when the FIFO memory is not full or upon assertion of $\overline{\text{RESET}}$; $\overline{\text{FULL}}$ is low when the FIFO memory is full. |
| HF | 22 | O | Half-full flag. HF is high when the FIFO memory contains 32 or more words. HF is low after reset. |
| LDCK | 25 | I | Load clock. Data is written to the FIFO on the rising edge of LDCK when $\overline{\text{FULL}}$ is high. |
| $\overline{\text{OE}}$ | 56 | I | Output enable. When $\overline{\text{OE}}$ is high, the data outputs are in the high-impedance state. |
| $\overline{\text{PEN}}$ | 23 | I | Program enable. After reset and before the first word is written to the FIFO, the binary value on D0–D4 is latched as an AF/AE offset value when $\overline{\text{PEN}}$ is low and WRTCLK is high. |
| Q0–Q17 | 33–34, 36–38, 40–43, 45–49, 51, 53–55 | O | 18-bit data output port |
| $\overline{\text{RESET}}$ | 1 | I | Reset. A low level on $\overline{\text{RESET}}$ resets the FIFO and drives $\overline{\text{FULL}}$ high and HF and $\overline{\text{EMPTY}}$ low. |
| UNCK | 32 | I | Unload clock. Data is read from the FIFO on the rising edge of UNCK when $\overline{\text{EMPTY}}$ is high. |

SN74ACT7814

64 × 18 STROBED FIRST-IN, FIRST-OUT MEMORY

SCAS209C – APRIL 1992 – REVISED APRIL 1998

offset values for AF/AE

The AF/AE flag has two programmable limits: the almost-empty offset value (X) and the almost-full offset value (Y). They can be programmed after the FIFO is reset and before the first word is written to memory. The AF/AE flag is high when the FIFO contains X or fewer words or (64 – Y) or more words.

To program the offset values, $\overline{\text{PEN}}$ can be brought low after reset only when LDCK is low. On the following low-to-high transition of LDCK, the binary value on D0–D4 is stored as the almost-empty offset value (X) and the almost-full offset value (Y). Holding $\overline{\text{PEN}}$ low for another low-to-high transition of LDCK reprograms Y to the binary value on D0–D4 at the time of the second LDCK low-to-high transition. Writes to the FIFO memory are disabled while the offsets are programmed. A maximum value of 31 can be programmed for either X or Y (see Figure 1). To use the default values of X = Y = 8, $\overline{\text{PEN}}$ must be held high.

