HD74AC273

Octal D-Type Flip-Flop

REJ03D0265–0200Z
(Previous ADE-205-386 (Z))
Rev.2.00
Jul.16.2004

Description

The HD74AC273 has eight edge-triggered D-type flip-flops with individual D inputs and Q outputs. The common buffered Clock (CP) and Master Reset ($\overline{\text{MR}}$) inputs load and reset (clear) all flip-flops simultaneously.

The register is fully edge-triggered. The state of each D input, one setup time before the Low-to-High clock transition, is transferred to the corresponding flip-flops's Q output

All outputs will be forced Low independently of Clock or Data inputs by a Low voltage level on the $\overline{\text{MR}}$ input. The device is useful for applications where the true output only is required and the Clock and Master Reset are common to all storage elements.

Features

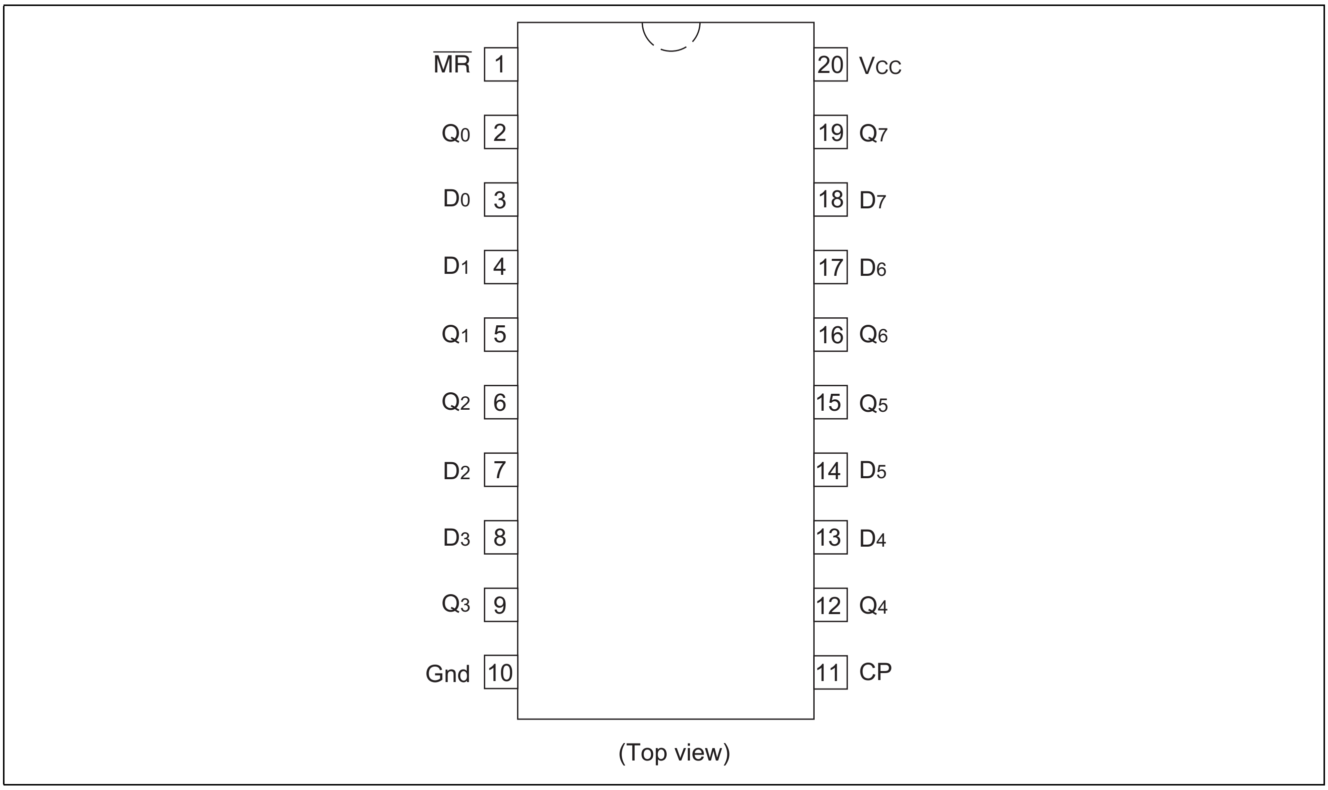
- Ideal Buffer for MOS Microprocessor or Memory
- Eight Edge-Triggered D Flip-Flops
- Buffered Common Clock
- Buffered, Asynchronous Master Reset
- See HD74AC373 for Transparent Latch Version
- See HD74AC374 for 3-State Version
- Outputs Source/Sink 24 mA

