

TC74HCT374AP, TC74HCT374AF, TC74HCT374AFW

OCTAL D - TYPE FLIP - FLOP WITH 3 - STATE OUTPUT

The TC74HCT374A is high speed CMOS OCTAL FLIP - FLOP with 3 - STATE OUTPUT fabricated with silicon gate C²MOS technology.

It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. Their inputs are compatible with TTL, NMOS, and CMOS output voltage levels.

This 8 - bit D - type flip - flop is controlled by a clock input (CK) and an output enable input (OE).

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

FEATURES:

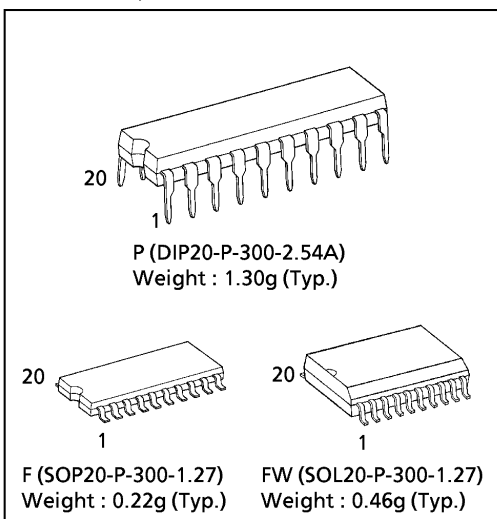
- High Speed..... $f_{MAX} = 62\text{MHz}(\text{typ.})$
at $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 4\mu\text{A}(\text{Max.})$ at $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs.... $V_{IH} = 2\text{V}(\text{Min.})$
 $V_{IL} = 0.8\text{V}(\text{Max.})$
- Wide interfacing ability..... LSTTL, NMOS, CMOS
- Output Drive Capability..... 15 LSTTL Loads
- Symmetrical Output Impedance... $|I_{OH}| = I_{OL} = 6\text{mA}(\text{Min.})$
- Balanced Propagation Delays.... $t_{PLH} \approx t_{PHL}$
- Pin and Function Compatible with 74LS374

TRUTH TABLE

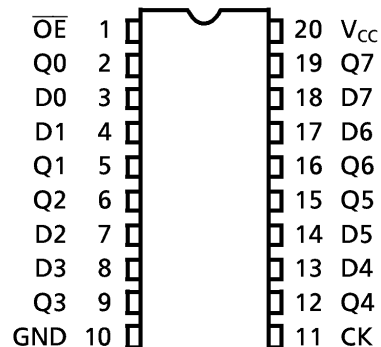
INPUTS			OUTPUTS
$\overline{\text{OE}}$	CK	D	Q
H	X	X	Z
L		X	Q_n
L		L	L
L		H	H

X : Don't Care
Z : High Impedance
 Q_n : No Change

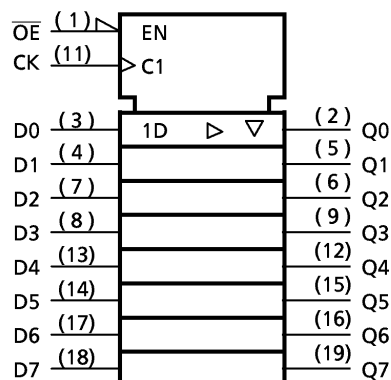
(Note) The JEDEC SOP (FW) is not available in Japan.



PIN ASSIGNMENT



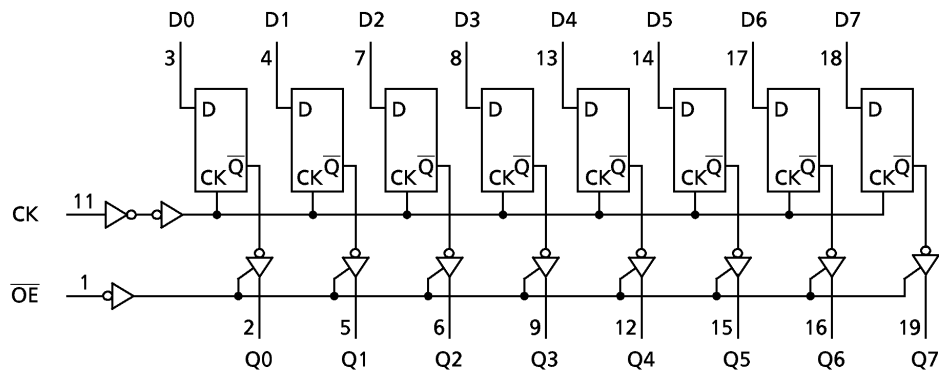
IEC LOGIC SYMBOL



980508EBA2

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SYSTEM DIAGRAM



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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	$-0.5 \sim 7$	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}	± 20	mA
Output Diode Current	I_{OK}	± 20	mA
DC Output Current	I_{OUT}	± 35	mA
DC V_{CC} /Ground Current	I_{CC}	± 75	mA
Power Dissipation	P_D	500 (DIP)* / 180 (SOP)	mW
Storage Temperature	T_{stg}	$-65 \sim 150$	°C

