

TC74ACT273P, TC74ACT273F, TC74ACT273FW

Octal D-Type Flip Flop with Clear

The TC74ACT273 is an advanced high speed CMOS OCTAL D-TYPE FLIP FLOP fabricated with silicon gate and double-layer metal wiring C²MOS technology.

It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.

This device may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

Information signals applied to D inputs are transferred to the Q outputs on the positive going edge of the clock pulse.

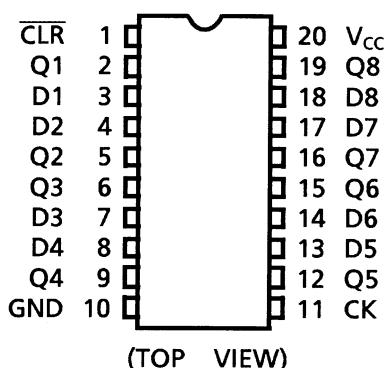
When the CLR input is held "L", the Q outputs are at a low logic level independent of the other inputs.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.

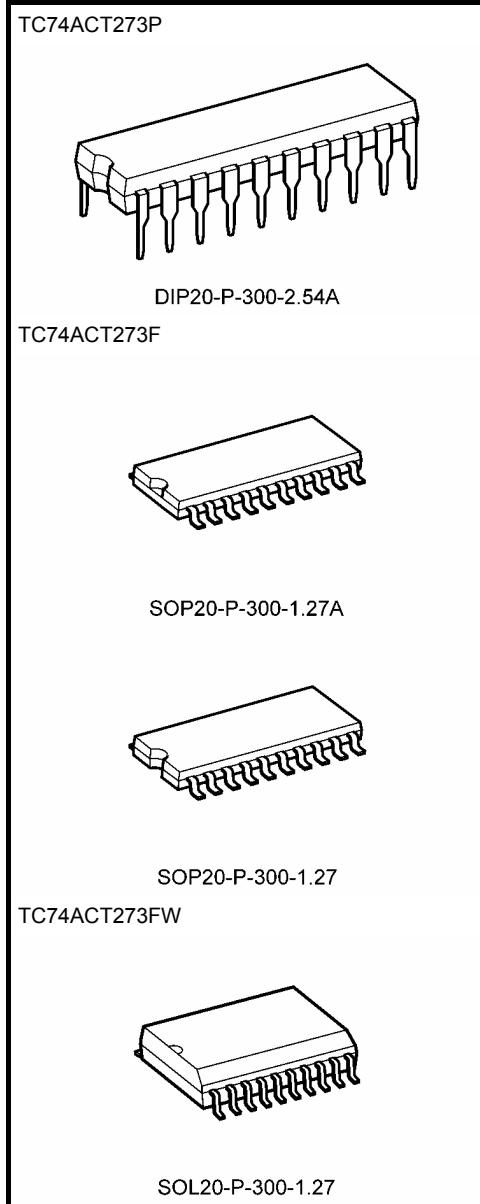
Features

- High speed: $f_{max} = 170$ MHz (typ.) at $V_{CC} = 5$ V
- Low power dissipation: $I_{CC} = 8 \mu A$ (max) at $T_a = 25^\circ C$
- Compatible with TTL outputs: $V_{IL} = 0.8$ V (max)
 $V_{IH} = 2.0$ V (min)
- Symmetrical output impedance: $|I_{OH}| = I_{OL} = 24$ mA (min)
 Capability of driving 50 Ω transmission lines.
- Balanced propagation delays: $t_{PLH} \approx t_{PHL}$
- Pin and function compatible with 74F273

Pin Assignment



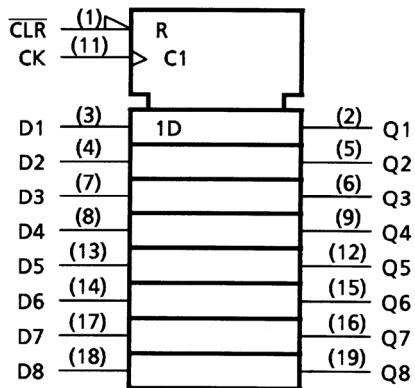
Note: xxxFW (JEDEC SOP) is not available in Japan.