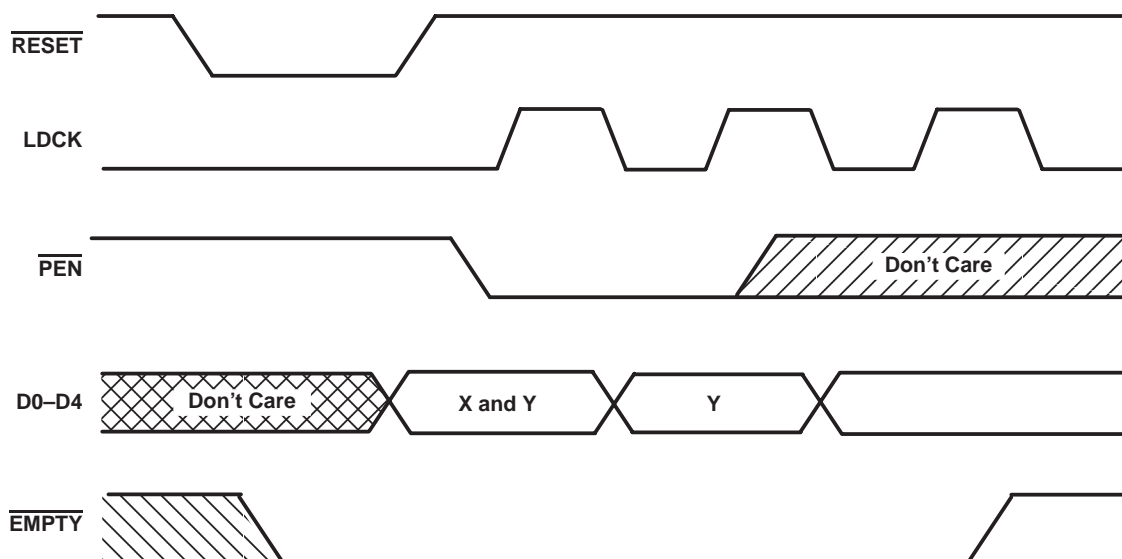


Figure 1. Programming X and Y Separately

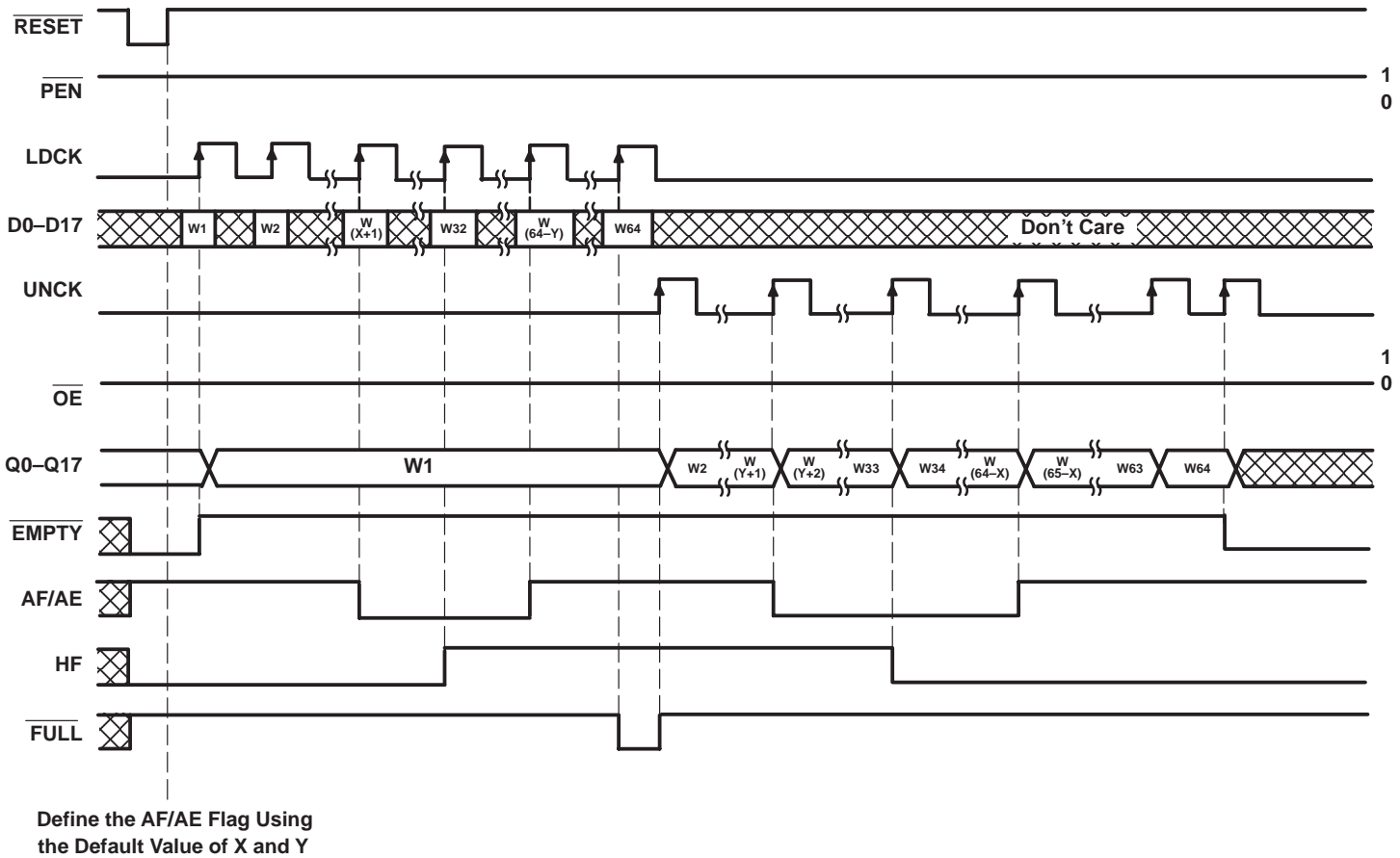


Figure 2. Write, Read, and Flag Timing Reference

SN74ACT7814

64 × 18 STROBED FIRST-IN, FIRST-OUT MEMORY

SCAS209C – APRIL 1992 – REVISED APRIL 1998

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

| | |
|---|-----------------|
| Supply voltage range, V_{CC} | –0.5 V to 7 V |
| Input voltage range, V_I | –0.5 V to 7 V |
| Voltage range applied to a disabled 3-state output | –0.5 V to 5.5 V |
| Package thermal impedance, θ_{JA} (see Note 1) | 74°C/W |
| Storage temperature range, T_{stg} | –65°C to 150°C |

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The package thermal impedance is calculated in accordance with JESD 51.

recommended operating conditions

| | | | 'ACT7814-20 | | 'ACT7814-25 | | 'ACT7814-40 | | UNIT |
|-----------------|--------------------------------|------------------|-------------|-----|-------------|-----|-------------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| V _{CC} | Supply voltage | | 4.5 | 5.5 | 4.5 | 5.5 | 4.5 | 5.5 | V |
| V _{IH} | High-level input voltage | | 2 | | 2 | | 2 | | V |
| V _{IL} | Low-level input voltage | | | 0.8 | | 0.8 | | 0.8 | V |
| I _{OH} | High-level output current | Q outputs, flags | −8 | | −8 | | −8 | | mA |
