

# TTL HD74/HD74S Series

## ■ PERFORMANCE(per gate)

| Performance            | HD74 Series | HD74S Series |
|------------------------|-------------|--------------|
| Propagation Delay Time | 10 ns       | 3 ns         |
| Power Dissipation      | 10 mW       | 20 mW        |
| Speed-Power Product    | 100 pJ      | 60 pJ        |

## ■ MAIN CHARACTERISTICS( $T_a = -20 \sim +75^\circ\text{C}$ )

| Parameter                          | Series |                  | HD74S Series |                  |
|------------------------------------|--------|------------------|--------------|------------------|
|                                    | min.   | max.             | min.         | max.             |
| $V_{OL}(I_{OL} \text{ max})$       | —      | 0.4V             | —            | 0.5V             |
| $V_{OH}(I_{OH} = -400\mu\text{A})$ | 2.4V   | —                | 2.7V         | —                |
| $V_{IL}$                           | —      | 0.8V             | —            | 0.8V             |
| $V_{IH}$                           | 2V     | —                | 2V           | —                |
| $I_{IL}$                           | —      | -1.6mA           | —            | -2mA             |
| $I_{IH}(V_{IH} \text{ min})$       | —      | 40 $\mu\text{A}$ | —            | 50 $\mu\text{A}$ |

## ■ SELECTION GUIDE

### ● NAND/NOR/AND/OR GATES

| Function                                                               | HD74Series | HD74S Series |
|------------------------------------------------------------------------|------------|--------------|
| Quad. 2-input Positive NAND Gates                                      | 00 ✓       | 00 ✓         |
| Quad. 2-input Positive NAND Gates (with Open Collector Output)         | 01 ✓       | —            |
| Quad. 2-input Positive NOR Gates                                       | 02 ✓       | 02 ✓         |
| Quad. Positive NAND Gates (with Open Collector Output)                 | 03 ✓       | 03 ✓         |
| Hex Inverters                                                          | 04 ✓       | 04 ✓         |
| Hex Inverters (with Open Collector Output)                             | 05 ✓       | 05 ✓         |
| Hex Inverter Buffers/Drivers (with Open Collector High-voltage Output) | 06 ✓       | —            |
| Hex Buffers/Drivers (with Open Collector High-voltage Output)          | 07 ✓       | —            |
| Quad. 2-input Positive AND Gates                                       | 08 ✓       | —            |
| Quad. 2-input Positive AND Gates (with Open Collector Output)          | 09 ✓       | —            |
| Triple 3-input Positive NAND Gates                                     | 10 ✓       | 10 ✓         |
| Triple 3-input Positive AND Gates                                      | —          | 11 ✓         |
| Triple 3-input Positive NAND Gates (with Open Collector Output)        | 12 ✓       | 12 ✓         |
| Dual 4-input Schmitt NAND Gates                                        | 13 ✓       | —            |
| Hex Schmitt-trigger Inverters                                          | 14 ✓       | —            |
| Triple 3-input Positive AND Gates (with Open Collector Output)         | —          | 15 ✓         |
| Hex Inverter Buffers/Drivers (with Open Collector High-voltage Output) | 16 ✓       | —            |
| Hex Buffers/Drivers (with Open Collector High-voltage Output)          | 17 ✓       | —            |
| Dual 4-input Positive NAND Gates                                       | 20 ✓       | 20 ✓         |
| Dual 4-input Positive NAND Gates (with Open Collector Output)          | 22 ✓       | 22 ✓         |
| Expandable Dual 4-input Positive NOR Gates (with Strobe)               | 23 ✓       | —            |
| Dual 4-input Positive NOR Gates                                        | 25 ✓       | —            |
| Quad. 2-input High-voltage Interface NAND Gates                        | 26 ✓       | —            |
| Triple 3-input Positive NOR Gates                                      | 27 ✓       | —            |
| 8-input Positive NAND Gate                                             | 30 ✓       | —            |
| Quad. 2-input Positive OR Gates                                        | 32 ✓       | —            |
| Quad. 2-input Positive NAND Buffers                                    | 37 ✓       | —            |
| Quad. 2-input Positive NAND Buffers (with Open Collector Output)       | 38 ✓       | —            |
| Dual 4-input Positive NAND Buffers                                     | 40 ✓       | 40 ✓         |
| Quad. Bus Buffer Gates with 3-state Output (Inverting)                 | 125 ✓      | —            |
| Quad. Bus Buffer Gates with 3-state Output (Noninverting)              | 126 ✓      | —            |
| Quad. 2-input Positive NAND Schmitt Triggers                           | 132 ✓      | —            |
| 13-input Positive NAND Gate                                            | —          | 133 ✓        |
| 12-input Positive NAND Gate (with 3-state Out.)                        | —          | 134 ✓        |
| Dual 4-input Positive NAND Line Drivers                                | —          | 140 ✓        |