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

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	$4.5 \sim 5.5$	V
Input Voltage	V_{IN}	$0 \sim V_{CC}$	V
Output Voltage	V_{OUT}	$0 \sim V_{CC}$	V
Operating Temperature	T_{opr}	$-40 \sim 85$	°C
Input Rise and Fall Time	t_r, t_f	$0 \sim 500$	ns

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40 \sim 85^\circ\text{C}$		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
High - Level Input Voltage	V_{IH}		$4.5 \begin{smallmatrix} \uparrow \\ 5.5 \end{smallmatrix}$	2.0	—	—	2.0	—	V
Low - Level Input Voltage	V_{IL}		$4.5 \begin{smallmatrix} \downarrow \\ 5.5 \end{smallmatrix}$	—	—	0.8	—	0.8	V
High - Level Output Voltage	V_{OH}	$V_{IN} = V_{IH}$	$I_{OH} = -20 \mu\text{A}$	4.5	4.4	4.5	—	4.4	V
		or V_{IL}	$I_{OH} = -6 \text{ mA}$	4.5	4.18	4.31	—	4.13	
Low - Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$	$I_{OL} = 20 \mu\text{A}$	4.5	—	0.0	0.1	—	V
		or V_{IL}	$I_{OL} = 6 \text{ mA}$	4.5	—	0.17	0.26	—	
3 - State Output Off - State Current	I_{OZ}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND	5.5	—	—	± 0.5	—	± 5.0	
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	—	—	4.0	—	40.0	
	I_C	Per input: $V_{IN} = 0.5\text{V}$ or 2.4V Other input: V_{CC} or GND	5.5	—	—	2.0	—	2.9	mA

TIMING REQUIREMENTS (Input $t_r = t_f = 6\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	Ta = 25°C		Ta = -40~85°C	UNIT
				TYP.	LIMIT	LIMIT	
Minimum Pulse Width (CK)	$t_{W(H)}$ $t_{W(L)}$		4.5	—	15	19	ns
			5.5	—	14	17	
Minimum Set-up Time (Dn)	t_s		4.5	—	15	19	
			5.5	—	14	17	
Minimum Hold Time (Dn)	t_h		4.5	—	0	0	
			5.5	—	0	0	
Clock Frequency	f		4.5	—	31	25	MHz
			5.5	—	37	30	

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 6\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION	CL (pF)	V_{CC} (V)	Ta = 25°C			Ta = -40~85°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t_{TLH} t_{THL}		50	4.5	—	7	12	—	15	ns
				5.5	—	6	11	—	14	
Propagation Delay Time (CK—Q)	t_{pLH} t_{pHL}		50	4.5	—	20	30	—	38	
				5.5	—	17	25	—	31	
			150	4.5	—	25	38	—	48	
				5.5	—	22	33	—	41	
Output Enable Time	t_{pZL} t_{pZH}	$R_L = 1\text{k}\Omega$	50	4.5	—	17	30	—	38	
				5.5	—	14	25	—	31	
			150	4.5	—	25	38	—	48	
				5.5	—	19	33	—	41	
Output Disable Time	t_{pLZ} t_{pHZ}	$R_L = 1\text{k}\Omega$	50	4.5	—	16	28	—	35	
				5.5	—	14	24	—	30	
Maximum Clock Frequency	f_{MAX}		50	4.5	31	50	—	25	—	MHz
				5.5	37	59	—	30	—	
Input Capacitance	C_{IN}				—	5	10	—	10	pF
Output Capacitance	C_{OUT}				—	10	—	—	—	
Power Dissipation Capacitance	$C_{PD} (1)$				—	48	—	—	—	

Note (1) 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 :

