

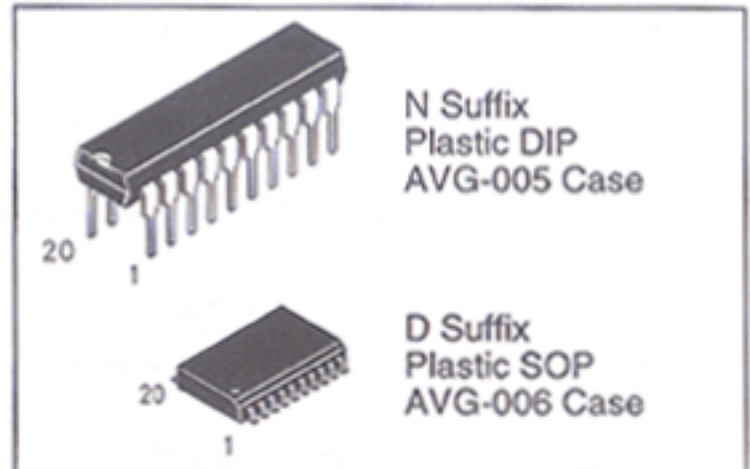
Available Q2, 1995

Octal 3-State Inverting Flip-Flop

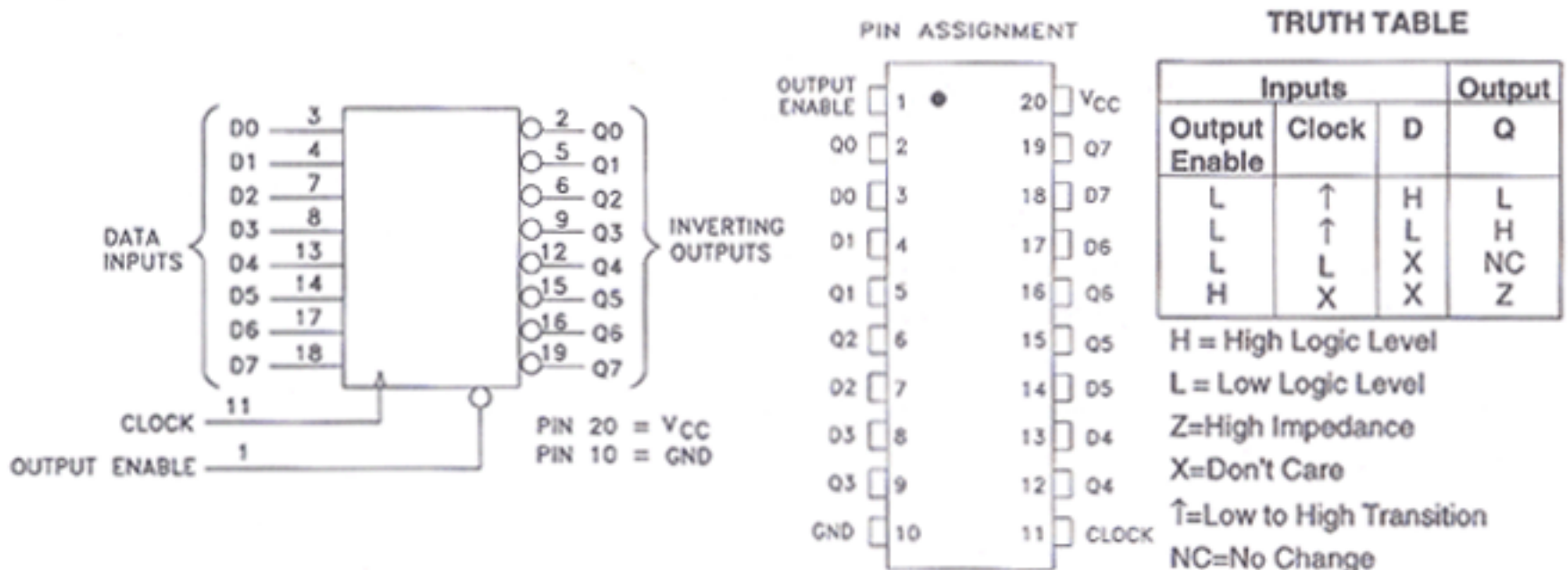
The Data meeting the setup time in these devices is clocked to the outputs with the rising edge of the Clock. The Output Enable input does not affect the states of the flip-flops, but when Output Enable is high, the outputs are forced to the high-impedance state; thus, data may be stored even when the outputs are not enabled.

- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2 to 6 V
- Low Input Current: 1 μ A
- DC, AC parameters guaranteed from -55°C to 125°C

DV74HC534
DV74HCT534



534



ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V _{IN}	DC Input Voltage (Referenced to GND)	-1.5 to V _{CC} + 1.5	V
V _{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V _{CC} + 0.5	V
I _{IN}	DC Input Current, per Pin	± 20	mA
I _{OUT}	DC Output Current, per Pin	± 35	mA
I _{CC}	DC Supply Current, V _{CC} and GND Pins	± 75	mA
P _D	Power Dissipation in Still Air, Plastic DIP SOP Package	750 500	mW
T _{STG}	Storage Temperature Range	-65 to +150	°C
TL	Lead Temperature, 1mm from Case for 10 Seconds	260	°C

GUARANTEED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V _{CC}	DC Supply Voltage (Referenced to GND)	2.0	6.0	V
V _{IN} , V _{OUT}	DC Input Voltage, Output Voltage (Referenced to GND)	0	V _{CC}	V
T _A	Ambient Temperature	-55	+125	°C

Symbol	Parameter	Min	Max	Unit
t_r, t_f	Input Rise and Fall Time: HC: $V_{CC}=2.0V$ HCT: $V_{CC}=5.5V$ / HC: $V_{CC}=4.5V$ HC: $V_{CC}=6.0V$	0 0 0	1000 500 400	ns

HC-534

DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Conditions	V_{CC} V	Guaranteed Limits			Unit
				25°C to -55°C	≤85°C	≤125°C	
V_{IH}	Minimum High-Level Input Voltage	$V_{OUT}=0.1V, I_{OUT} \leq 20\mu A$ or $V_{OUT} = V_{CC}-0.1V$	2.0 4.5 6.0	1.5 3.15 4.2	1.5 3.15 4.2	1.5 3.15 4.2	V
V_{IL}	Maximum Low-Level Input Voltage	$V_{OUT}=0.1V, I_{OUT} \leq 20\mu A$ or $V_{OUT} = V_{CC}-0.1V$	2.0 4.5 6.0	0.5 1.35 1.8	0.5 1.35 1.8	0.5 1.35 1.8	V
V_{OH}	Minimum High-Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL} $I_{OUT} \leq 20\mu A$	2.0 4.5 6.0	1.9 4.4 5.9	1.9 4.4 5.9	1.9 4.4 5.9	V
		$V_{IN} = V_{IH}$ or $V_{IL}, I_{OUT} \leq 6.0mA$ $I_{OUT} \leq 7.8mA$	4.5 6.0	3.98 5.48	3.84 5.34	3.7 5.2	
V_{OL}	Maximum Low Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL} $I_{OUT} \leq 20\mu A$	2.0 4.5 6.0	0.1 0.1 0.1	0.1 0.1 0.1	0.1 0.1 0.1	V
		$V_{IN} = V_{IH}$ or $V_{IL}, I_{OUT} \leq 6.0mA$ $I_{OUT} \leq 7.8mA$	4.5 6.0	0.26 0.26	0.33 0.33	0.40 0.40	
I_{IN}	Maximum Input Leakage Current	$V_{IN} = V_{CC}$ or GND	6.0	±0.1	±1.0	±1.0	μA
I_{OZ}	Maximum Three-State Leakage Current	Output in High Impedance State $V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND	6.0	±0.5	±5.0	±10.0	μA
I_{CC}	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0\mu A$ (Per Package)	6.0	8.0	80	160	μA

AC ELECTRICAL CHARACTERISTICS over full operating conditions ($C_L=50pF$, Input $t_f=t_r=6ns$)