(to be continued)

# TTL HD74/74S Series

## ● AND-OR-INVERT GATES

| Function                                                      | HD74 Series | HD74S Series |
|---------------------------------------------------------------|-------------|--------------|
| Expandable Dual 2-wide 2-input AND-OR-INVERT Gates            | 50 ✓        | —            |
| Dual 2-wide 2-input AND-OR-INVERT Gates                       | 51 ✓        | —            |
| Expandable 4-wide 2-input AND-OR-INVERT Gate                  | 53 ✓        | —            |
| 4-wide 2-input AND-OR-INVERT Gate                             | 54          | —            |
| 4-2-3-2-input AND-OR-INVERT Gate                              | —           | 64 ✓         |
| 4-2-3-2-input AND-OR-INVERT Gate (with Open Collector Output) | —           | 65 ✓         |

## ● EXPANDER

| Function               | HD74 Series | HD74S Series |
|------------------------|-------------|--------------|
| Dual 4-input Expanders | 60 ✓        | —            |

## ● FLIP FLOPS

| Function                                                                         | HD74 Series | HD74S Series |
|----------------------------------------------------------------------------------|-------------|--------------|
| J-K Master-Flip Flop (AND Inputs)                                                | 72          | —            |
| Dual J-K Flip Flops                                                              | 73 ✓        | —            |
| Dual D-type Edge-triggered Flip Flops                                            | 74 ✓        | 74 ✓         |
| Dual J-K Flip Flops (with PR and CLR)                                            | 76          | —            |
| Dual J-K Flip Flops                                                              | 107 ✓       | —            |
| Dual J-K Negative-edge-triggered Flip Flops (with PR and CLR)                    | —           | 112 ✓        |
| Dual J-K Negative-edge-triggered Flip Flops (with PR)                            | —           | 113 ✓        |
| Dual J-K Negative-edge-triggered Flip Flops (with PR, Common CLR, and Common CK) | —           | 114 ✓        |
| Monostable Multivibrator                                                         | 121 ✓       | —            |
| Dual Retriggerable Monostable Multivibrators                                     | 123 ✓       | —            |
| Hex D-type Flip Flops (with CLR)                                                 | 174 ✓       | 174 ✓        |
| Quad. D-type Flip Flops (with CLR)                                               | 175         | 175 ✓        |
| Dual Monostable Multivibrators (with Schmitt Trigger)                            | 221         | —            |

