

**TC74ACT273P, TC74ACT273F, TC74ACT273FW****OCTAL D-TYPE FLIP FLOP WITH CLEAR**

(Note) The JEDEC SOP (FW) is not available in Japan.

The TC74ACT273 is an advanced high speed CMOS OCTAL D-TYPE FLIP FLOP fabricated with silicon gate and double-layer metal wiring C<sup>2</sup>MOS 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  $\overline{\text{CLR}}$  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.

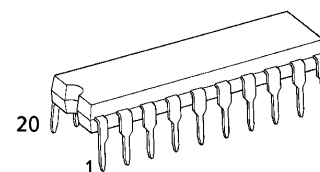
**FEATURES:**

- High Speed..... $f_{\text{MAX}} = 170\text{MHz}(\text{typ.})$   
at  $V_{\text{CC}} = 5\text{V}$
- Low Power Dissipation..... $I_{\text{CC}} = 8\mu\text{A}(\text{Max.})$  at  $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs... $V_{\text{IL}} = 0.8\text{V}(\text{Max.})$   
 $V_{\text{IH}} = 2.0\text{V}(\text{Min.})$
- Symmetrical Output Impedance... $|I_{\text{OH}}| = I_{\text{OL}} = 24\text{mA}(\text{Min.})$   
Capability of driving  $50\Omega$  transmission lines.
- Balanced Propagation Delays... $t_{\text{PLH}} \approx t_{\text{PHL}}$
- Pin and Function Compatible with 74F273

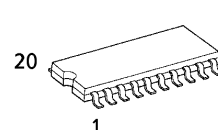
**TRUTH TABLE**

INPUTS			OUTPUTS	FUNCTION
$\overline{\text{CLR}}$	D	CK	Q	
L	X	X	L	CLEAR
H	L	$\uparrow$	L	—
H	H	$\uparrow$	H	—
H	X	$\downarrow$	$Q_n$	NO CHANGE

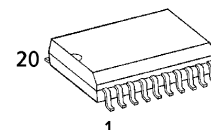
X : Don't care



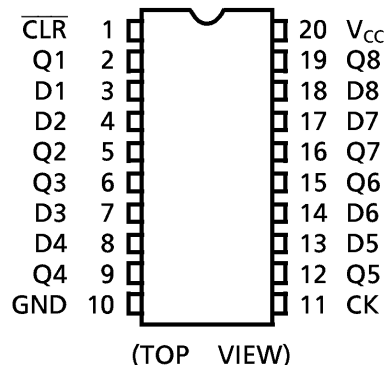
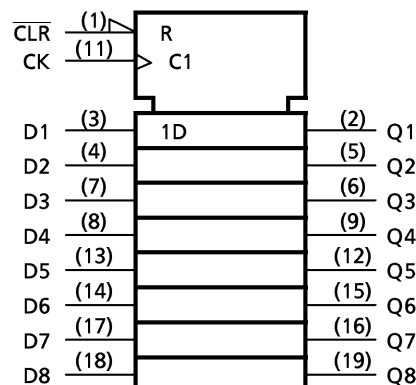
P (DIP20-P-300-2.54A)  
Weight : 1.30g (Typ.)