| I _{OL} | Low-level output current | Q outputs | 16 | | 16 | | 16 | | mA |
| | | Flags | 8 | | 8 | | 8 | | |
| T _A | Operating free-air temperature | | 0 | 70 | 0 | 70 | 0 | 70 | °C |

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | MIN | TYP [‡] | MAX | UNIT |
|----------------------|-----------|------------------------------------|---|-----|------------------|-----|------|
| V_{OH} | | $V_{CC} = 4.5\text{ V}$, | $I_{OH} = -8\text{ mA}$ | 2.4 | | | V |
| V_{OL} | Flags | $V_{CC} = 4.5\text{ V}$, | $I_{OL} = 8\text{ mA}$ | | | 0.5 | V |
| | Q outputs | $V_{CC} = 4.5\text{ V}$, | $I_{OL} = 16\text{ mA}$ | | | 0.5 | |
| I_I | | $V_{CC} = 5.5\text{ V}$, | $V_I = V_{CC}$ or 0 | | | ±5 | μA |
| I_{OZ} | | $V_{CC} = 5.5\text{ V}$, | $V_O = V_{CC}$ or 0 | | | ±5 | μA |
| I_{CC} | | $V_I = V_{CC} - 0.2\text{ V}$ or 0 | | | | 400 | μA |
| ΔI_{CC}^{\S} | | $V_{CC} = 5.5\text{ V}$, | One input at 3.4 V, Other inputs at V_{CC} or GND | | | 1 | mA |
| C_i | | $V_I = 0$, | $f = 1\text{ MHz}$ | | 4 | | pF |
| C_o | | $V_O = 0$, | $f = 1\text{ MHz}$ | | 8 | | pF |

[‡] All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

^{\S} This is the supply current for each input that is at one of the specified TTL voltage levels rather 0 V or V_{CC} .



