

HD14015B

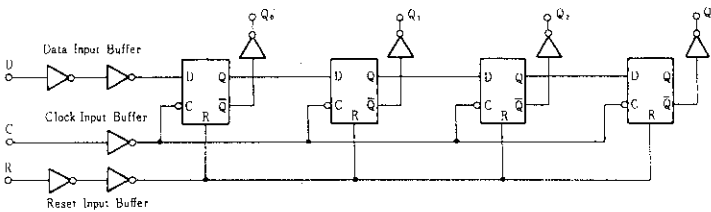
Dual 4-bit Static Shift Register

The HD14015B dual 4-bit static shift register consists of two identical, independent 4-state serial-input/parallel-output registers. Each register has independent Clock and Reset inputs with a single serial Data input. The register states are type D master-slave flip-flops. Data is shifted from one stage to the next during the positive-going clock transition. Each register can be cleared when a high level is applied on the Reset line.

FEATURES

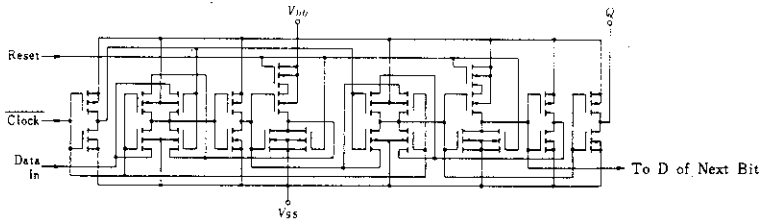
- Quiescent Current = 5nA/pkg typ @5V
- Supply Voltage Range = 3 to 18V
- High Fanout > 50
- Input Impedance = $10^{12} \Omega$ typ.
- Low Input Capacitance = 5pF typ.
- Toggle Rate = 6MHz @10V
- Capable of Driving One Low-power Schottky TTL Load Over the Rated Temperature Range

LOGIC DIAGRAM (1/2)

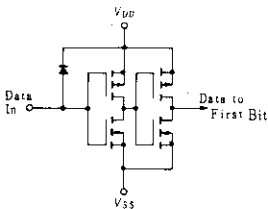


CIRCUIT SCHEMATIC

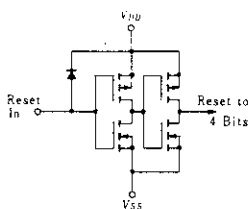
Single Bit



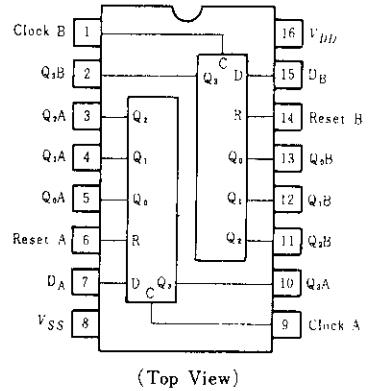
Data Input Buffer



Reset Input Buffer



PIN ARRANGEMENT



TRUTH TABLE

Clocked Operation(Synchronous)

D	Qn	Qn+1
0	0	0
0	1	0
1	0	1
1	1	1

Note) $Q_{n+1} = D_n$, Reset=0

Direct Operation(Asynchronous)