Weight

DIP20-P-300-2.54A	: 1.30 g (typ.)
SOP20-P-300-1.27A	: 0.22 g (typ.)
SOP20-P-300-1.27	: 0.22 g (typ.)
SOL20-P-300-1.27	: 0.46 g (typ.)

IEC Logic Symbol

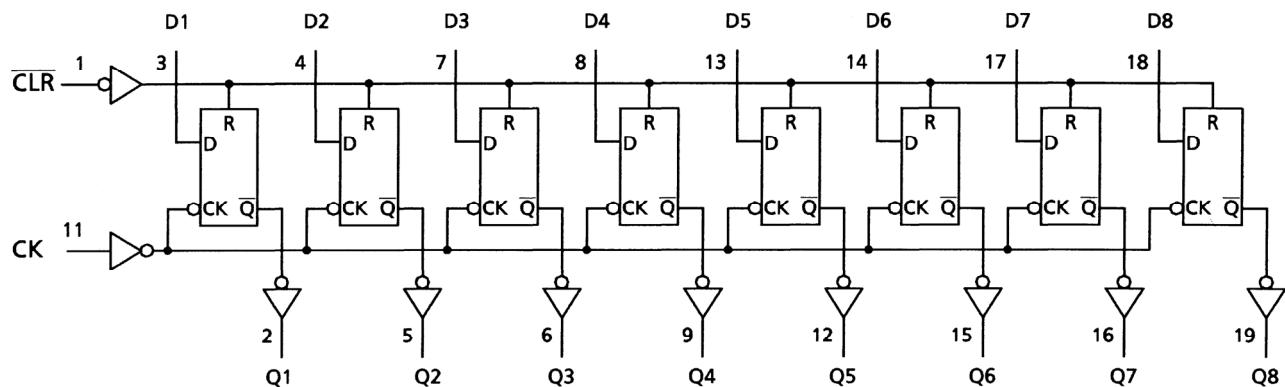


Truth Table

Inputs			Output	Function
$\overline{\text{CLR}}$	D	CK	Q	
L	X	X	L	Clear
H	L	↑	L	—
H	H	↑	H	—
H	X	↓	Q_n	No Change

X: Don't care

System Diagram



Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V _{CC}	−0.5 to 7.0	V
DC input voltage	V _{IN}	−0.5 to V _{CC} + 0.5	V
DC output voltage	V _{OUT}	−0.5 to V _{CC} + 0.5	V
Input diode current	I _{IK}	±20	mA
Output diode current	I _{OK}	±50	mA
DC output current	I _{OUT}	±50	mA
DC V _{CC} /ground current	I _{CC}	±200	mA
Power dissipation	P _D	500 (DIP) (Note 2)/180 (SOP)	mW
Storage temperature	T _{STG}	−65 to 150	°C

Note1: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Note2: 500 mW in the range of Ta = −40 to 65°C. From Ta = 65 to 85°C a derating factor of −10 mW/°C should be applied up to 300 mW.

Recommended Operating Conditions (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V _{CC}	4.5 to 5.5	V
Input voltage	V _{IN}	0 to V _{CC}	V
Output voltage	V _{OUT}	0 to V _{CC}	V
Operating temperature	T _{OPR}	−40 to 85	°C
Input rise and fall time	dt/dV	0 to 10	ns/V

Note: The recommended operating conditions are required to ensure the normal operation of the device.
Unused inputs must be tied to either V_{CC} or GND.