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN74ACT7814

64 × 18 STROBED FIRST-IN, FIRST-OUT MEMORY

SCAS209C – APRIL 1992 – REVISED APRIL 1998

timing requirements over recommended operating conditions (see Figures 1 through 3)

| | | | 'ACT7814-20 | | 'ACT7814-25 | | 'ACT7814-40 | | UNIT |
|--------------------|-----------------|--|-------------|-----|-------------|-----|-------------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| f _{clock} | Clock frequency | | 50 | | 40 | | 25 | | MHz |
| t _w | Pulse duration | LDCK high or low | 7 | | 8 | | 12 | | ns |
| | | UNCK high or low | 7 | | 8 | | 12 | | |
| | | PEN _{low} | 7 | | 8 | | 12 | | |
| | | RESET _{low} | 10 | | 10 | | 12 | | |
| t _{su} | Setup time | D0–D17 before LDCK↑ | 5 | | 5 | | 5 | | ns |
| | | PEN _{high} before LDCK↑ | 5 | | 5 | | 5 | | |
| | | LDCK inactive before RESET _{high} | 5 | | 6 | | 6 | | |
| t _h | Hold time | D0–D17 after LDCK↑ | 0 | | 0 | | 0 | | ns |
| | | LDCK inactive after RESET _{high} | 5 | | 6 | | 6 | | |
| | | PEN _{low} after LDCK↑ | 3 | | 3 | | 3 | | |
| | | PEN _{high} after LDCK↓ | 0 | | 0 | | 0 | | |

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, C_L = 50 pF (unless otherwise noted) (see Figure 3)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | 'ACT7814-20 | | | 'ACT7814-25 | | 'ACT7814-40 | | UNIT |
|-------------------|-----------------|----------------|-------------|------|-----|-------------|-----|-------------|-----|------|
| | | | MIN | TYP† | MAX | MIN | MAX | MIN | MAX | |
| f _{max} | LDCK or UNCK | | 50 | | | 40 | | 25 | | MHz |
| t _{pd} | LDCK↑ | Any Q | 9 | | 20 | 9 | 22 | 9 | 24 | ns |
| | UNCK↑ | | 6 | 11.5 | 15 | 6 | 18 | 6 | 20 | |
| t _{pd} ‡ | UNCK↑ | Any Q | 10.5 | | | | | | | ns |
| t _{PLH} | LDCK↑ | EMPTY | 6 | | 15 | 6 | 17 | 6 | 19 | ns |
| t _{PHL} | UNCK↑ | EMPTY | 6 | | 15 | 6 | 17 | 6 | 19 | ns |
| | RESET low | | 4 | | 16 | 4 | 18 | 4 | 20 | |
| | LDCK↑ | FULL | 6 | | 15 | 6 | 17 | 6 | 19 | |
| t _{PLH} | UNCK↑ | FULL | 6 | | 15 | 6 | 17 | 6 | 19 | ns |
| | RESET low | | 4 | | 18 | 4 | 20 | 4 | 22 | |
| t _{pd} | LDCK↑ | AF/AE | 7 | | 18 | 7 | 20 | 7 | 22 | ns |
| | UNCK↑ | | 7 | | 18 | 7 | 20 | 7 | 22 | |
| t _{PLH} | RESET low | AF/AE | 2 | | 10 | 2 | 12 | 2 | 14 | ns |
| | LDCK↑ | HF | 5 | | 18 | 5 | 20 | 5 | 22 | |
| t _{PHL} | UNCK↑ | HF | 7 | | 18 | 7 | 20 | 7 | 22 | ns |
| | RESET low | | 3 | | 12 | 3 | 14 | 3 | 16 | |
| t _{en} | OE | Any Q | 2 | | 9 | 2 | 10 | 2 | 11 | ns |
| t _{dis} | OE | Any Q | 2 | | 10 | 2 | 11 | 2 | 12 | ns |

† All typical values are at V_{CC} = 5 V, T_A = 25°C.

