

# HD100131

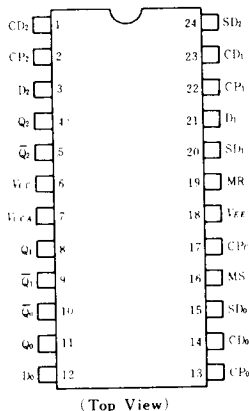
## Triple D-type Flip-Flops

The HD100131 contains three D-type Master Slave Flip Flops with true and complement outputs, a Common Clock (CPc), and Master Set (MS) and Master Reset (MR) inputs. Each flip-flop has individual clocks (CPn), Direct Set (SDn) and

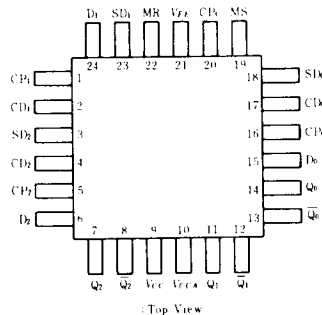
Direct Clear (CDn) inputs. Data enters a master when both CPn and CPc are low and transfers to a slave when CPn or CPc (or both) go high. The Master Set, Master Reset and individual CDn and SDn inputs override the Clock inputs.

### PIN ARRANGEMENT

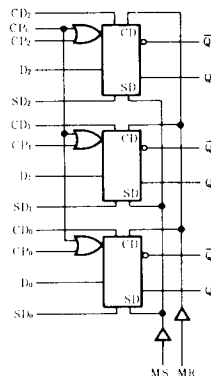
#### ● HD100131



#### ● HD100131F



### LOGIC DIAGRAM



### TRUTH TABLE

D <sub>n</sub>	CP <sub>n</sub>	CP <sub>c</sub>	MS SD <sub>n</sub>	MR CD <sub>n</sub>	Q <sub>n+1</sub>
L	↑	L	L	L	L
H	↑	L	L	L	H
L	L	↑	L	L	L
H	L	↑	L	L	H
x	H	x	L	L	Q <sub>n</sub>
x	x	H	L	L	Q <sub>n</sub>
x	x	x	H	L	H
x	x	x	L	H	L
x	x	x	H	H	U

H = High level  
L = Low level  
x = Immaterial  
U = Undefined  
↑ = Clock transition from low level to high level

### DC CHARACTERISTICS (V<sub>EE</sub> = -4.2 to -4.8V, V<sub>CC</sub> = V<sub>CCA</sub> = GND, T<sub>a</sub> = 0 to +85°C)

Item	Symbol	Test Condition	min	typ	max	Unit
Supply Current	I <sub>EE</sub>	All input open	74	106	149	mA
Input Current	I <sub>II</sub>	CP <sub>n</sub> , D <sub>n</sub> input	—	—	240	μA
		MS, MR, CP <sub>c</sub> input	—	—	450	
		CD <sub>n</sub> , SD <sub>n</sub> input	—	—	530	

Note) As for other items, refer to the "Common DC Characteristics".

**■ AC CHARACTERISTICS** ( $V_{EE} = -2.2$  to  $-2.8V$ ,  $V_{CC} = V_{CCA} = 2.0V$ )

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Item	Symbol	Test Condition	0°C		25°C		85°C		Unit		
			min	max	min	typ	max	min		max	
Toggle Frequency	$f_{Tos}$		325	—	325	—	—	325	—	MHz	
Propagation Delay Time	$t_{PLH}, t_{PHL}$	See test circuit and waveform	CP <sub>C</sub> input	0.70	1.70	0.75	1.00	1.70	0.75	1.70	ns
			CD <sub>n</sub> , SD <sub>n</sub> input (CP=H)	0.70	1.70	0.70	1.10	1.70	0.80	1.70	
			CD <sub>n</sub> , SD <sub>n</sub> input (CP=L)	0.65	1.60	0.70	1.10	1.60	0.70	1.70	
			CP <sub>n</sub> input	0.65	1.60	0.70	1.10	1.60	0.70	1.60	
			MS, MR input (CP=H)	1.00	2.85	1.05	1.50	2.85	1.05	2.85	
			MS, MR input (CP=L)	1.00	2.55	1.10	1.45	2.55	1.10	2.55	
Transition Time	$t_{TLH}, t_{THL}$		0.35	1.50	0.35	0.90	1.50	0.35	1.50	ns	
Setup Time	$t_{SU}$		D <sub>n</sub> input	0.70	—	0.70	—	—	0.90	—	ns
			CD <sub>n</sub> , SD <sub>n</sub> input (Release Time)	1.30	—	1.30	—	—	1.40	—	
			MS, MR input (Release Time)	2.20	—	2.20	—	—	2.20	—	
Hold Time	$t_h$								ns		
Pulse Width	$t_{WH}$									ns	
	$t_{WL}$										
			CD <sub>n</sub> , SD <sub>n</sub> , MR, MS	1.35	—	1.35	—	—	1.35	—	
			CP <sub>n</sub> , CP <sub>C</sub>	0.95	—	0.95	—	—	0.95	—	

