

# 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)

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## ● ARITHMETIC ELEMENTS

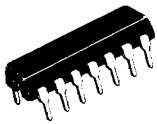
Function	HD74 Series	HD74S Series
4-bit Binary Full Adder	83A ✓	—
4-bit Magnitude Comparator	85 ✓	—
Quad. 2-input Exclusive-OR Gates	86 ✓	86 ✓
Quad. Exclusive-OR/NOR Gates	—	135 ✓
Quad. 2-input Exclusive-OR Gates (with Open Collector Output)	136 ✓	—
8-bit Odd/Even Parity Generator/Checker	180 ✓	—
4-bit 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

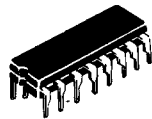
Function	HD74 Series	HD74S Series
16-bit Data Selector/Multiplexer	150 ✓	—
8-bit Data Selector/Multiplexer (with Strobe)	151A ✓	151 ✓
8-bit Data Selector/Multiplexer	—	—
Dual 4-line-to-1-line Data Selectors/Multiplexers	153 ✓	—
Quad. 2-line-to-1-line Data Selectors/Multiplexers	157 ✓	157 ✓
Quad. 2-line-to-1-line 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

DP-14



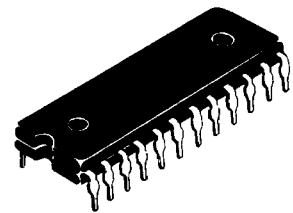
DP-16



DP-20



DP-24



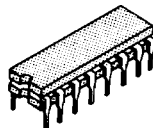
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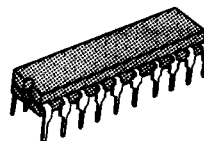
DG-16



DG-16A



DG-20



DG-24

