

HD14015B

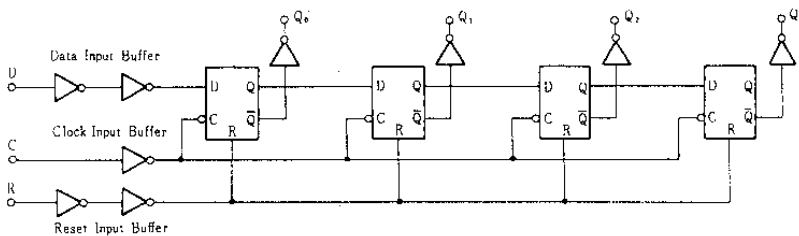
Dual 4-bit Static Shift Register

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

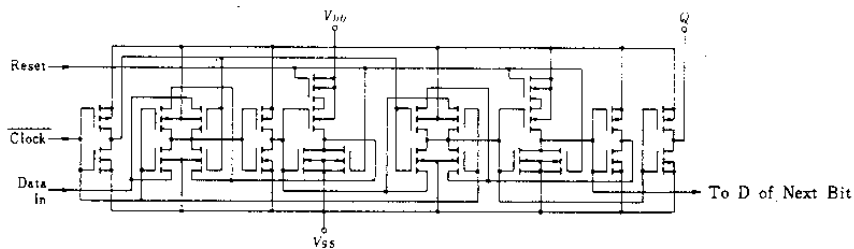
- Quiescent Current = 5nA/pkg typ @5V
- Supply Voltage Range = 3 to 18V
- High Fanout > 50
- Input Impedance = $10^{12} \Omega$ typ.
- Low Input Capacitance = 5pF typ.
- Toggle Rate = 6MHz @10V
- Capable of Driving One Low-power Schottky TTL Load Over the Rated Temperature Range

LOGIC DIAGRAM (1/2)

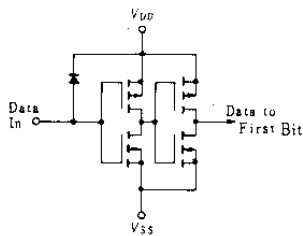


CIRCUIT SCHEMATIC

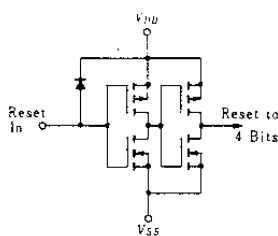
Single Bit



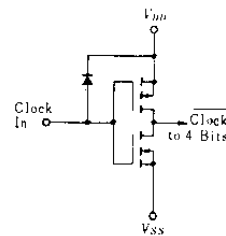
Data Input Buffer



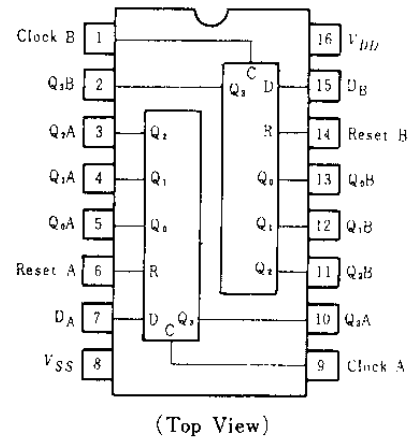
Reset Input Buffer



Clock Input Buffer



PIN ARRANGEMENT



TRUTH TABLE

Clocked Operation(Synchronous)

D	Q _n	Q _{n+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

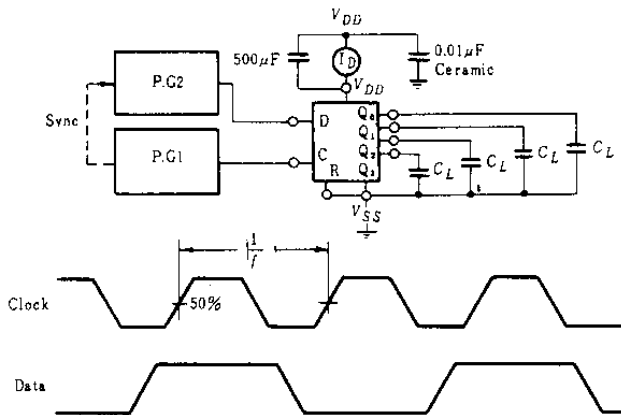
ELECTRICAL CHARACTERISTICS

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	-	
	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	-	±0.00001	±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	-	-	-	1.2	-	-	-	μA
		10	f = 1 kHz,	-	-	-	2.4	-	-	-	
		15	per Gate	-	-	-	3.6	-	-	-	

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

① V_{DD} = 5.0V I_T = 1.2μA/kHz · f + I_{DD} ② V_{DD} = 10V I_T = 2.4μA/kHz · f + I_{DD} ③ V_{DD} = 15V I_T = 3.6μA/kHz · f + I_{DD}