● **HD100131F**

Item	Symbol	Test Condition	0°C		25°C		85°C		Unit		
			min	max	min	typ	max	min		max	
Toggle Frequency	$f_{Tos}$		325	—	325	—	—	325	—	MHz	
Propagation Delay Time	$t_{PLH}, t_{PHL}$	See test circuit and waveform	CP <sub>C</sub> input	0.70	1.65	0.75	1.05	1.65	0.75	1.65	ns
			CD <sub>n</sub> , SD <sub>n</sub> input (CP=H)	0.70	1.50	0.70	1.25	1.50	0.70	1.65	
			CD <sub>n</sub> , SD <sub>n</sub> input (CP=L)	0.50	1.50	0.60	0.90	1.50	0.60	1.50	
			CP <sub>n</sub> input	0.70	1.50	0.70	1.00	1.50	0.70	1.50	
			MS, MR input (CP=H)	1.00	2.75	1.05	1.50	2.75	1.00	2.75	
			MS, MR input (CP=L)	1.00	2.40	1.10	1.30	2.40	1.10	2.40	
Transition Time	$t_{TLH}, t_{THL}$		0.35	1.30	0.35	0.65	1.30	0.35	1.30	ns	
Setup Time	$t_{SU}$		D <sub>n</sub> input	0.60	—	0.60	—	—	0.70	—	ns
			CD <sub>n</sub> , SD <sub>n</sub> input (Release Time)	1.20	—	1.20	—	—	1.25	—	
			MS, MR input (Release Time)	2.00	—	2.00	—	—	2.00	—	
Hold Time	$t_h$								ns		
Pulse Width	$t_{WH}$									ns	
	$t_{WL}$										
			CD <sub>n</sub> , SD <sub>n</sub> , MR, MS	1.15	—	1.15	—	—	1.15	—	
			CP <sub>n</sub> , CP <sub>C</sub>	0.75	—	0.75	—	—	0.75	—	

Note) The circuits in a test socket or mounted on a printed circuit board and transverse air flow greater than 2.5m/s (500 linear fpm) is maintained.

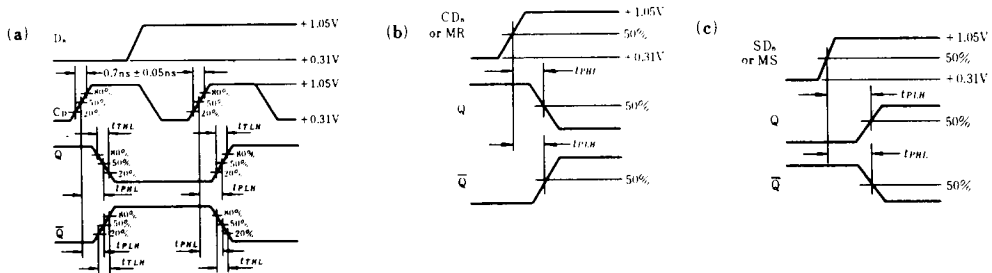


Fig.1 Propagation Delay Time

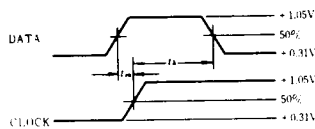


Fig.2 Set-up, and Hold Time

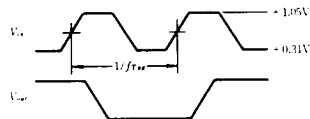


Fig.3 Toggle Frequency