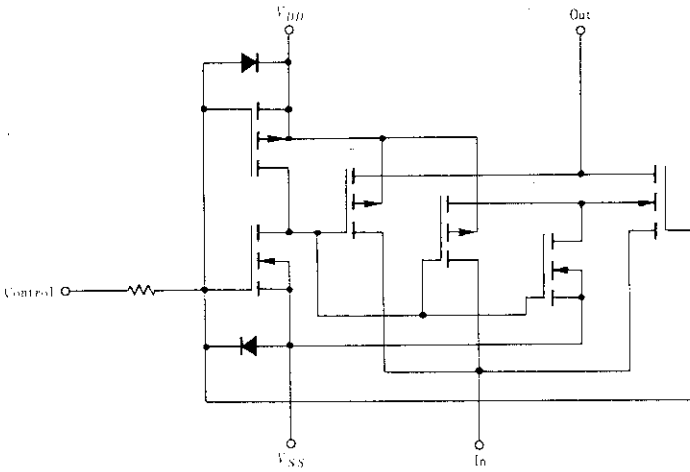


HD14016B

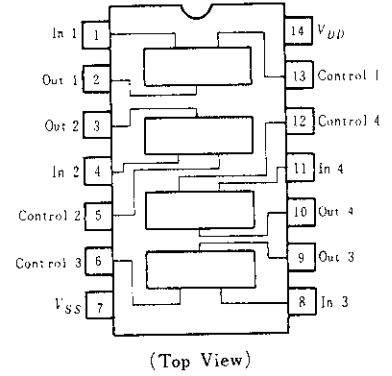
Quadruple Analog Switch/ Quadruple Multiplexer

The HD14016B quad bilateral switch consists of four independent switches capable of controlling either digital or analog signals. The quad bilateral switch is used in signal gating, chopper, modulator, demodulator and CMOS logic implementation.

■ CIRCUIT SCHEMATIC (1/4)



■ PIN ARRANGEMENT



ELECTRICAL CHARACTERISTICS

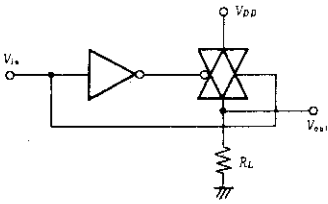
Characteristic	Symbol	Test Circuit	Test Conditions		-40°C		25°C			85°C		Unit		
					min	max	min	typ	max	min	max			
Input Voltage	V_{IL}	1	5.0	$R_L = 10k\Omega$ SW Input $= V_{DD}$	$V_O = 1.0V$	—	0.9	—	1.5	0.9	—	0.9	V	
			10			—	0.9	—	1.5	0.9	—	0.9		
			15			—	0.9	—	1.5	0.9	—	0.9		
	V_{IH}		5.0	$R_L = 10k\Omega$ SW Input $= V_{DD}$	$V_O = 4.0V$	3.5	—	3.5	2.75	—	3.5	—	V	
			10			$V_O = 9.0V$	7.0	—	7.0	5.5	—	7.0		—
			15				$V_O = 14V$	11.0	—	11.0	8.25	—		11.0
Input Current	I_{iK}	15			—	± 0.3		—	± 0.00001	± 0.3	—	± 1.0	μA	
Input Capacitance	Control	C_{in}				—	—	—	5.0	—	—	—	pF	
	Switch Input					—	—	—	5.0	—	—	—		
	Switch Output					—	—	—	5.0	—	—	—		
	Feed Through					—	—	—	0.2	—	—	—		
Quiescent Current	I_{DD}	2	5.0			—	1.0	—	0.0005	1.0	—	7.5	μA	
			10			—	2.0	—	0.0010	2.0	—	15		
			15			—	4.0	—	0.0015	4.0	—	30		
"ON" Resistance	R_{ON}	3	5.0	$V_C = V_{DD}$ $R_L = 10k\Omega$	$V_{SS} = -5V$	$V_{in} = -5.0V$	—	610	—	300	660	—	840	Ω
						$V_{in} = -5.0V$	—	610	—	300	660	—	840	
						$V_{in} = \pm 0.25V$	—	610	—	280	660	—	840	
					$V_{SS} = -7.5V$	$V_{in} = -7.5V$	—	370	—	240	400	—	520	
						$V_{in} = -7.5V$	—	370	—	240	400	—	520	
						$V_{in} = \pm 0.25V$	—	370	—	180	400	—	520	
			10	$V_{SS} = 0V$	$V_{in} = -10V$	—	610	—	260	660	—	840		
					$V_{in} = -0.25V$	—	610	—	260	660	—	840		
					$V_{in} = -5.6V$	—	610	—	310	660	—	840		
					$V_{SS} = 0V$	$V_{in} = +15V$	—	370	—	260	400	—	520	
						$V_{in} = +0.25V$	—	370	—	260	400	—	520	
						$V_{in} = +9.3V$	—	370	—	300	400	—	520	
"ON" Resistance Difference	ΔR_{ON}	5.0	$V_C = V_{DD}$	$V_{in} = \pm 5.0V, V_{SS} = -5V$		—	—	—	15	—	—	—	Ω	
		7.5		$V_{in} = \pm 7.5V, V_{SS} = -7.5V$		—	—	—	10	—	—	—		
Input/Output Leakage Current			5.0	$V_C = V_{SS}$	$V_{in} = +5.0V, V_{out} = -5.0V$		—	± 125	—	± 0.001	± 125	—	—	nA
					$V_{in} = -5.0V, V_{out} = +5.0V$		—	± 125	—	± 0.001	± 125	—	—	
					$V_{in} = +7.5V, V_{out} = -7.5V$		—	± 250	—	± 0.0015	± 250	—	—	
					$V_{in} = -7.5V, V_{out} = +7.5V$		—	± 250	—	± 0.0015	± 250	—	—	