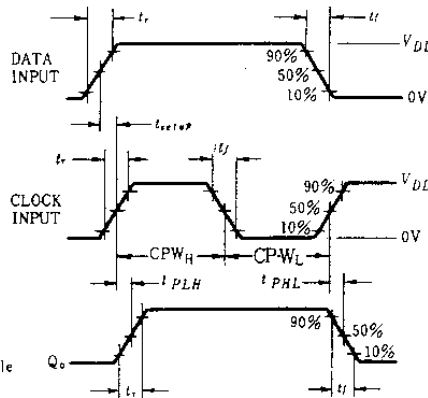
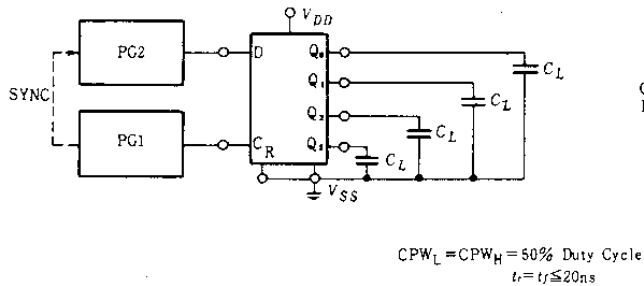
POWER DISSIPATION TEST CIRCUIT AND WAVEFORM



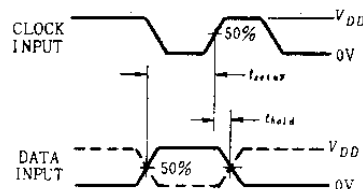
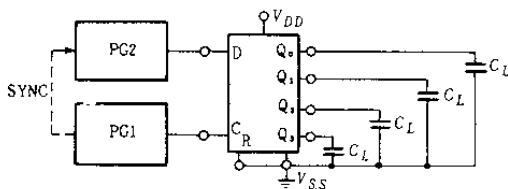
■ SWITCHING CHARACTERISTICS ($C_L=50\text{pF}$, $T_a=25^\circ\text{C}$)

Characteristic		Symbol	$V_{DD}(\text{V})$	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_{PLH}, 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	—	

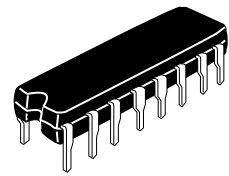
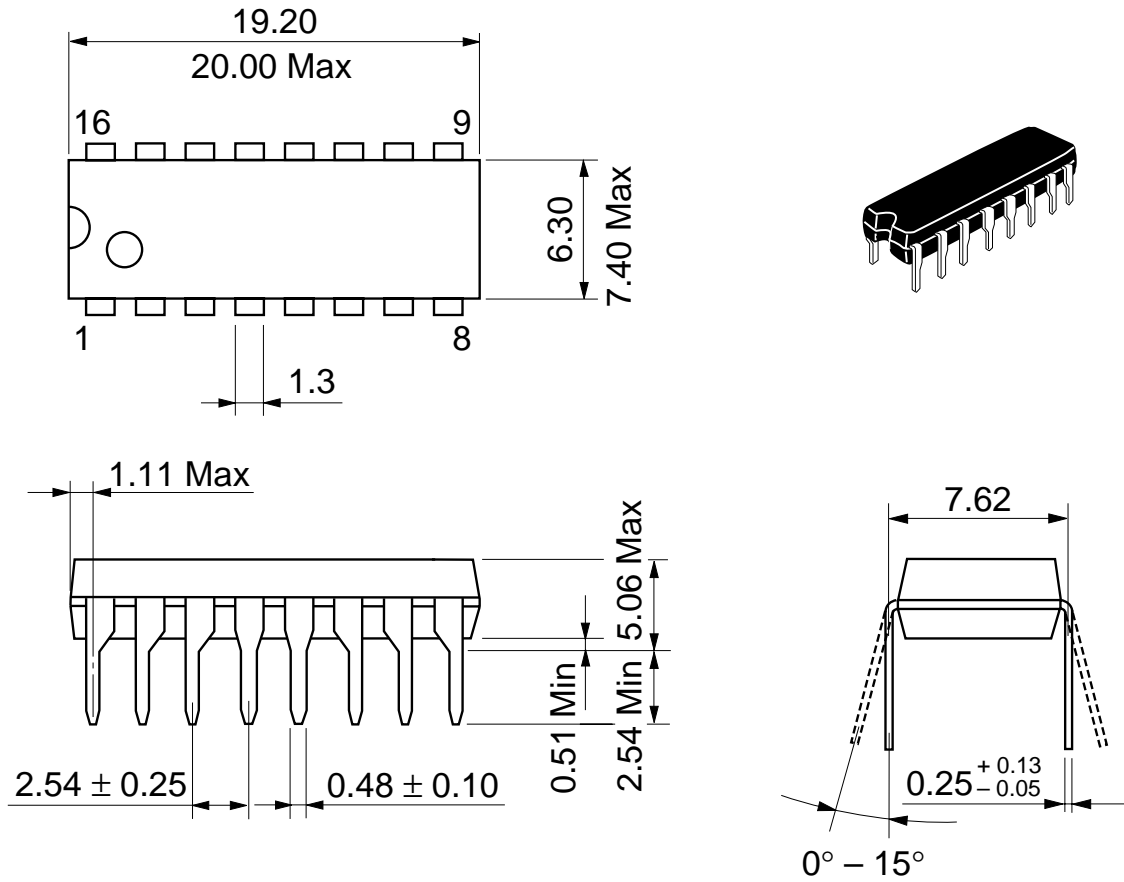
■ SWITCHING TIME TEST CIRCUIT



