

HD14076B

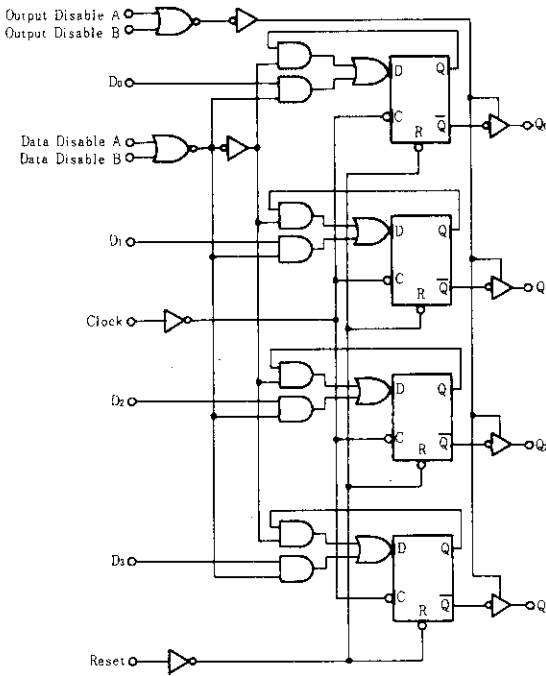
4-bit D-type Register

The HD14076B 4-bit Register consists of four D-type flip-flops operating synchronously from a common clock. OR gated output-disable inputs force the outputs into a high-impedance state for use in bus organized systems. OR gated data-disable inputs cause the Q outputs to be fed back to the D inputs of the flip-flops. Thus they are inhibited from changing state while the clocking process remains undisturbed. An asynchronous master reset is provided to clear all four flip-flops simultaneously independent of the clock or disable inputs.

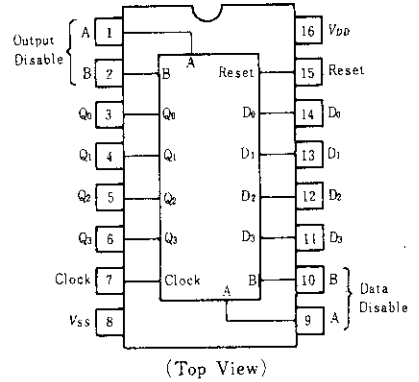
■ FEATURES

- Three-State Outputs with Gated Control Lines
- Fully Independent Clock Allows Unrestricted Operation for the Two Modes: Parallel Load and Do Nothing
- Asynchronous Master Reset
- For Bus Buffer Registers
- Quiescent Current = 5nA/pkg typ. @5V
- Supply Voltage Range = 3 to 18V
- Capable of Driving One Low-power Schottky TTL Load Over the Rated Temperature Range

■ LOGIC DIAGRAM



■ PIN ARRANGEMENT



■ TRUTH TABLE

| Reset | Clock | Inputs | | | Output |
|-------|-------|----------------|----------------|--------|----------------|
| | | Data Disable A | Data Disable B | Data D | |
| 1 | × | × | × | × | 0 |
| 0 | 0 | × | × | × | Q _n |
| 0 | | 1 | × | × | Q _n |
| 0 | | × | 1 | × | Q _n |
| 0 | | 0 | 0 | 0 | 0 |
| 0 | | 0 | 0 | 1 | 1 |

Note) × = Don't Care

When either output disable A or B (or both) is (are) high the output is disabled to the high-impedance state; however sequential operation of the flip-flops is not affected.