## ● COUNTERS

| Function                                   | HD74 Series | HD74S Series |
|--------------------------------------------|-------------|--------------|
| Decade Counter                             | 90A ✓       | —            |
| Divide-by-Twelve Counter                   | 92A         | —            |
| 4-bit Binary Counter                       | 93A         | —            |
| Presetable Decade Counter/Latch            | 176         | —            |
| 4-bit Binary Counter/Latch                 | 177         | —            |
| Synchronous Decade Counter                 | 160 ✓       | —            |
| Synchronous 4-bit Binary Counter           | 161 ✓       | —            |
| Fully Synchronous Decade Counter           | 162         | —            |
| Fully Synchronous 4-bit Binary Counter     | 163 ✓       | —            |
| Synchronous Decade Decimal Rate Multiplier | 167 ✓       | —            |
| Synchronous Decade Up/Down Counter         | 190 ✓       | —            |
| Synchronous 4-bit Binary Up/Down Counter   | 191 ✓       | —            |
| Synchronous Decade Up/Down Counter         | 192 ✓       | —            |
| Synchronous 4-bit Binary Up/Down Counter   | 193 ✓       | —            |
| Decade Counter                             | 290 ✓       | —            |
| 4-bit Binary Counter                       | 293 ✓       | —            |

(to be continued)

# TTL HD74/74S Series

## ● 4-BIT, 5-BIT SHIFT/STORAGE REGISTERS

| Function                                                                    | HD74 Series | HD74S Series |
|-----------------------------------------------------------------------------|-------------|--------------|
| 4-bit Right-shift, Left-shift Register                                      | 95A ✓       | —            |
| 5-bit Shift Register (Dual Parallel-in, Parallel-out)                       | 96 ✓        | —            |
| 4-bit D-type Register (with 3-state Output)                                 | 173 ✓       | —            |
| 4-bit Parallel-in, Parallel-out Bidirectional Shift Register                | 194 ✓       | —            |
| 4-bit Parallel-in, Parallel-out Shift Register (J-K Inputs for First Stage) | 195 ✓       | —            |

## ● 8-BIT SHIFT REGISTERS

| Function                                                                    | HD74 Series | HD74S Series |
|-----------------------------------------------------------------------------|-------------|--------------|
| 8-bit Shift Register                                                        | 91A ✓       | —            |
| 8-bit Parallel-out Shift Register                                           | 164 ✓       | —            |
| Parallel-load 8-bit Shift Register                                          | 166 ✓       | —            |
| 8-bit Parallel-in, Parallel-out Bidirectional Shift Register                | 198 ✓       | —            |
| 8-bit Parallel-in, Parallel-out Shift Register (J-K Inputs for First Stage) | 199 ✓       | —            |

## ● ENCODERS

| Function                           | HD74 Series | HD74S Series |
|------------------------------------|-------------|--------------|
| 10-line-to-4-line Priority Encoder | 147 ✓       | —            |
| 8-line-to-3-line Priority Encoder  | 148 ✓       | —            |

## ● DECODERS/DEMULPLEXERS

| Function                                                                   | HD74 Series | HD74S Series |
|----------------------------------------------------------------------------|-------------|--------------|
| BCD-to-Decimal Decoder                                                     | 42A ✓       | —            |
| Excess 3-to-Decimal Decoder                                                | 43A ✓       | —            |
| Excess 3-Gray-to-Decimal Decoder                                           | 44A ✓       | —            |
| 4-line-to-16-line Decoder/Demultiplexer                                    | 154 ✓       | —            |
| Dual 2-line-to-4-line Decoders/Demultiplexers                              | 155 ✓       | —            |
| Dual 2-line-to-4-line Decoders/Demultiplexers (with Open Collector Output) | 156 ✓       | —            |
| 4-line-to-16-line Decoder/Demultiplexer (with Open Collector Output)       | 159 ✓       | —            |

## ● DECODERS/LAMP DRIVERS/BUFFERS

| Function                                              | HD74 Series | HD74S Series |
|-------------------------------------------------------|-------------|--------------|
| BCD-to-Decimal Decoder/Driver (with 30V Out.)         | 45 ✓        | —            |
| BCD-to-Decimal Decoder/Driver (with 15V Out.)         | 145 ✓       | —            |
| BCD-to-Seven Segment Decoder/Driver (with 30V Output) | 46A ✓       | —            |
| BCD-to-Seven Segment Decoder/Driver (with 15V Output) | 47A ✓       | —            |
| BCD-to-Decimal Decoder/Driver (with 60V Out.)         | 141 ✓       | —            |