- Ordering Information

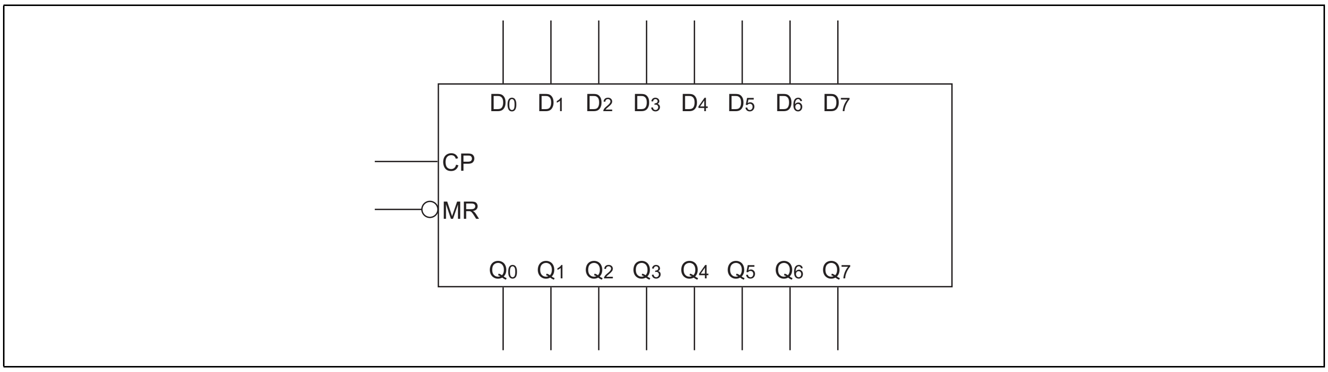
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74AC273P	DIP-20 pin	DP-20N	P	—
HD74AC273FPEL	SOP-20 pin (JEITA)	FP-20DAV	FP	EL (2,000 pcs/reel)
HD74AC273RPEL	SOP-20 pin (JEDEC)	FP-20DBV	RP	EL (1,000 pcs/reel)

Notes: 1. Please consult the sales office for the above package availability.
2. The packages with lead-free pins are distinguished from the conventional products by adding V at the end of the package code.

Pin Arrangement



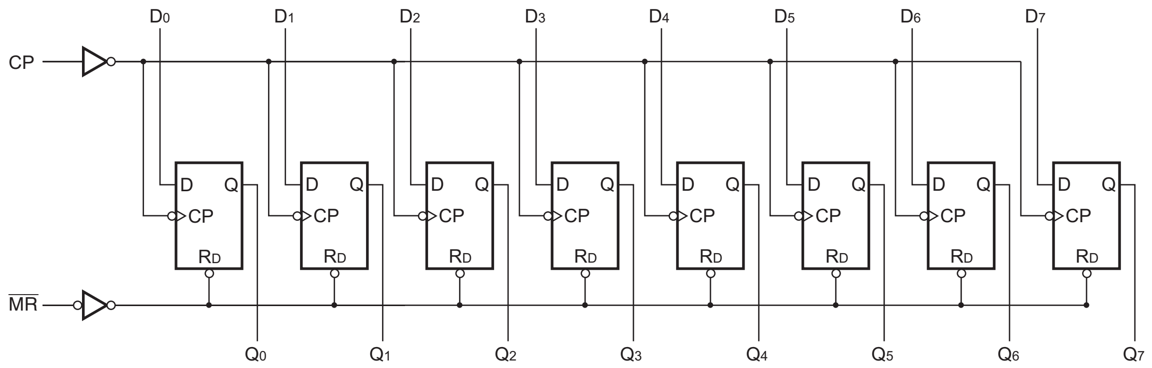
Logic Symbol



Pin Names

$D_0 - D_7$	Data Inputs
$\overline{MR}$	Master Reset
CP	Clock Pulse Input
$Q_0 - Q_7$	Data Outputs