‡ This parameter is measured at C_L = 30 pF (see Figure 4).

operating characteristics, V_{CC} = 5 V, T_A = 25°C

| PARAMETER | | TEST CONDITIONS | | TYP | UNIT |
|-----------------|--|-----------------|-----------------------------------|-----|------|
| C _{pd} | Power dissipation capacitance per FIFO channel | Outputs enabled | C _L = 50 pF, f = 5 MHz | 53 | pF |



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN74ACT7814

64 × 18 STROBED FIRST-IN, FIRST-OUT MEMORY

SCAS209C – APRIL 1992 – REVISED APRIL 1998

PARAMETER MEASUREMENT INFORMATION

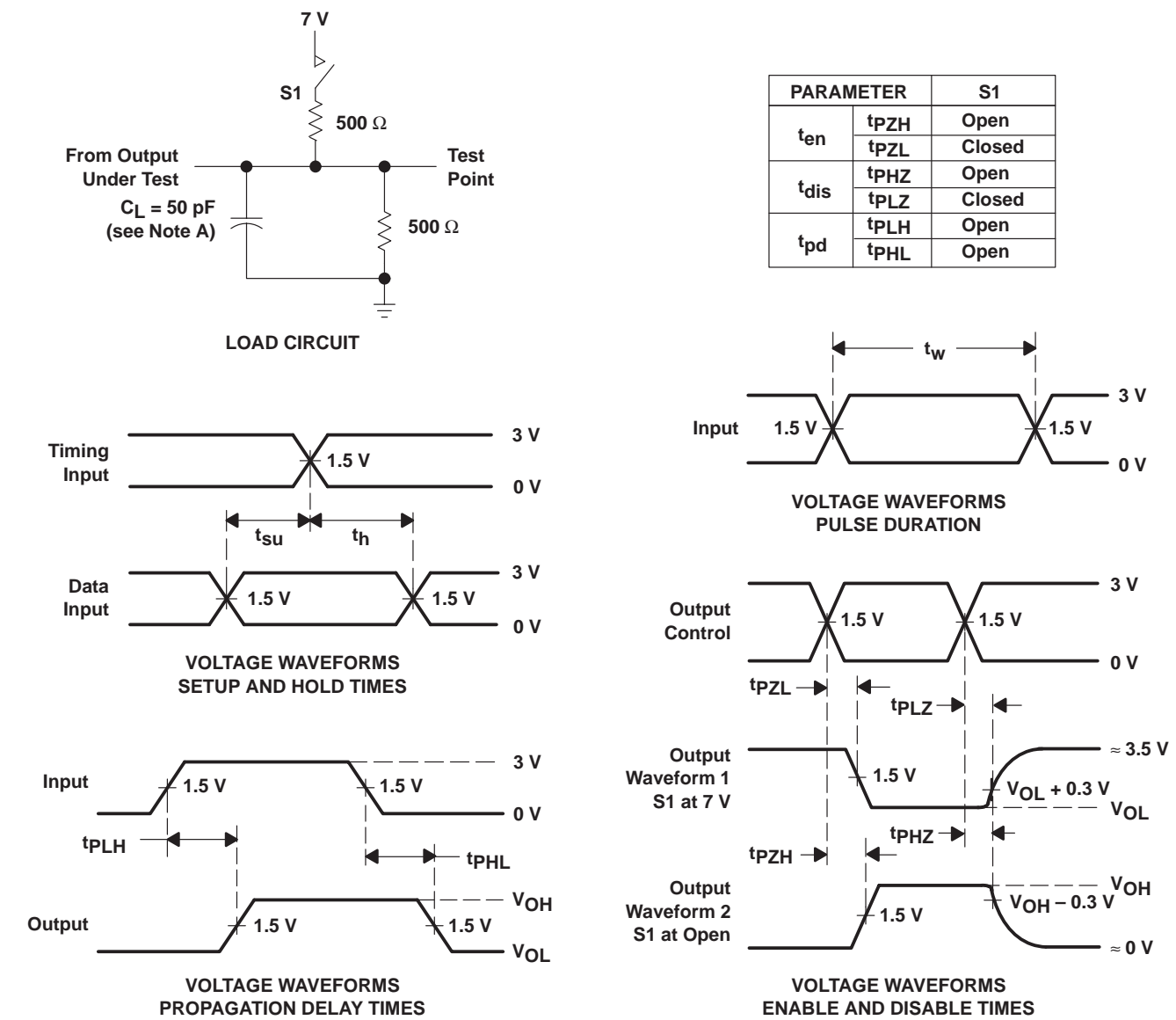


Figure 3. Load Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

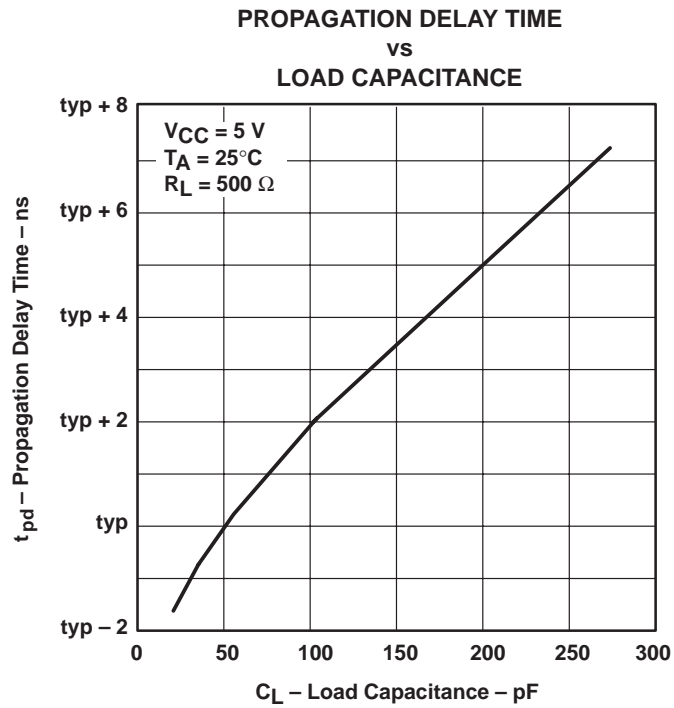


Figure 4

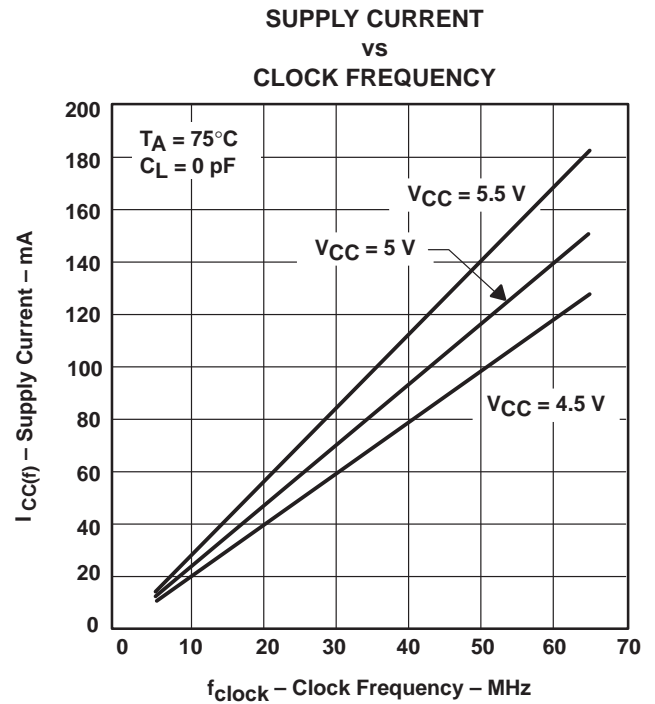


Figure 5

SN74ACT7814

64 × 18 STROBED FIRST-IN, FIRST-OUT MEMORY

