

HD14007UB

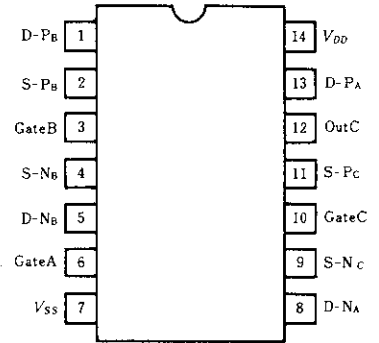
Dual Complementary Pair plus Inverter

The HD14007UB multi-purpose device consists of three N-channel and three P-channel enhancement mode devices packaged to provide access to each device. These versatile parts are useful in inverter circuits, pulse-shapers, linear amplifiers, high input impedance amplifiers, threshold detectors, transmission gating, and functional gating.

FEATURES

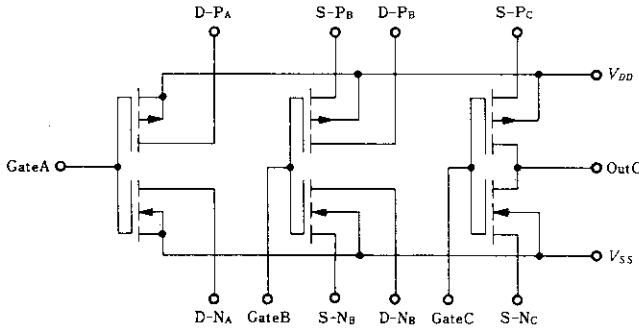
- Quiescent Current = 0.5nA/pkg typ @5V
- Supply Voltage Range = 3 to 18V
- Pin-for-Pin Replacement for CD4 007UB and MC14007UB

PIN ARRANGEMENT



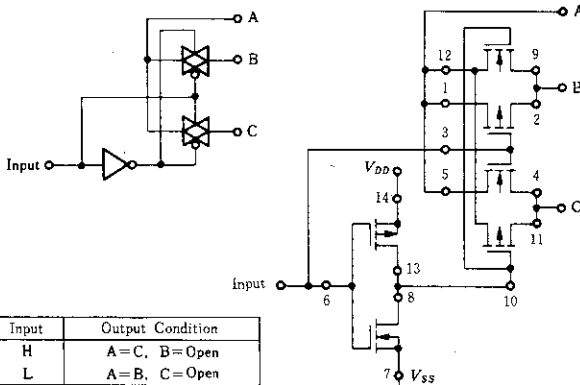
(Top View)

CIRCUIT SCHEMATIC



TYPICAL APPLICATION

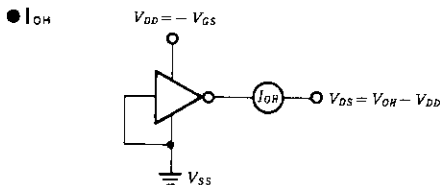
(2-input Analog Multiplexer)



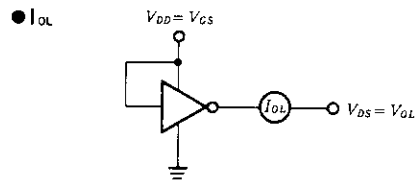
Input	Output Condition
H	A = C, B = Open
L	A = B, C = Open

Substrates of P-channel devices internally connected to V_{DD} .
Substrates of N-channel devices internally connected to V_{SS} .

DC CHARACTERISTIC TEST CIRCUIT



All unused inputs connected to ground.



All unused inputs connected to ground.

■ ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	V _{DD} (V)	Test Conditions	-40°C		25°C			85°C		Unit
				min	max	min	typ	max	min	max	
Output Voltage	V _{OL}	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}	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}	5.0	V _{out} = 4.5 or 0.5V	—	1.0	—	2.25	1.0	—	1.0	V
		10	V _{out} = 9.0 or 1.0V	—	2.0	—	4.50	2.0	—	2.0	
		15	V _{out} = 13.5 or 1.5V	—	2.5	—	6.75	2.5	—	2.5	
	V _{IH}	5.0	V _{out} = 0.5 or 4.5V	4.0	—	4.0	2.75	—	4.0	—	V
		10	V _{out} = 1.0 or 9.0V	8.0	—	8.0	5.50	—	8.0	—	
		15	V _{out} = 1.5 or 13.5V	12.5	—	12.5	8.25	—	12.5	—	
Output Drive Current	I _{OH}	5.0	V _{OH} = 2.5V	-1.3	—	-1.1	-5.0	—	-0.9	—	mA
		10	V _{OH} = 9.5V	-0.65	—	-0.55	-2.5	—	-0.45	—	
		15	V _{OH} = 13.5V	-2.4	—	-2.0	-10	—	-1.6	—	
	I _{OL}	5.0	V _{OL} = 0.4V	0.52	—	0.44	1.0	—	0.36	—	mA
		10	V _{OL} = 0.5V	1.3	—	1.1	2.5	—	0.9	—	
		15	V _{OL} = 1.5V	4.0	—	3.3	10	—	2.7	—	
Input Current	I _{in}	15		—	±0.3	—	±0.0001	±0.3	—	±1.0	μA
Input Capacitance	C _{in}		V _{in} = 0	—	—	—	5.0	7.5	—	—	pF
Quiescent Current	I _{DD}	5.0	Zero Signal, per Package	—	0.5	—	0.0005	0.5	—	3.8	μA
		10		—	1.0	—	0.0010	1.0	—	7.5	
		15		—	2.0	—	0.0015	2.0	—	15	
Total Supply Current*	I _T	5.0	Dynamic + I _{DD} ,	—	—	—	0.72	—	—	—	μA
		10	per Gate,	—	—	—	1.44	—	—	—	
		15	C _L = 50pF, f = 1kHz	—	—	—	2.16	—	—	—	