Symbol	Parameter	V_{CC} V	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125°C	
f_{max}	Maximum Clock Frequency (50% Duty Cycle)	2.0 4.5 6.0	6.0 30 35	4.8 24 28	4.0 20 24	MHz
$t_{PLH},$ t_{PHL}	Maximum Propagation Delay Time, Clock to Q	2.0 4.5 6.0	180 36 31	225 45 38	270 54 46	ns
$t_{PLZ},$ t_{PHZ}	Maximum Propagation Delay Time, Output Disable to Q	2.0 4.5 6.0	150 30 26	190 38 33	225 45 38	ns
$t_{PZL},$ t_{PZH}	Maximum Propagation Delay Time, Output Enable to Q	2.0 4.5 6.0	150 30 26	190 38 33	225 45 38	ns
$t_{TLH},$ t_{THL}	Maximum Output Transition Time Any Output	2.0 4.5 6.0	60 12 10	75 15 13	90 18 15	ns
C_{IN}	Maximum Input Capacitance	—	10	10	10	pF

Symbol	Parameter	V _{CC} V	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125°C	
C _{OUT}	Maximum Three-State Output Capacitance (Output High-Impedance)	—	15	15	15	pF

C _{PD}	Power Dissipation Capacitance (Per Flip-Flop) Used to determine the no-load dynamic power consumption $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$	Typical @ 25°C, V _{CC} = 5 V			pF
		40			

TIMING REQUIREMENTS (Input t_r=t_f=6 ns)

Symbol	Parameter	V _{CC}	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125°C	
t _{SU}	Minimum Setup Time, Data to Clock	2.0	100	125	150	ns
		4.5	20	25	30	
		6.0	17	21	26	
t _H	Minimum Hold Time, Clock to Data	2.0	25	30	40	ns
		4.5	5	6	8	
		6.0	5	6	7	
t _W	Minimum Pulse Width, Clock	2.0	80	100	120	ns
		4.5	16	20	24	
		6.0	14	17	20	

HCT-534

534

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} V	Guaranteed Limits			Unit
				25°C to -55°C	≤85°C	≤125°C	
V _{IH}	Minimum High-Level Input Voltage	V _{OUT} = 0.1 V, I _{OUT} ≤ 20 μA or V _{OUT} = V _{CC} - 0.1 V	4.5	2.0	2.0	2.0	V
			5.5	2.0	2.0	2.0	
V _{IL}	Maximum Low-Level Input Voltage	V _{OUT} = 0.1 V, I _{OUT} ≤ 20 μA or V _{OUT} = V _{CC} - 0.1 V	4.5	0.8	0.8	0.8	V
			5.5	0.8	0.8	0.8	
V _{OH}	Minimum High-Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 20 μA	4.5	4.4	4.4	4.4	V
			5.5	5.4	5.4	5.4	
V _{OL}	Maximum Low Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 20 μA	4.5	0.1	0.1	0.1	V
			5.5	0.1	0.1	0.1	
I _{IN}	Maximum Input Leakage Current	V _{IN} = V _{CC} or GND	4.5	3.98	3.84	3.7	μA
			5.5	±0.1	±1.0	±1.0	
I _{OZ}	Maximum Three-State Leakage Current	Output in High Impedance State V _{IN} = V _{IH} or V _{IL} V _{OUT} = V _{CC} or GND	5.5	±0.5	±5.0	±10.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND, I _{OUT} = 0 μA (Per Package)	5.5	8.0	80	160	μA
ΔI _{CC}	Additional Quiescent Supply Current	V _{IN} = 2.4 V, Any One Input V _{IN} = V _{CC} or GND, Other Inputs I _{OUT} = 0 μA	5.5	≥ -55°C	25°C to 125°C	mA	
		2.9		2.4			

AC ELECTRICAL CHARACTERISTICS over full operating conditions ($C_L=50\text{pF}$, Input $t_r=t_f=6\text{ns}$)