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition		V _{CC} (V)	Ta = 25°C			Ta = -40 to 85°C		Unit
					Min	Typ.	Max	Min	Max	
High-level input voltage	V _{IH}	—		4.5 to 5.5	2.0	—	—	2.0	—	V
Low-level input voltage	V _{IL}	—		4.5 to 5.5	—	—	0.8	—	0.8	V
High-level output voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -50 µA I _{OH} = -24 mA I _{OH} = -75 mA (Note)	4.5 4.5 5.5	4.4 3.94 —	4.5 — —	— — —	4.4 3.80 3.85	— — —	V
Low-level output voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 50 µA I _{OL} = 24 mA I _{OL} = 75 mA (Note)	4.5 4.5 5.5	— — —	0.0 0.36 —	0.1 — —	— — —	0.1 0.44 1.65	V
Input leakage current	I _{IN}	V _{IN} = V _{CC} or GND		5.5	—	—	±0.1	—	±1.0	µA
Quiescent supply current	I _{CC}	V _{IN} = V _{CC} or GND		5.5	—	—	8.0	—	80.0	µA
	I _C	Per input: V _{IN} = 3.4 V Other input: V _{CC} or GND		5.5	—	—	1.35	—	1.5	mA

Note: This spec indicates the capability of driving 50 Ω transmission lines.

One output should be tested at a time for a 10 ms maximum duration.

Timing Requirements (input: t_r = t_f = 3 ns)

Characteristics	Symbol	Test Condition			Ta = 25°C	Ta = -40 to 85°C	Unit	
					V _{CC} (V)	Limit		
Minimum pulse width (CK)	t _W (L) t _W (H)	—			5.0 ± 0.5	5.0	5.0	ns
Minimum pulse width (CLR)	t _W (L)	—			5.0 ± 0.5	5.0	5.0	ns
Minimum set-up time	t _s	—			5.0 ± 0.5	3.5	3.5	ns
Minimum hold time	t _h	—			5.0 ± 0.5	1.5	1.5	ns
Minimum removal time (CLR)	t _{rem}	—			5.0 ± 0.5	3.0	3.0	ns

AC Characteristics ($C_L = 50 \text{ pF}$, $R_L = 500 \Omega$, input: $t_r = t_f = 3 \text{ ns}$)

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit	
			V _{CC} (V)	Min	Typ.	Max	Min		
Propagation delay time (CK-Q)	t_{pLH} t_{pHL}	—	5.0 ± 0.5	—	6.6	10.5	1.0	12.0	ns
Propagation delay time (\overline{CLR} -Q)	t_{pHL}	—	5.0 ± 0.5	—	7.4	10.8	1.0	12.3	ns
Maximum clock frequency	f_{max}	—	5.0 ± 0.5	80	150	—	80	—	MHz
Input capacitance	C_{IN}	—	—	—	5	10	—	10	pF
Power dissipation capacitance	C_{PD} (Note)	—	—	—	34	—	—	—	pF

Note: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation:

$$I_{CC} (\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/8 \text{ (per F/F)}$$