SCAS209C – APRIL 1992 – REVISED APRIL 1998

APPLICATION INFORMATION

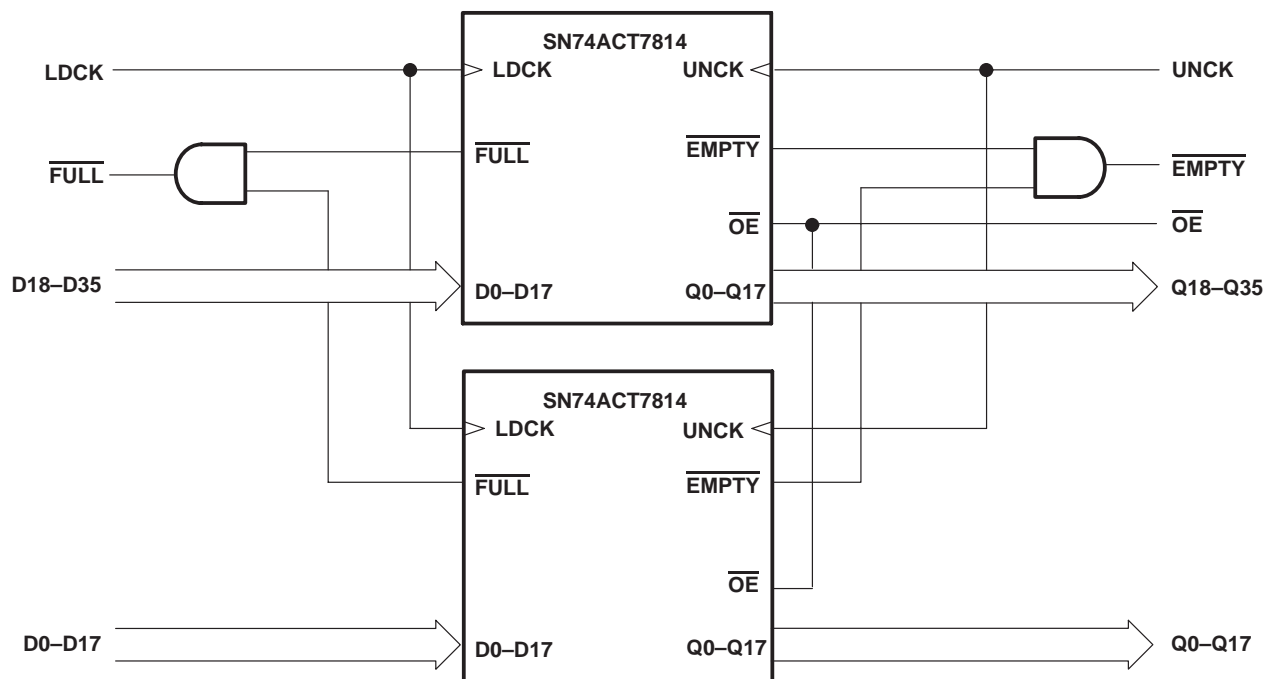


Figure 6. Word-Width Expansion: 64 × 36 Bits

PACKAGING INFORMATION

| Orderable part number | Status (1) | Material type (2) | Package Pins | Package qty Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|----------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| SN74ACT7814-20DL | Active | Production | SSOP (DL) 56 | 20 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | ACT7814-20 |
| SN74ACT7814-20DL.A | Active | Production | SSOP (DL) 56 | 20 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | ACT7814-20 |
| SN74ACT7814-40DL | Active | Production | SSOP (DL) 56 | 20 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | ACT7814-40 |
| SN74ACT7814-40DL.A | Active | Production | SSOP (DL) 56 | 20 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | ACT7814-40 |

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TUBE



*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|--------------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| SN74ACT7814-20DL | DL | SSOP | 56 | 20 | 473.7 | 14.24 | 5110 | 7.87 |
| SN74ACT7814-20DL.A | DL | SSOP | 56 | 20 | 473.7 | 14.24 | 5110 | 7.87 |
| SN74ACT7814-40DL | DL | SSOP | 56 | 20 | 473.7 | 14.24 | 5110 | 7.87 |
| SN74ACT7814-40DL.A | DL | SSOP | 56 | 20 | 473.7 | 14.24 | 5110 | 7.87 |

DL (R-PDSO-G56)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MO-118

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#), [TI's General Quality Guidelines](#), or other applicable terms available either on [ti.com](#) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2025, Texas Instruments Incorporated

Last updated 10/2025