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Mode Select-Truth Table

Operating Mode	**Inputs**			**Outputs**
	$\overline{MR}$	**CP**	**D_n**	**Q_n**
Reset (Clear)	L	X	X	L
Load “1”	H	↑	H	H
Load “0”	H	↑	L	L

H : High Voltage Level
L : Low Voltage Level
X : Immaterial
↑ : Low-to-High Clock Transition

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Condition
Supply voltage	V_{CC}	–0.5 to 7	V	
DC input diode current	I_{IK}	–20	mA	V_I = –0.5V
		20	mA	V_I = Vcc+0.5V
DC input voltage	V_I	–0.5 to Vcc+0.5	V	
DC output diode current	I_{OK}	–50	mA	V_O = –0.5V
		50	mA	V_O = Vcc+0.5V
DC output voltage	V_O	–0.5 to Vcc+0.5	V	
DC output source or sink current	I_O	±50	mA	
DC V_{CC} or ground current per output pin	I_{CC}, I_{GND}	±50	mA	
Storage temperature	Tstg	–65 to +150	°C	

Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Condition
Supply voltage	V_{CC}	2 to 6	V	
Input and output voltage	V_I, V_O	0 to V_{CC}	V	
Operating temperature	Ta	–40 to +85	°C	
Input rise and fall time (except Schmitt inputs) V_{IN} 30% to 70% V_{CC}	tr, tf	8	ns/V	V_{CC} = 3.0V
				V_{CC} = 4.5 V
				V_{CC} = 5.5 V

DC Characteristics

Item	Sym-bol	Vcc (V)	Ta = 25°C			Ta = –40 to +85°C		Unit	Condition	
			min.	typ.	max.	min.	max.			
Input Voltage	V_{IH}	3.0	2.1	1.5	—	2.1	—	V	V_{OUT} = 0.1 V or V_{CC} –0.1 V	
		4.5	3.15	2.25	—	3.15	—			
		5.5	3.85	2.75	—	3.85	—			
	V_{IL}	3.0	—	1.50	0.9	—	0.9		V_{OUT} = 0.1 V or V_{CC} –0.1 V	
		4.5	—	2.25	1.35	—	1.35			
		5.5	—	2.75	1.65	—	1.65			
Output voltage	V_{OH}	3.0	2.9	2.99	—	2.9	—	V	V_{IN} = V_{IL} or V_{IH} I_{OUT} = –50 µA	
		4.5	4.4	4.49	—	4.4	—			
		5.5	5.4	5.49	—	5.4	—			
		3.0	2.58	—	—	2.48	—		V_{IN} = V_{IL} or V_{IH}	I_{OH} = –12 mA
		4.5	3.94	—	—	3.80	—			I_{OH} = –24 mA
		5.5	4.94	—	—	4.80	—			I_{OH} = –24 mA
	V_{OL}	3.0	—	0.002	0.1	—	0.1		V_{IN} = V_{IL} or V_{IH} I_{OUT} = 50 µA	
		4.5	—	0.001	0.1	—	0.1			
		5.5	—	0.001	0.1	—	0.1			
		3.0	—	—	0.32	—	0.37		V_{IN} = V_{IL} or V_{IH}	I_{OL} = 12 mA
		4.5	—	—	0.32	—	0.37			I_{OL} = 24 mA
		5.5	—	—	0.32	—	0.37			I_{OL} = 24 mA
Input leakage current	I_{IN}	5.5	—	—	±0.1	—	±1.0	µA	V_{IN} = V_{CC} or GND	
Dynamic output current*	I_{OLD}	5.5	—	—	—	86	—	mA	V_{OLD} = 1.1 V	
	I_{OHD}	5.5	—	—	—	–75	—	mA	V_{OHD} = 3.85 V	
Quiescent supply current	I_{CC}	5.5	—	—	8.0	—	80	µA	V_{IN} = V_{CC} or ground	

*Maximum test duration 2.0 ms, one output loaded at a time.