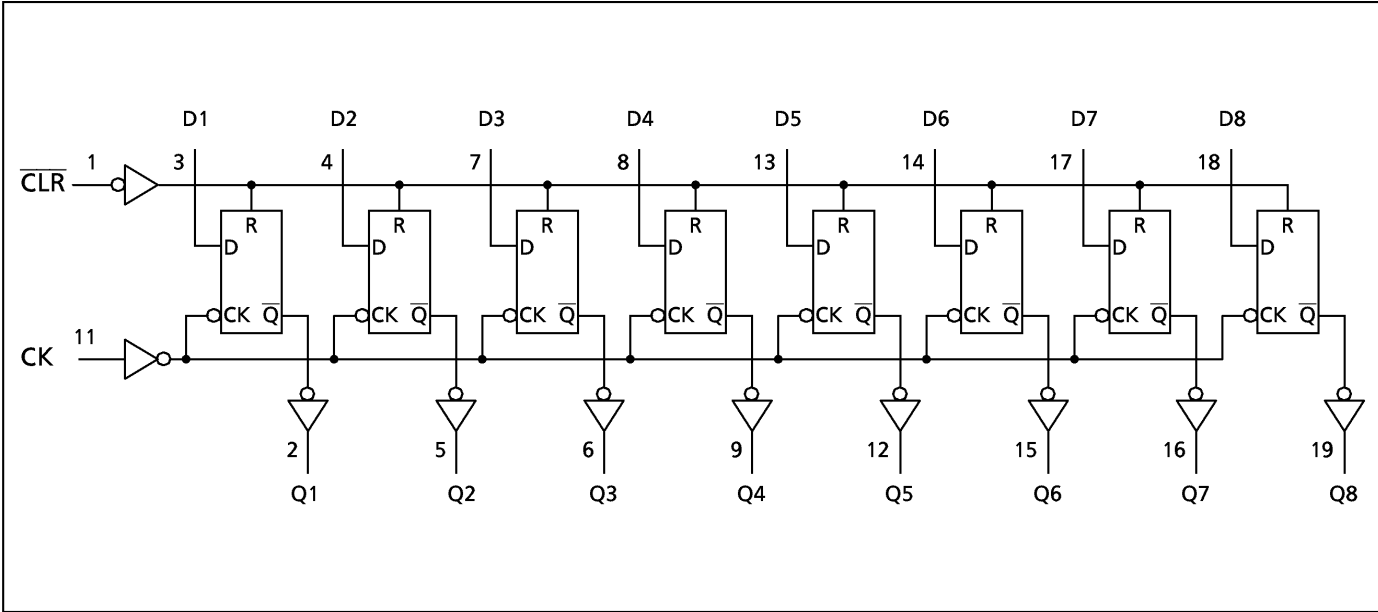
F (SOP20-P-300-1.27)  
Weight : 0.22g (Typ.)



FW (SOL20-P-300-1.27)  
Weight : 0.46g (Typ.)

**PIN ASSIGNMENT****IEC LOGIC SYMBOL**

SYSTEM DIAGRAM



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	$V_{CC}$	$-0.5 \sim 7.0$	V
DC Input Voltage	$V_{IN}$	$-0.5 \sim V_{CC} + 0.5$	V
DC Output Voltage	$V_{OUT}$	$-0.5 \sim V_{CC} + 0.5$	V
Input Diode Current	$I_{IK}$	$\pm 20$	mA
Output Diode Current	$I_{OK}$	$\pm 50$	mA
DC Output Current	$I_{OUT}$	$\pm 50$	mA
DC $V_{CC}$ /Ground Current	$I_{CC}$	$\pm 200$	mA
Power Dissipation	$P_D$	500 (DIP)* / 180 (SOP)	mW
Storage Temperature	$T_{stg}$	$-65 \sim 150$	$^{\circ}C$

\*500mW in the range of  $T_a = -40^{\circ}C \sim 65^{\circ}C$ . From  $T_a = 65^{\circ}C$  to  $85^{\circ}C$  a derating factor of  $-10mW/^{\circ}C$  should be applied up to 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	$V_{CC}$	4.5~5.5	V
Input Voltage	$V_{IN}$	0~ $V_{CC}$	V
Output Voltage	$V_{OUT}$	0~ $V_{CC}$	V
Operating Temperature	$T_{opr}$	$-40 \sim 85$	$^{\circ}C$
Input Rise and Fall Time	$dt/dV$	0~10	ns/V

## DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
High - Level Input Voltage	V <sub>IH</sub>			4.5 } 5.5	2.0	—	—	2.0	—	V
Low - Level Input Voltage	V <sub>IL</sub>			4.5 } 5.5	—	—	0.8	—	0.8	V
High - Level Output Voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -50μA	4.5	4.4	4.5	—	4.4	—	V
			I <sub>OH</sub> = -24mA	4.5	3.94	—	—	3.80	—	
			I <sub>OH</sub> = -75mA*	5.5	—	—	—	3.85	—	
Low - Level Output Voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 50μA	4.5	—	0.0	0.1	—	0.1	V
			I <sub>OL</sub> = 24mA	4.5	—	—	0.36	—	0.44	
			I <sub>OL</sub> = 75mA*	5.5	—	—	—	—	1.65	
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND		5.5	—	—	±0.1	—	±1.0	μA
Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND		5.5	—	—	8.0	—	80.0	
	I <sub>C</sub>	PER INPUT : V <sub>IN</sub> = 3.4V OTHER INPUT : V <sub>CC</sub> or GND		5.5	—	—	1.35	—	1.5	mA

\* : This spec indicates the capability of driving 50Ω transmission lines.  
One output should be tested at a time for a 10ms maximum duration.

TIMING REQUIREMENTS ( Input t<sub>r</sub> = t<sub>f</sub> = 3ns )

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C	Ta = -40~85°C	UNIT
			V <sub>CC</sub> (V)	LIMIT	LIMIT	
Minimum Pulse Width ( CK )	t <sub>W</sub> (L) t <sub>W</sub> (H)		5.0 ± 0.5	5.0	5.0	ns
Minimum Pulse Width ( CLR )	t <sub>W</sub> (L)		5.0 ± 0.5	5.0	5.0	
Minimum Set - up Time	t <sub>s</sub>		5.0 ± 0.5	3.5	3.5	
Minimum Hold Time	t <sub>h</sub>		5.0 ± 0.5	1.5	1.5	
Minimum Removal Time ( CLR )	t <sub>rem</sub>		5.0 ± 0.5	3.0	3.0	

AC ELECTRICAL CHARACTERISTICS (  $C_L = 50\text{pF}$  ,  $R_L = 500\ \Omega$  , Input  $t_r = t_f = 3\text{ns}$  )

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = − 40~85°C		UNIT
			V <sub>CC</sub> (V)	MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time (CK—Q)	t <sub>pLH</sub> t <sub>pHL</sub>		5.0 ± 0.5	—	6.6	10.5	1.0	12.0	ns
Propagation Delay Time ( $\overline{\text{CLR}}$ —Q)	t <sub>pHL</sub>		5.0 ± 0.5	—	7.4	10.8	1.0	12.3	
Maximum Clock Frequency	f <sub>MAX</sub>		5.0 ± 0.5	80	150	—	80	—	MHz
Input Capacitance	C <sub>IN</sub>			—	5	10	—	10	pF
Power Dissipation Capacitance	C <sub>PD</sub> (1)			—	34	—	—	—	

Note (1)  $C_{\text{PD}}$  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 :

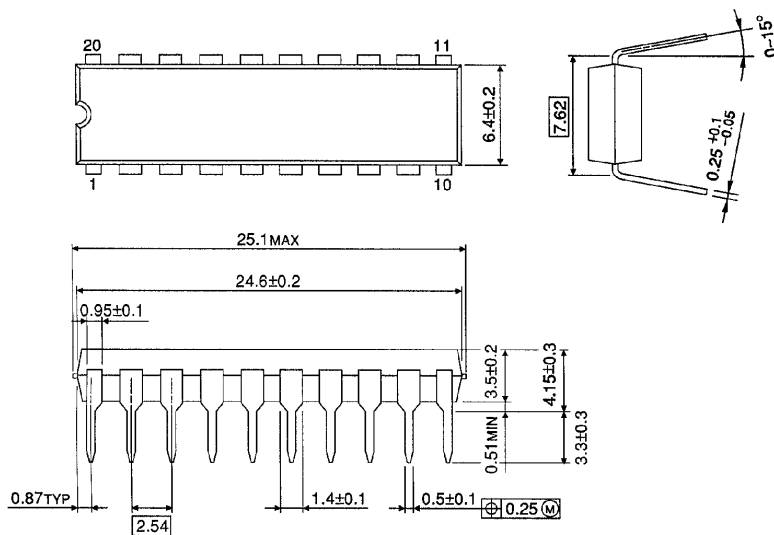
$$I_{\text{CC}}(\text{opr.}) = C_{\text{PD}} \cdot V_{\text{CC}} \cdot f_{\text{IN}} + I_{\text{CC}} / 8 \text{ (per F/F)}$$