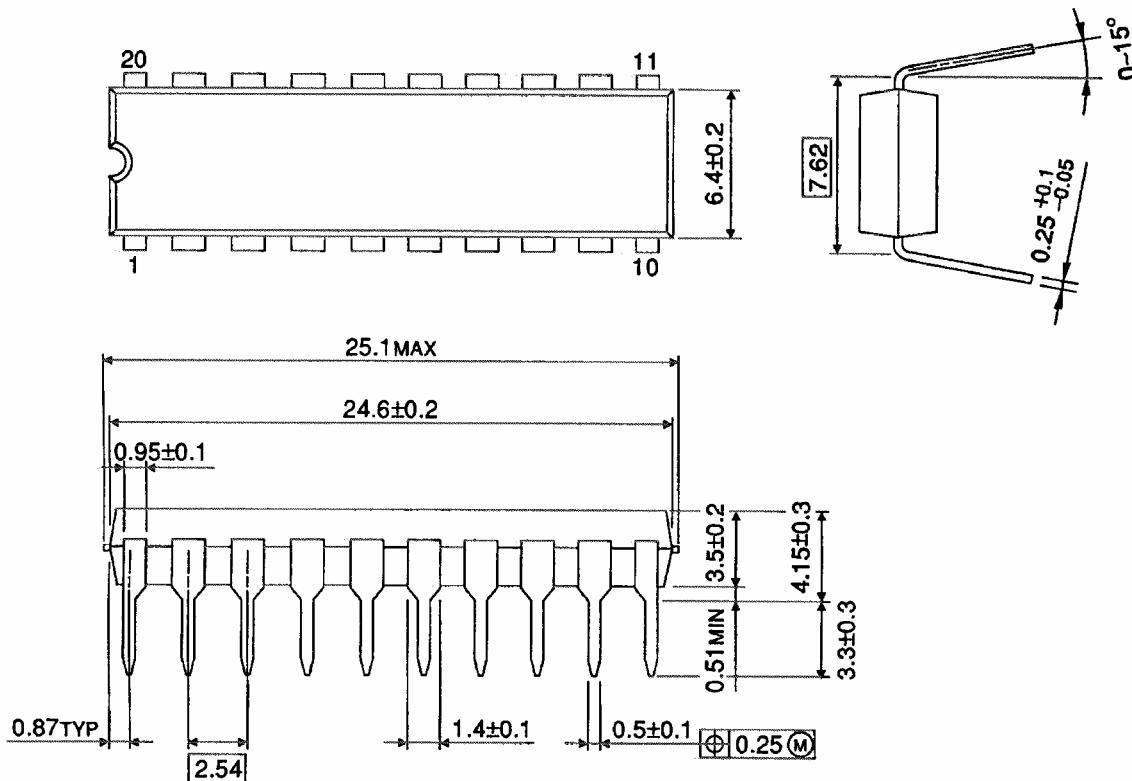
And the total C_{PD} when n pcs. of Flip Flop operate can be gained by the following equation.