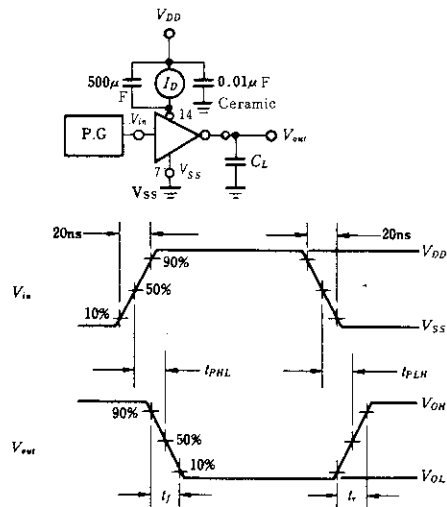
* To calculate total supply current at frequency other than 1kHz.

* V_{DD} = 5.0V I_T = (0.72μA/kHz)f + I_{DD}, @V_{DD} = 10V I_T = (1.44μA/kHz)f + I_{DD}, @V_{DD} = 15V I_T = (2.16μA/kHz)f + I_{DD}

■ SWITCHING CHARACTERISTICS (C_L = 50pF, T_a = 25°C)

Characteristic	Symbol	V _{DD} (V)	typ	max	Unit
Output Rise Time	t _r	5.0	90	180	ns
		10	45	90	
		15	35	70	
Output Fall Time	t _f	5.0	75	150	ns
		10	40	80	
		15	30	60	
Propagation Delay Time	t _{PLH}	5.0	60	130	ns
		10	30	75	
		15	25	55	
	t _{PHL}	5.0	60	130	ns
		10	30	75	
		15	25	55	

■ SWITCHING TIME TEST CIRCUIT



■ DC CHARACTERISTICS ($V_{CC}=5V \pm 10\%$, $T_a=-40$ to $+85^\circ C$)

Item	Symbol	Test Condition	min	typ	max	Unit	
Input Voltage	V_{IH}	$V_{out}=0.1V$ or $V_{CC}-0.1V$,	2.0	—	—	V	
	V_{IL}	$I_{out} \leq 20\mu A$	—	—	0.8	V	
Output Voltage	V_{OH}	$V_{in}=V_{IH}$ or V_{IL} , $I_{out} \leq 20\mu A$	$V_{CC}-0.05$	V_{CC}	—	V	
	V_{OL}		—	0.0	0.05	V	
Output Current	I_{OH}	$V_{in}=V_{IH}$ or V_{IL} , $V_{out}=V_{CC}-0.8V$	—	—	-6.0	mA	
	I_{OL}	$V_{in}=V_{IH}$ or V_{IL} , $V_{out}=0.4V$	6.0	—	—	mA	
Input Current	I_{in}	$V_{in}=V_{CC}$ or GND	—	± 0.00001	± 1.0	μA	
3-state Leakage Current	I_{TL}		$T_a=25^\circ C$	—	—	0.5	μA
			$T_a=85^\circ C$	—	—	5.0	μA
Quiescent Current	I_{CC}	$V_{in}=V_{CC}$ or GND, $I_{out}=0\mu A$	$T_a=25^\circ C$	—	—	4.0	μA
			$T_a=85^\circ C$	—	—	40	μA

■ AC CHARACTERISTICS ($V_{CC}=5V$, $T_a=25^\circ C$, Input $t_r=t_f=6ns$)

Item	Symbol	Test Condition	min	typ	max	Unit
Maximum Clock Frequency	f_{max}	$C_L=50pF$	—	—	30	MHz
Propagation Delay Time	t_{PLH}	$C_L=50pF$	—	—	28	ns
	t_{PHL}		—	—	28	ns
Output Enable Time	t_{ZL}	$C_L=50pF$, $R_L=1k\Omega$	—	—	30	ns
	t_{ZH}		—	—	30	
Output Disable Time	t_{LZ}	$C_L=50pF$, $R_L=1k\Omega$	—	—	25	ns
	t_{HZ}		—	—	25	
Setup Time	t_{su}		20	—	—	ns
Hold Time	t_h		—	—	—	ns
Pulse Width	t_w		16	—	—	ns
Input Capacitance	C_{in}		—	—	10	pF

● Switching Waveforms

Figure 1

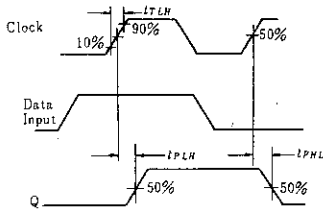


Figure 2a

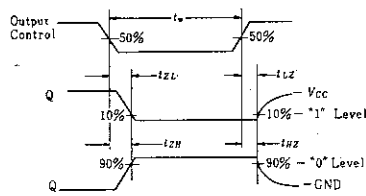


Figure 2b - Load Circuit for Three-State Outputs

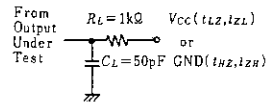
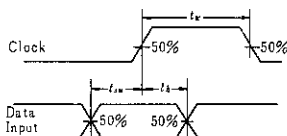


Figure 3



*Outputs Q shown are for the HCT374. Outputs for the HCT534 are the inversion of those for the HCT374.



Hitachi Code	DP-14
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.97 g

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