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

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

## DIP 20PIN PACKAGE DIMENSIONS (DIP20-P-300-2.54A)

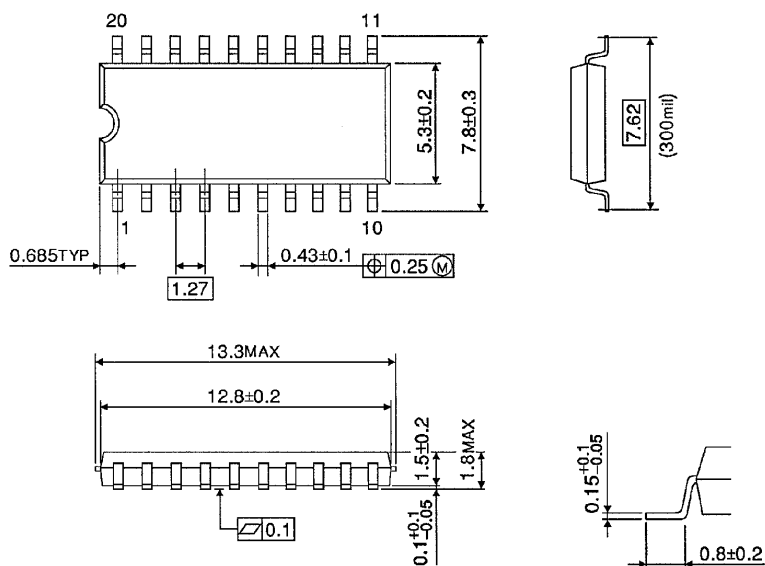
Unit in mm



Weight : 1.30g (Typ.)

## SOP 20PIN (200mil BODY) PACKAGE DIMENSIONS (SOP20-P-300-1.27)

Unit in mm

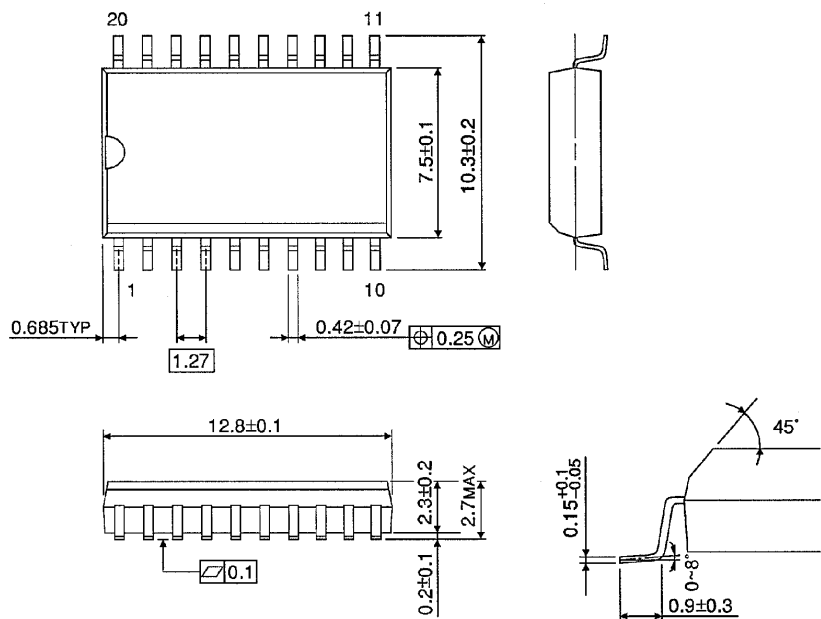


Weight : 0.22g (Typ.)

SOP 20PIN (300mil BODY) PACKAGE DIMENSIONS (SOL20-P-300-1.27)

Unit in mm

(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

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