ELECTRICAL CHARACTERISTICS

| Characteristic | Symbol | Test Conditions | -40°C | | 25°C | | | 85°C | | Unit | |
|-----------------------|----------|--------------------------|--|-------|-------|---------|-------|-------|-------|------|----|
| | | | min | max | min | typ | max | min | max | | |
| Output Voltage | V_{OL} | $V_{DD} = 5.0$ | $V_{in} = V_{DD}$ or 0 | — | 0.05 | — | 0 | 0.05 | — | 0.05 | V |
| | | 10 | | — | 0.05 | — | 0 | 0.05 | — | 0.05 | |
| | | 15 | | — | 0.05 | — | 0 | 0.05 | — | 0.05 | |
| | V_{OH} | $V_{DD} = 5.0$ | $V_{in} = 0$ or V_{DD} | 4.95 | — | 4.95 | 5.0 | — | 4.95 | — | V |
| | | 10 | | 9.95 | — | 9.95 | 10 | — | 9.95 | — | |
| | | 15 | | 14.95 | — | 14.95 | 15 | — | 14.95 | — | |
| Input Voltage | V_{IL} | $V_{out} = 4.5$ or 0.5V | — | 1.5 | — | 2.25 | 1.5 | — | 1.5 | V | |
| | | $V_{out} = 9.0$ or 1.0V | — | 3.0 | — | 4.50 | 3.0 | — | 3.0 | | |
| | | $V_{out} = 13.5$ or 1.5V | — | 4.0 | — | 6.75 | 4.0 | — | 4.0 | | |
| | V_{IH} | $V_{out} = 0.5$ or 4.5V | 3.5 | — | 3.5 | 2.75 | — | 3.5 | — | V | |
| | | $V_{out} = 1.0$ or 9.0V | 7.0 | — | 7.0 | 5.50 | — | 7.0 | — | | |
| | | $V_{out} = 1.5$ or 13.5V | 11.0 | — | 11.0 | 8.25 | — | 11.0 | — | | |
| Output Drive Current | I_{OH} | $V_{OH} = 2.5$ V | -1.0 | — | -0.8 | -1.7 | — | -0.6 | — | mA | |
| | | $V_{OH} = 4.6$ V | -0.2 | — | -0.16 | -0.36 | — | -0.12 | — | | |
| | | $V_{OH} = 9.5$ V | -0.5 | — | -0.4 | -0.9 | — | -0.3 | — | | |
| | I_{OL} | $V_{OH} = 13.5$ V | -1.4 | — | -1.2 | -3.5 | — | -1.0 | — | mA | |
| | | $V_{OL} = 0.4$ V | 0.52 | — | 0.44 | 0.88 | — | 0.36 | — | | |
| | | $V_{OL} = 0.5$ V | 1.3 | — | 1.1 | 2.25 | — | 0.9 | — | | |
| Input Current | I_{in} | $V_{OL} = 1.5$ V | 3.6 | — | 3.0 | 8.8 | — | 2.4 | — | μA | |
| | | | — | ±0.3 | — | ±0.0001 | ±0.3 | — | ±0.0 | | |
| Input Capacitance | C_{in} | $V_{in} = 0$ | — | — | — | 5.0 | 7.5 | — | — | pF | |
| Quiescent Current | I_{DD} | 5.0 | Zero Signal, per Package | — | 20 | — | 0.005 | 20 | — | 150 | μA |
| | | 10 | | — | 40 | — | 0.010 | 40 | — | 300 | |
| | | 15 | | — | 80 | — | 0.015 | 80 | — | 600 | |
| Total Supply Current* | I_T | 5.0 | Dynamic + I_{DD} , per Gate, $C_L = 50$ pF $f = 1$ kHz | — | — | — | 0.75 | — | — | — | μA |
| | | 10 | | — | — | — | 1.50 | — | — | — | |
| | | 15 | | — | — | — | 2.25 | — | — | — | |

* To calculate total supply current at frequency other than 1kHz.

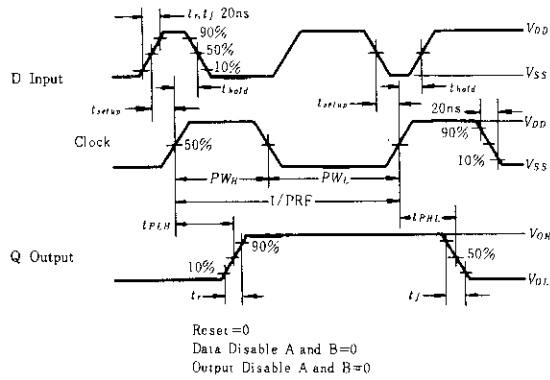
@ $V_{DD} = 5.0$ V $I_T = (0.75 \mu A/kHz)f + I_{DD}$, @ $V_{DD} = 10$ V $I_T = (1.50 \mu A/kHz)f + I_{DD}$, @ $V_{DD} = 15$ V $I_T = (2.25 \mu A/kHz)f + I_{DD}$