■ SWITCHING CHARACTERISTICS

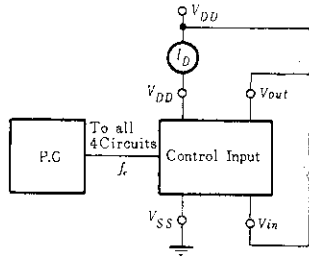
Characteristic		Symbol	Test Circuit	V _{DD} (V)	Test Conditions	min	typ	max	Unit
Propagation Delay Time	Data Input	t _{PLH}	4	5.0	V _C = V _{DD} , R _L = 10kΩ, V _{SS} = 0 V	—	15	45	ns
				10		—	7.0	15	
				15		—	6.0	12	
		t _{PHL}		5.0		—	15	45	ns
				10		—	7.0	15	
				15		—	6.0	12	
	Control Input	t _{PLH}	5	5.0	V _{in} ≤ 10 V, R _L = 1.0kΩ, V _{SS} = 0 V	—	34	90	ns
				10		—	20	45	
				15		—	15	35	
		t _{PHL}		5.0		—	34	90	ns
				10		—	20	45	
				15		—	15	35	
Crosstalk (Control to Output)			6	5.0	V _C = V _{DD} , R _{in} = 1.0kΩ, R _{out} = 10kΩ, V _{SS} = 0 V	—	30	—	mV
		10	—	50		—			
		15	—	100		—			
Crosstalk (between any two switches)				5.0	R _L = 1.0kΩ, f = 1.0MHz, V _{SS} = 0 V, Crosstalk = 20log ₁₀ V _{out1} / V _{out2}	—	-80	—	dB
Maximum Control Input Pulse Frequency				5.0	R _L = 1.0kΩ, V _{SS} = 0 V	—	5.0	—	MHz
		10	—	10		—			
		15	—	12		—			
Noise Voltage	V _n	7	5.0	V _C = V _{DD} , f = 100Hz, V _{SS} = 0 V	—	24	—	nV/√Hz	
			10		—	25	—		
			15		—	30	—		
			5.0	V _C = V _{DD} , f = 100kHz, V _{SS} = 0 V	—	12	—		
			10		—	12	—		
			15		—	15	—		
Sine Wave (Distortion)				5.0	V _{in} = 1.77 V (rms Centered @0.0V), R _L = 10kΩ, f = 1.0kHz, V _{SS} = -5 V	—	0.16	—	%
Insertion Loss			5.0	V _C = V _{DD} , V _{in} = 1.77V, V _{SS} = -5 V, rms Centered @0.0V, f = 1MHz, I.L. = 20log ₁₀ $\frac{V_{out}}{V_{in}}$	R _L = 1.0kΩ	—	2.3	—	dB
					R _L = 10kΩ	—	0.2	—	
					R _L = 100kΩ	—	0.1	—	
					R _L = 1.0MΩ	—	0.05	—	
Bandwidth	BW	8	5.0	V _C = V _{DD} , V _{in} = 1.77V, V _{SS} = -5V, rms Centered @0.0V, -3 dB	R _L = 1.0kΩ	—	54	—	MHz
					R _L = 10kΩ	—	40	—	
					R _L = 100kΩ	—	38	—	
					R _L = 1.0MΩ	—	37	—	
Feedthrough			5.0	V _C = V _{SS} , V _{SS} = -5 V, 20log ₁₀ $\frac{V_{out}}{V_{in}}$ = -50dB	R _L = 1.0kΩ	—	1250	—	kHz
					R _L = 10kΩ	—	140	—	
					R _L = 100kΩ	—	18	—	
					R _L = 1.0MΩ	—	2.0	—	