$$C_{PD} (\text{total}) = 23 + 11 \cdot n$$

Package Dimensions

DIP20-P-300-2.54A

Unit : mm

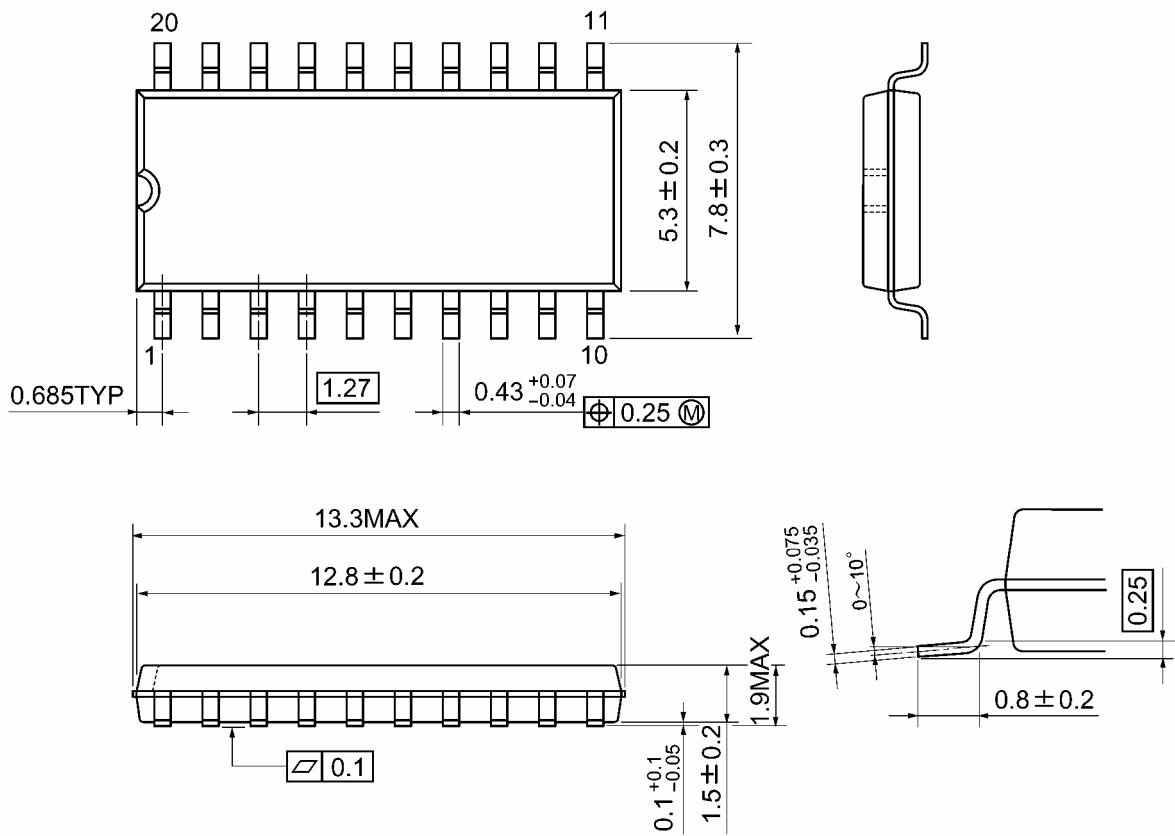


Weight: 1.30 g (typ.)

Package Dimensions

SOP20-P-300-1.27A

Unit: mm

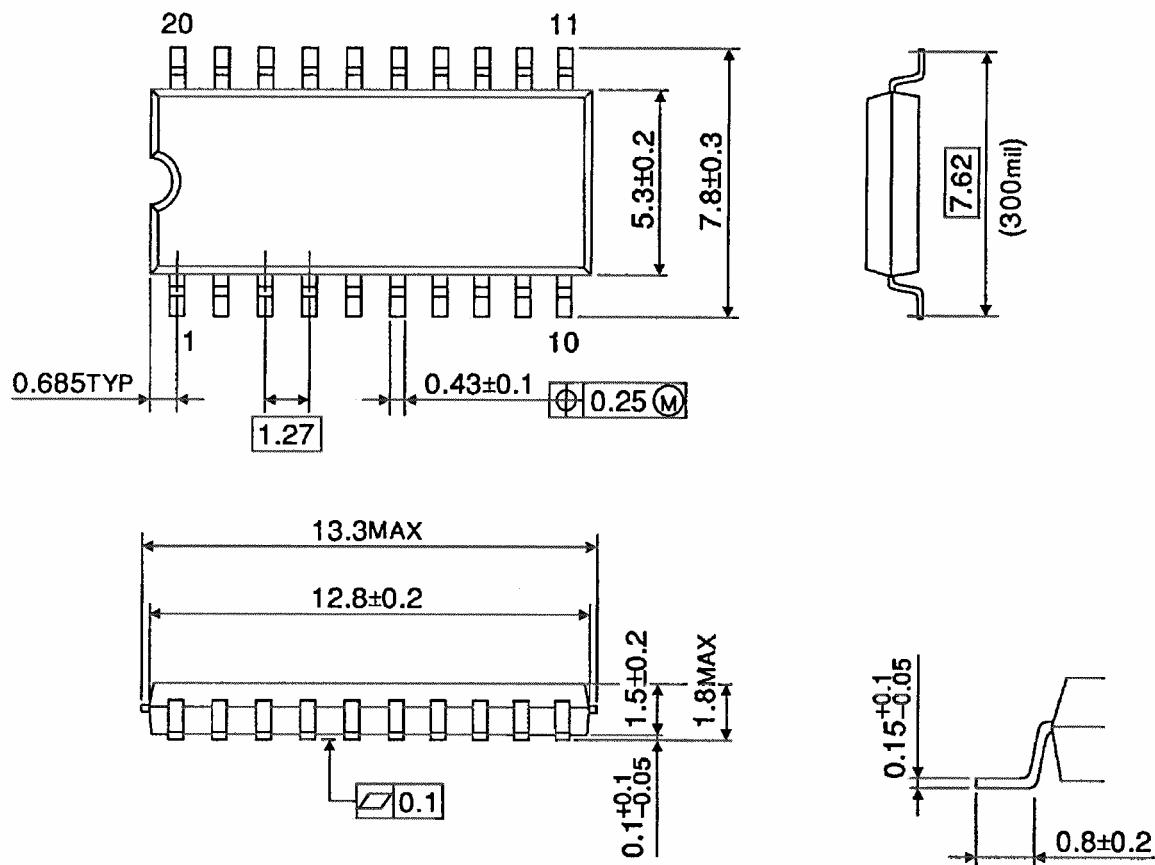


Weight: 0.22 g (typ.)