SWITCHING CHARACTERISTICS ($C_L = 50\text{pF}$, $T_a = 25^\circ\text{C}$)

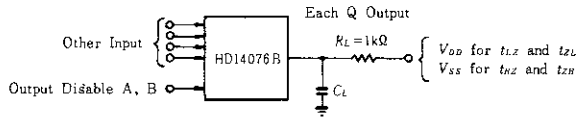
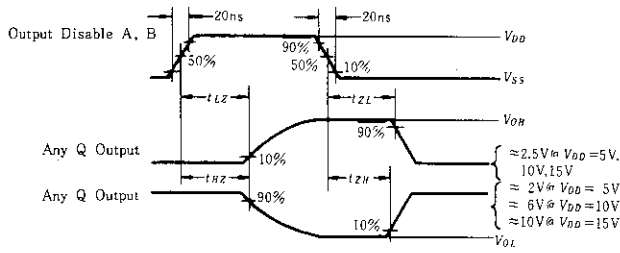
| Characteristic | | Symbol | V_{DD} (V) | min | typ | max | Unit |
|--------------------------------|-------|--------------------------|--------------|-----|-----|-----|---------------|
| Output Rise Time | | t_r | 5.0 | — | 180 | 360 | ns |
| | | | 10 | — | 90 | 180 | |
| | | | 15 | — | 65 | 130 | |
| Output Fall Time | | t_f | 5.0 | — | 100 | 200 | ns |
| | | | 10 | — | 50 | 100 | |
| | | | 15 | — | 40 | 80 | |
| Propagation Delay Time | Clock | t_{PLH} , t_{PHL} | 5.0 | — | 300 | 600 | ns |
| | | | 10 | — | 125 | 250 | |
| | | | 15 | — | 90 | 180 | |
| | Reset | 5.0 | — | 300 | 600 | | |
| | | 10 | — | 125 | 250 | | |
| | | 15 | — | 90 | 180 | | |
| Output Disable Time | | t_{HZ} , t_{LZ} | 5.0 | — | 150 | 300 | ns |
| | | | 10 | — | 60 | 120 | |
| | | | 15 | — | 45 | 90 | |
| Output Enable Time | | t_{ZH} , t_{ZL} | 5.0 | — | 200 | 400 | ns |
| | | | 10 | — | 80 | 160 | |
| | | | 15 | — | 60 | 120 | |
| Clock Pulse Width | | PW_C | 5.0 | 260 | 130 | — | ns |
| | | | 10 | 110 | 55 | — | |
| | | | 15 | 80 | 40 | — | |
| Reset Pulse Width | | PW_R | 5.0 | 370 | 185 | — | ns |
| | | | 10 | 150 | 75 | — | |
| | | | 15 | 110 | 55 | — | |
| Setup Time | | t_{setup} | 5.0 | 30 | 15 | — | ns |
| | | | 10 | 10 | 5 | — | |
| | | | 15 | 4 | 2 | — | |
| Hold Time | | t_{hold} | 5.0 | 130 | 65 | — | ns |
| | | | 10 | 60 | 30 | — | |
| | | | 15 | 50 | 25 | — | |
| Data Disable Setup Time | | t_{setup} | 5.0 | 220 | 110 | — | ns |
| | | | 10 | 80 | 40 | — | |
| | | | 15 | 50 | 25 | — | |
| Clock Pulse Rise and Fall Time | | t_r , t_f | 5.0 | — | — | 15 | μs |
| | | | 10 | — | — | 15 | |
| | | | 15 | — | — | 15 | |
| Clock Frequency | | PRF | 5.0 | — | 3.6 | 1.8 | MHz |
| | | | 10 | — | 9.0 | 4.5 | |
| | | | 15 | — | 12 | 6.0 | |

■ DYNAMIC SIGNAL WAVEFORMS

● TIMING DIAGRAM



● Three-state Enable/Disable Delay





| | |
|--------------------------|----------|
| Hitachi Code | DP-16 |
| JEDEC | Conforms |
| EIAJ | Conforms |
| Weight (reference value) | 1.07 g |

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