AC Characteristics

Item	Symbol	V_{CC} (V)*1	Ta = +25°C C_L = 50 pF			Ta = –40°C to +85°C C_L = 50 pF		Unit
			Min	Typ	Max	Min	Max	
Maximum clock frequency	f_{max}	3.3	90	125	—	75	—	MHz
		5.0	140	175	—	125	—	
Propagation delay Clock to output	t_{PLH}	3.3	1.0	7.0	12.5	1.0	14.0	ns
		5.0	1.0	5.5	9.0	1.0	10.0	
Propagation delay Clock to output	t_{PHL}	3.3	1.0	7.0	13.0	1.0	14.5	ns
		5.0	1.0	5.0	10.0	1.0	11.0	
Propagation delay $\overline{\text{MR}}$ to output	t_{PHL}	3.3	1.0	7.0	13.0	1.0	14.0	ns
		5.0	1.0	5.0	10.0	1.0	10.5	

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

AC Operating Requirements

Item	Symbol	V_{CC} (V)*1	Ta = +25°C C_L = 50 pF		Ta = –40°C to +85°C C_L = 50 pF	Unit
			Typ	Guaranteed Minimum		
Setup time, HIGH or LOW Data to CP	t_{su}	3.3	3.5	5.5	6.0	ns
		5.0	2.5	4.0	4.5	
Hold time, HIGH or LOW Data to CP	t_h	3.3	–2.0	0.0	0.0	ns
		5.0	–1.0	1.0	1.0	
Clock pulse width HIGH or LOW	t_w	3.3	3.5	5.5	6.0	ns
		5.0	2.5	4.0	4.5	
$\overline{\text{MR}}$ Pulse width HIGH or LOW	t_w	3.3	2.0	5.5	6.0	ns
		5.0	1.5	4.0	4.5	
Recovery time $\overline{\text{MR}}$ to CP	t_{rec}	3.3	1.5	3.5	4.5	ns
		5.0	1.0	2.0	3.0	

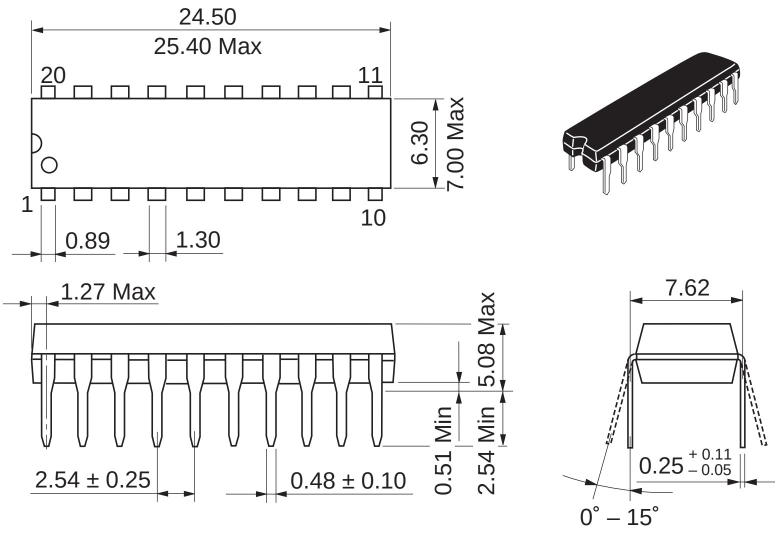
Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

Capacitance

Item	Symbol	Typ	Unit	Condition
Input capacitance	C_{IN}	4.5	pF	V_{CC} = 5.5 V
Power dissipation capacitance	C_{PD}	50.0	pF	V_{CC} = 5.0 V