## ● LATCHES

| Function                            | HD74 Series | HD74S Series |
|-------------------------------------|-------------|--------------|
| Quad. Bistable Latches              | 75 ✓        | —            |
| Quad. $\bar{S}$ - $\bar{R}$ Latches | 279 ✓       | —            |

## ● RANDOM ACCESS MEMORIES (less than 256-bit)

| Function                                | HD74 Series | HD74S Series |
|-----------------------------------------|-------------|--------------|
| 64-bit Random Access Memory (16w by 4b) | 89 ✓        | —            |

(to be continued)

## ● ARITHMETIC ELEMENTS

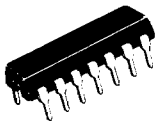
| Function                                                      | HD74 Series | HD74S Series |
|---------------------------------------------------------------|-------------|--------------|
| 4-bit Binary Full Adder                                       | 83A ✓       | —            |
| 4-bit Magnitude Comparator                                    | 85 ✓        | —            |
| Quad. 2-input Exclusive-OR Gates                              | 86 ✓        | 86 ✓         |
| Quad. Exclusive-OR/NOR Gates                                  | —           | 135 ✓        |
| Quad. 2-input Exclusive-OR Gates (with Open Collector Output) | 136 ✓       | —            |
| 8-bit Odd/Even Parity Generator/Checker                       | 180 ✓       | —            |
| 4-bit Arithmetic Logic Unit/Function Generator                | —           | 181 ✓        |
| Look-Ahead Carry Generator (for ALU)                          | 182 ✓       | 182 ✓        |
| Dual Carry Save Full Adders                                   | H183 ✓      | —            |
| 9-bit Odd/Even Parity Generator/Checker                       | —           | 280 ✓        |
| 4-bit Binary Full Adder (with Fast Carry)                     | 283 ✓       | —            |

## ● DATA SELECTORS/MULTIPLEXERS

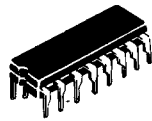
| Function                                                                 | HD74 Series | HD74S Series |
|--------------------------------------------------------------------------|-------------|--------------|
| 16-bit Data Selector/Multiplexer                                         | 150 ✓       | —            |
| 8-bit Data Selector/Multiplexer (with Strobe)                            | 151A ✓      | 151 ✓        |
| 8-bit Data Selector/Multiplexer                                          | —           | —            |
| Dual 4-line-to-1-line Data Selectors/Multiplexers                        | 153 ✓       | —            |
| Quad. 2-line-to-1-line Data Selectors/Multiplexers                       | 157 ✓       | 157 ✓        |
| Quad. 2-line-to-1-line Data Selectors/Multiplexers                       | —           | 158 ✓        |
| 8-bit Data Selector/Multiplexer (with Strobe and 3-state Output)         | 251 ✓       | 251 ✓        |
| Quad. 2-line-to-1-line Data Selectors/Multiplexers (with 3-state Output) | —           | 257 ✓        |
| Quad. 2-line-to-1-line Data Selectors/Multiplexers (with 3-state Output) | —           | 258 ✓        |

## ■ OUTLINE

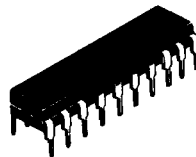
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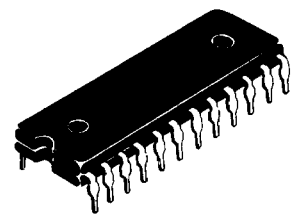
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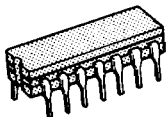
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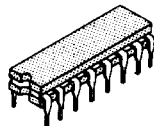
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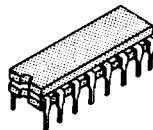
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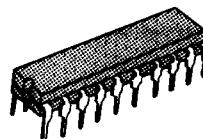
DG-16



DG-16A



DG-20



DG-24