Package Dimensions

SOP20-P-300-1.27

Unit : mm

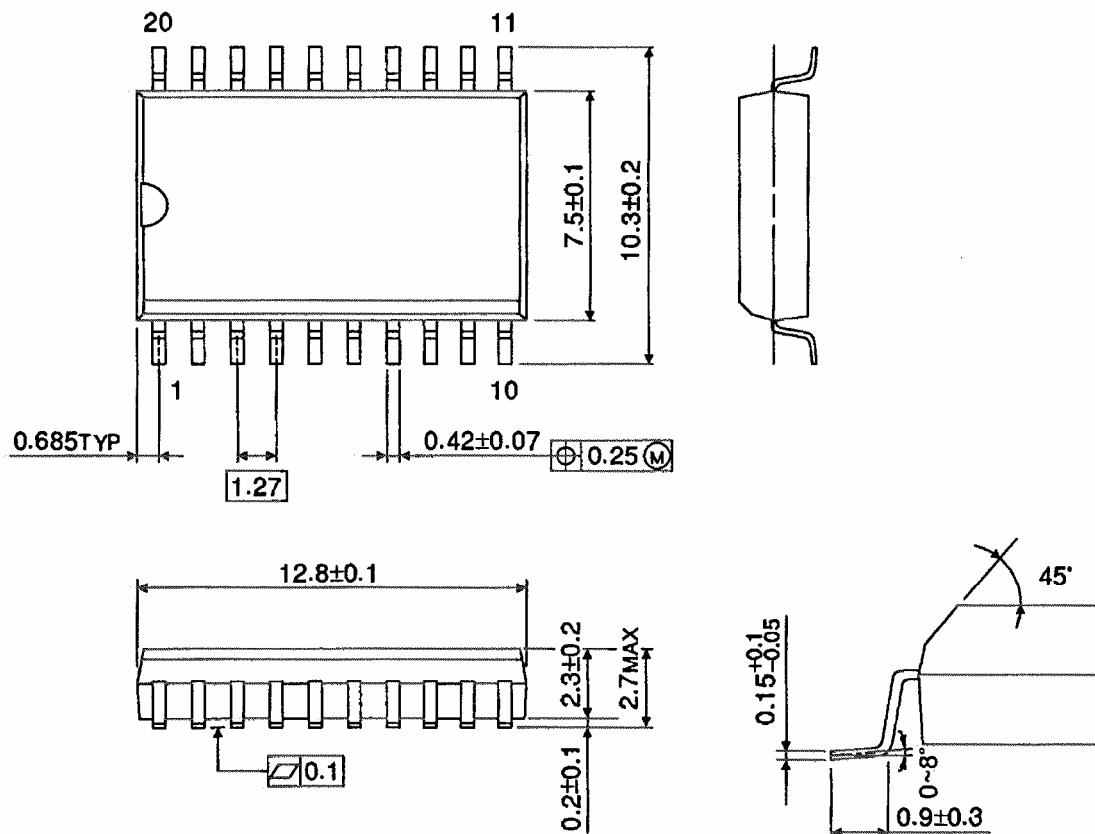


Weight: 0.22 g (typ.)

Package Dimensions (Note)

SOL20-P-300-1.27

Unit : mm



Note: This package is not available in Japan.

Weight: 0.46 g (typ.)

Note: Lead (Pb)-Free Packages
DIP20-P-300-2.54A SOP20-P-300-1.27A

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