Reset	Q
0	Q
1	0

Note) Clock=D=Don't Care

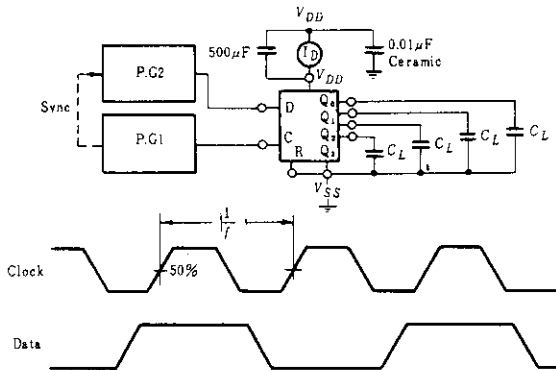
■ ELECTRICAL CHARACTERISTICS

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 $0.5V$	-	1.5	-	2.25	1.5	-	1.5	V
		10	$V_{out} = 9.0$ or $1.0V$	-	3.0	-	4.50	3.0	-	3.0	
		15	$V_{out} = 13.5$ or $1.5V$	-	4.0	-	6.75	4.0	-	4.0	
	V_{IH}	5.0	$V_{out} = 0.5$ or $4.5V$	3.5	-	3.5	2.75	-	3.5	-	V
		10	$V_{out} = 1.0$ or $9.0V$	7.0	-	7.0	5.50	-	7.0	-	
		15	$V_{out} = 1.5$ or $13.5V$	11.0	-	11.0	8.25	-	11.0	-	
Output Drive Current	I_{OH}	5.0	$V_{OH} = 2.5V$	-1.0	-	-0.8	-1.7	-	-0.6	-	mA
		5.0	$V_{OH} = 4.6V$	-0.2	-	-0.16	-0.36	-	-0.12	-	
		10	$V_{OH} = 9.5V$	-0.5	-	-0.4	-0.9	-	-0.3	-	
		15	$V_{OH} = 13.5V$	-1.4	-	-1.2	-3.5	-	-1.0	-	
	I_{OL}	5.0	$V_{OL} = 0.4V$	0.52	-	0.44	0.88	-	0.36	-	mA
		10	$V_{OL} = 0.5V$	1.3	-	1.1	2.25	-	0.9	-	
15		$V_{OL} = 1.5V$	3.6	-	3.0	8.8	-	2.4	-		
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	-	20	-	0.005	20	-	150	μA
		10		-	40	-	0.010	40	-	300	
		15		-	80	-	0.015	80	-	600	
Total Supply Current*	I_T	5.0	Dynamic + I_{DD} , $C_L = 50pF$ $f = 1kHz$, per Gate	-	-	-	1.2	-	-	-	μA
		10		-	-	-	2.4	-	-	-	
		15		-	-	-	3.6	-	-	-	

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

@ $V_{DD} = 5.0V$ $I_T = 1.2\mu A/kHz \cdot f + I_{DD}$ @ $V_{DD} = 10V$ $I_T = 2.4\mu A/kHz \cdot f + I_{DD}$ @ $V_{DD} = 15V$ $I_T = 3.6\mu A/kHz \cdot f + I_{DD}$

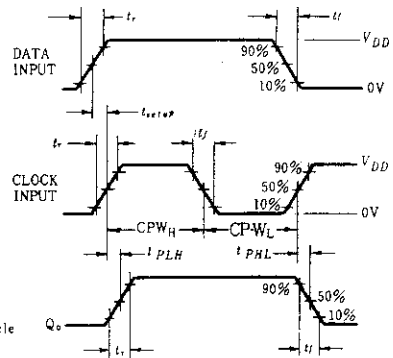
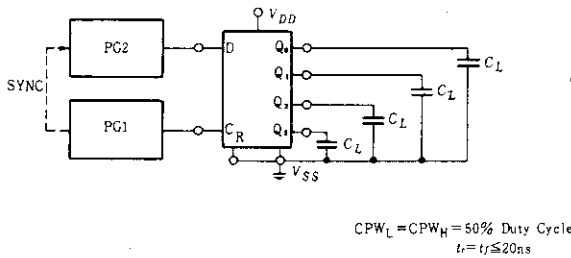
● POWER DISSIPATION TEST CIRCUIT AND WAVEFORM



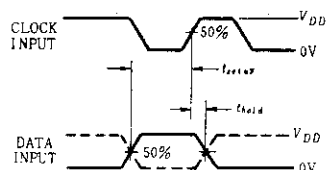
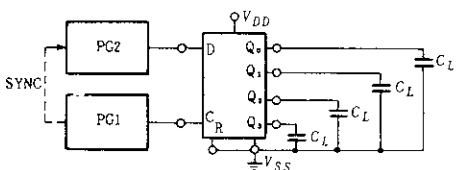
SWITCHING CHARACTERISTICS ($C_L=50pF, T_a=25^{\circ}C$)