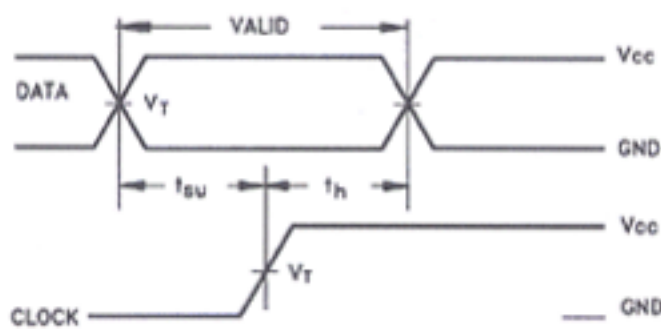
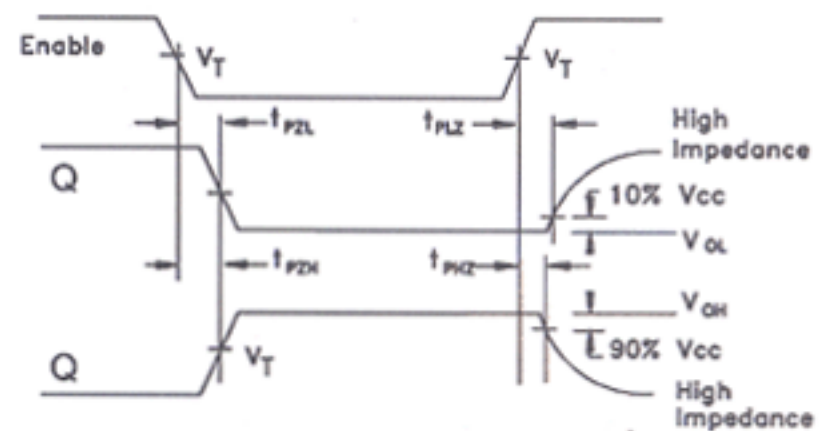
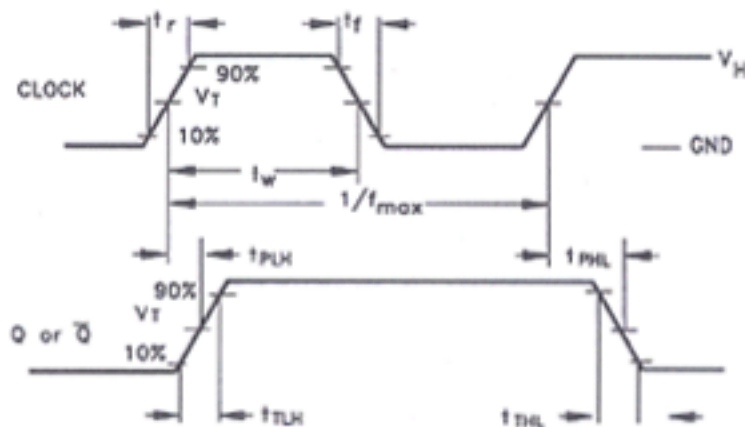
Symbol	Parameter	Vcc V	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125°C	
fmax	Maximum Clock Frequency (50% Duty Cycle)	5.0 ±10%	25	31	38	ns
tPLH, tPHL	Maximum Propagation Delay Time, Clock to Q		35	44	53	ns
tPLZ, tPHZ	Maximum Propagation Delay Time, Output Disable to Q		35	44	53	ns
tPZL, tPZH	Maximum Propagation Delay Time, Output Enable to Q		35	44	53	ns
tTLH, tTHL	Maximum Output Transition Time, Any Output	5.0 ±10%	12	15	18	ns
CIN	Maximum Input Capacitance	—	10	10	10	pF
COU	Maximum 3-State Output Capacitance (Output High-Impedance)	—	15	15	15	pF

CPD	Power Dissipation Capacitance (Per Flip-Flop) Used to determine the no-load dynamic power consumption $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$	Typical @ 25°C, Vcc = 5 V			pF
		65			

TIMING REQUIREMENTS (Input $t_r=t_f=6\text{ ns}$)

Symbol	Parameter	Vcc	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125 °C	
t _{SU}	Minimum Setup Time, Data to Clock	5.0V ±10%	10	13	15	ns
t _H	Minimum Hold Time, Clock to Data		5	5	5	ns
t _W	Minimum Pulse Width, Clock		16	20	24	ns

SWITCHING WAVEFORMS



Input and output threshold voltage:
 $V_T = 50\% V_{CC}$ for HC; 1.3V for HCT;
 $V_H = V_{CC}$ for HC, 3V for HCT

534