● Setup and Hold Time Test Circuit and Waveforms

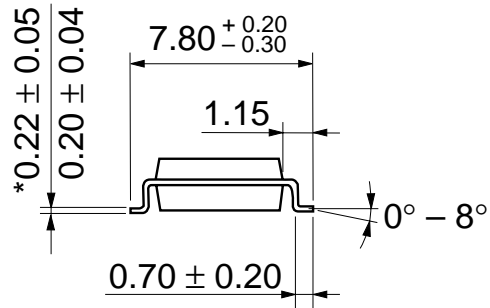
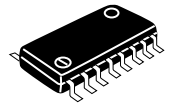
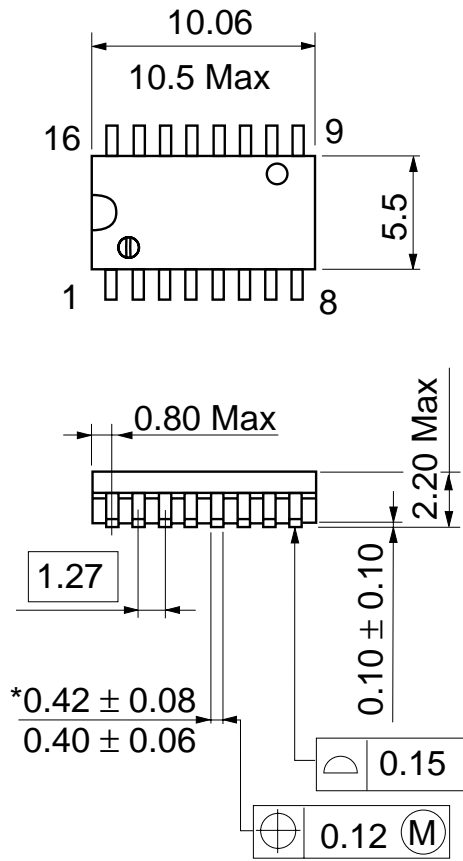


Unit: mm



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

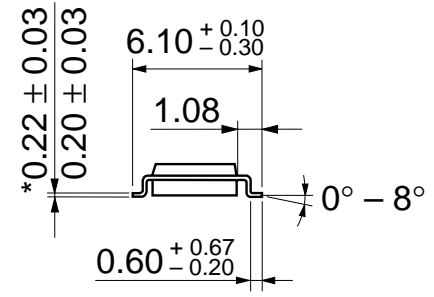
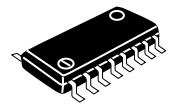
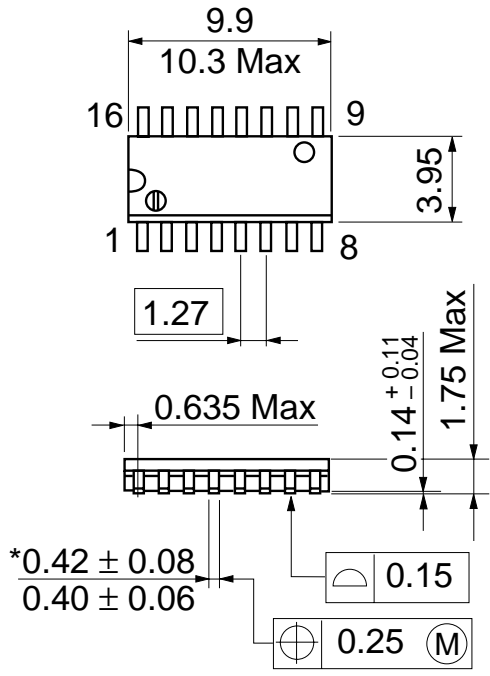
Unit: mm



*Dimension including the plating thickness
 Base material dimension

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

Unit: mm



*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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