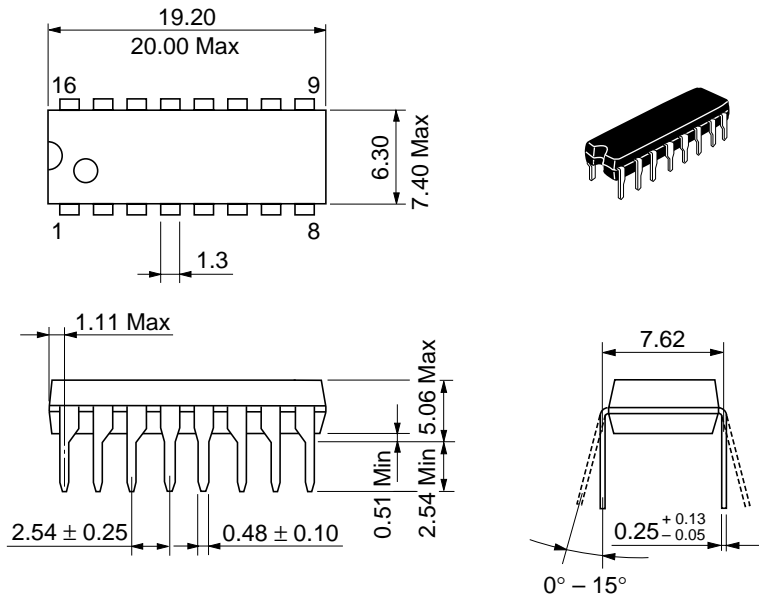
Characteristic	Symbol	$V_{DD}(V)$	min	typ	max	Unit	
Output Rise Time	t_r	5.0	—	180	400	ns	
		10	—	90	200		
		15	—	65	160		
Output Fall Time	t_f	5.0	—	170	250	ns	
		10	—	70	150		
		15	—	50	80		
Propagation Delay Time	Clock, Data	t_{PLH}, t_{PHL}	5.0	—	310	1000	ns
			10	—	125	400	
			15	—	90	265	
	Reset	t_{PHL}	5.0	—	460	1000	
			10	—	180	400	
			15	—	120	265	
Clock Pulse Width	PWC	5.0	500	185	—	ns	
		10	200	85	—		
		15	150	55	—		
Clock Pulse Frequency	PRF	5.0	—	2.0	1.0	MHz	
		10	—	6.0	2.5		
		15	—	7.5	3.0		
Clock Pulse Rise and Fall Time	t_r, t_f	5.0	—	—	15	μs	
		10	—	—	15		
		15	—	—	15		
Reset Pulse Width	PWR	5.0	500	200	—	ns	
		10	200	80	—		
		15	150	60	—		
Setup Time	t_{setup}	5.0	500	100	—	ns	
		10	100	50	—		
		15	75	40	—		

SWITCHING TIME TEST CIRCUIT

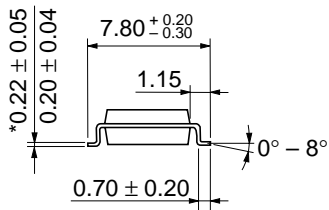
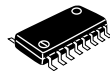
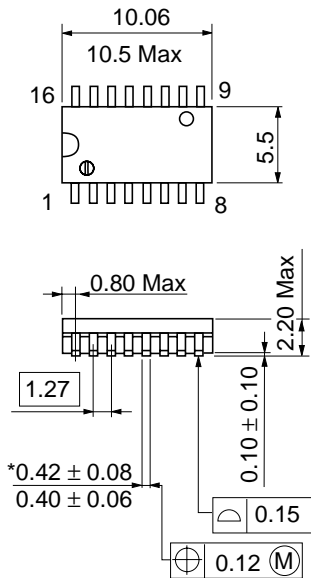


Setup and Hold Time Test Circuit and Waveforms



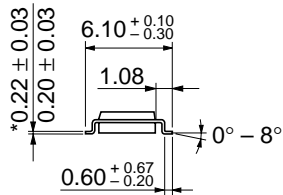
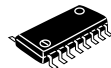
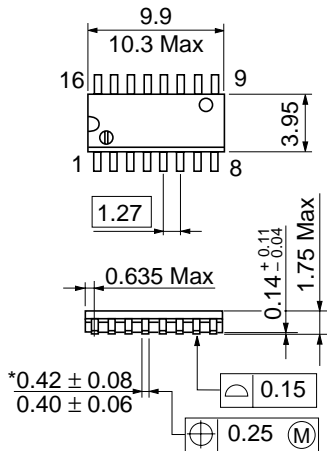


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



*Dimension including the plating thickness
 Base material dimension

Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.24 g



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.15 g

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