■ DC CHARACTERISTIC TEST CIRCUIT

1. V_{IL} , V_{IH}

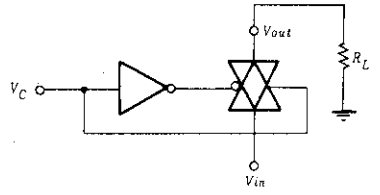


2. Quiescent Power Dissipation Test Circuit

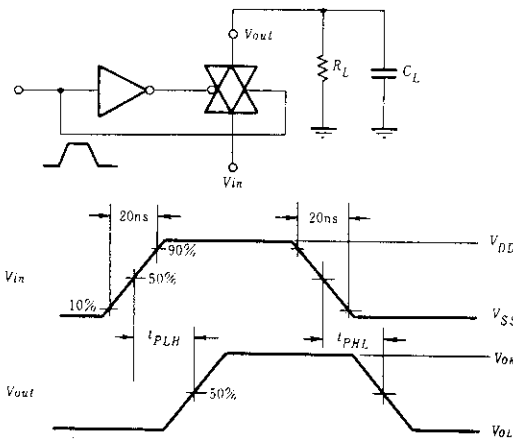


$P_D = V_{DD} \times I_D$

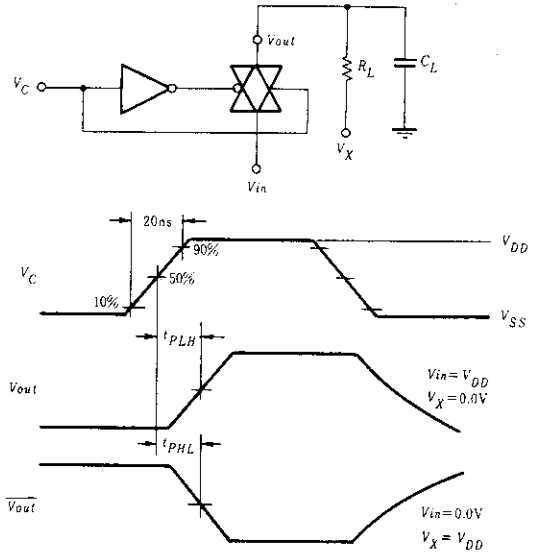
3. R_{ON}



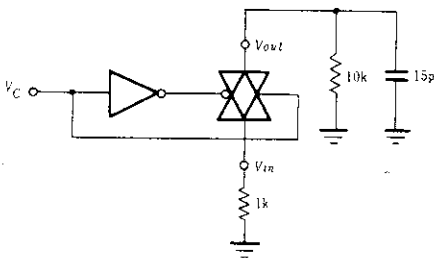
4. t_{PLH} , t_{PHL}



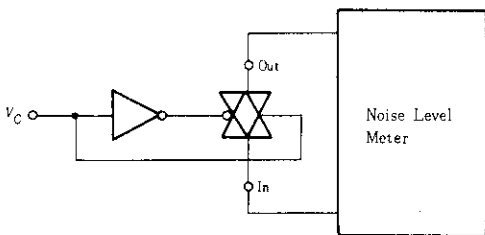
5. Turn-on Delay Time Test Circuit and Waveform



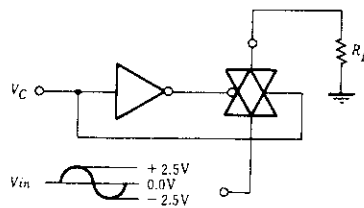
6. Crosstalk



7. V_n



8. BW





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

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