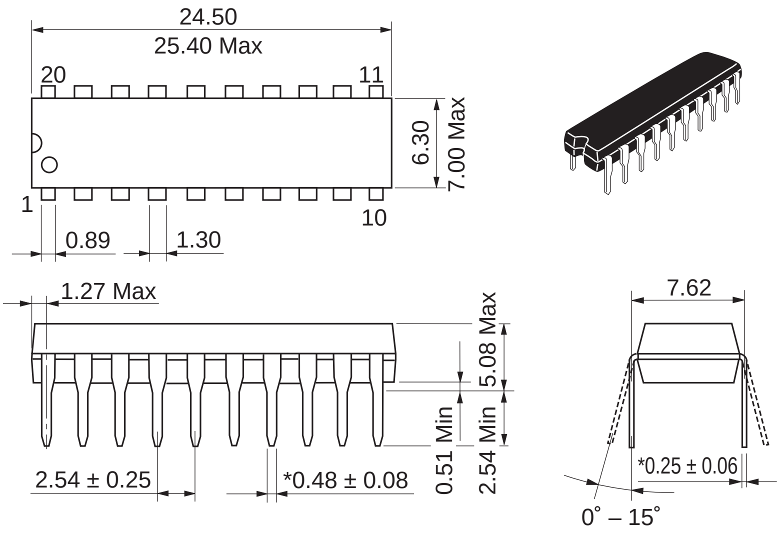
Package Dimensions

As of January, 2003
Unit: mm



Package Code	DP-20N
JEDEC	—
JEITA	Conforms
Mass (reference value)	1.26 g

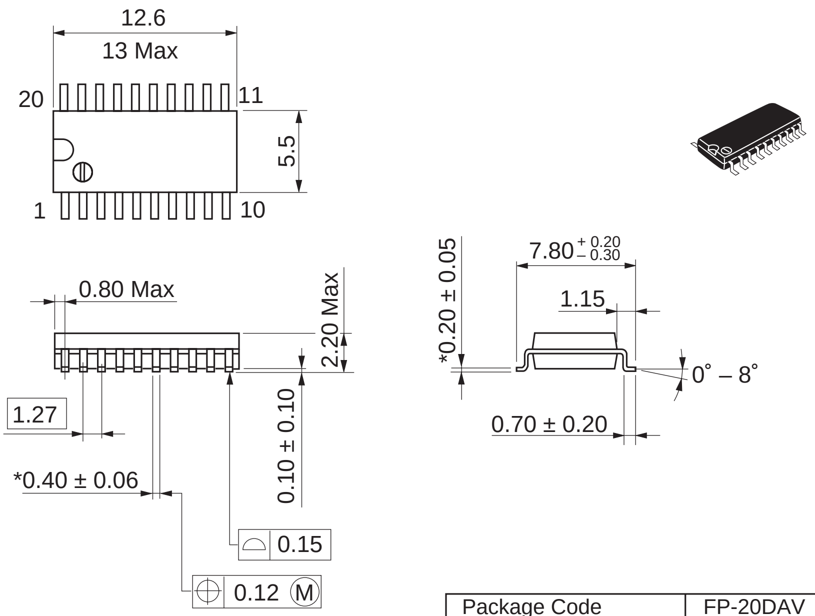
Unit: mm



*NI/Pd/AU Plating

Package Code	DP-20NEV
JEDEC	—
JEITA	Conforms
Mass (reference value)	1.26 g

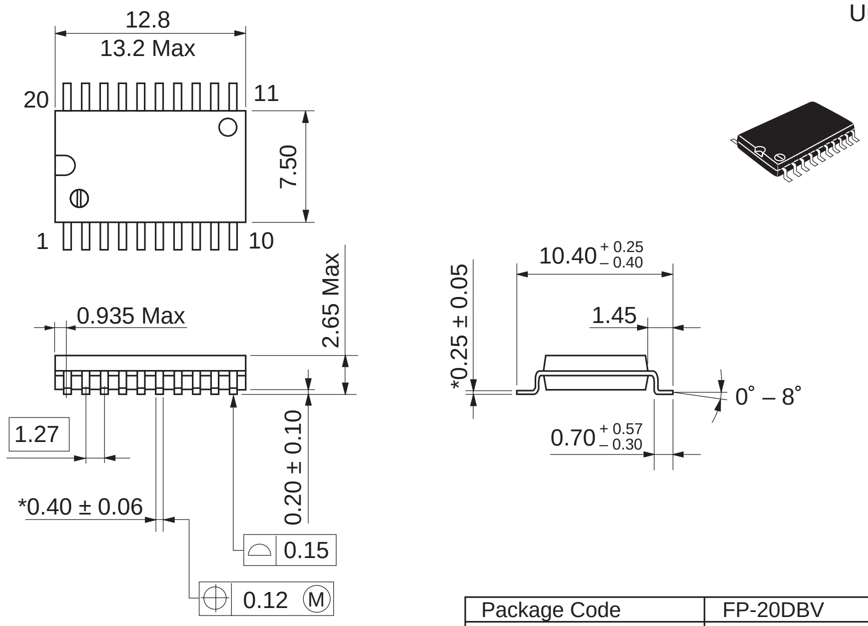
As of January, 2003
Unit: mm



*Ni/Pd/Au plating

Package Code	FP-20DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.31 g

As of January, 2003
Unit: mm



*Ni/Pd/Au plating

Package Code	FP-20DBV
JEDEC	Conforms
JEITA	—
Mass (reference value)	0.52 g

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Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.
1, Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
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