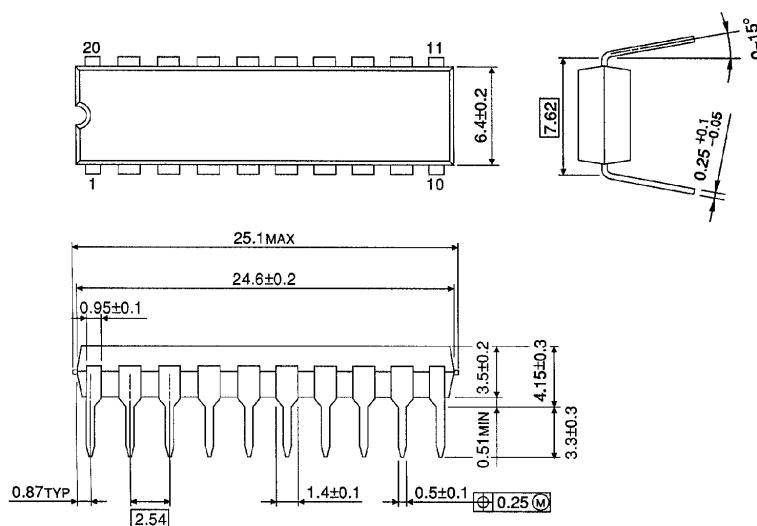
$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/8 \text{ (per F/F)}$$

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

$$C_{PD}(\text{total}) = 30 + 18 \cdot n$$

DIP 20PIN OUTLINE DRAWING (DIP20-P-300-2.54A)

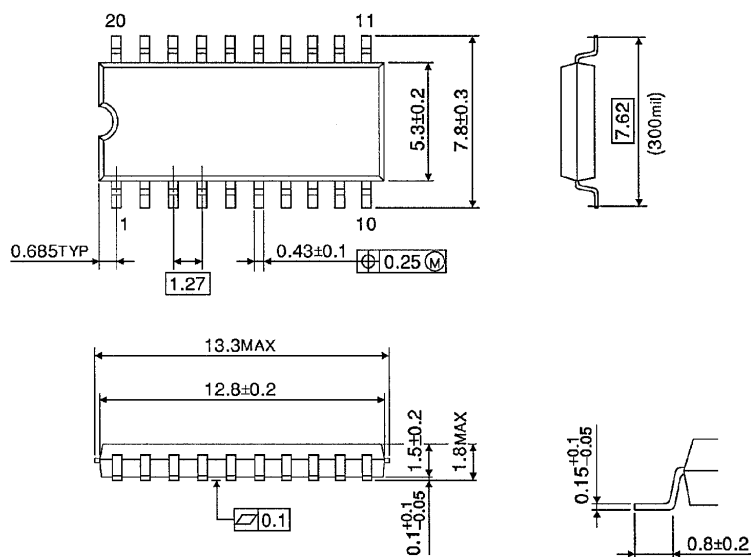
Unit in mm



Weight : 1.30g (Typ.)

SOP 20PIN (200mil BODY) OUTLINE DRAWING (SOP20-P-300-1.27)

Unit in mm

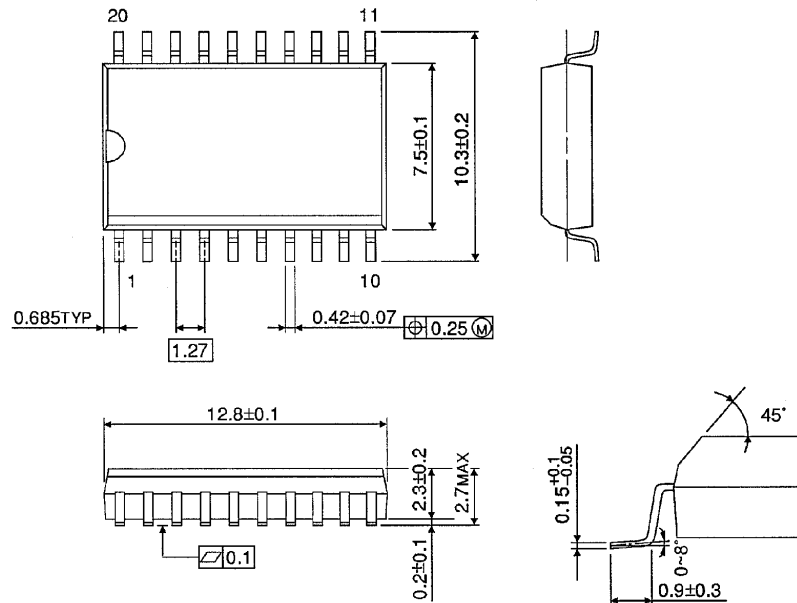


Weight : 0.22g (Typ.)

SOP 20PIN (300mil BODY) OUTLINE DRAWING (SOL20-P-300-1.27)

Unit in mm

(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)