

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

The TC74AC574 is an advanced high speed CMOS OCTAL 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.

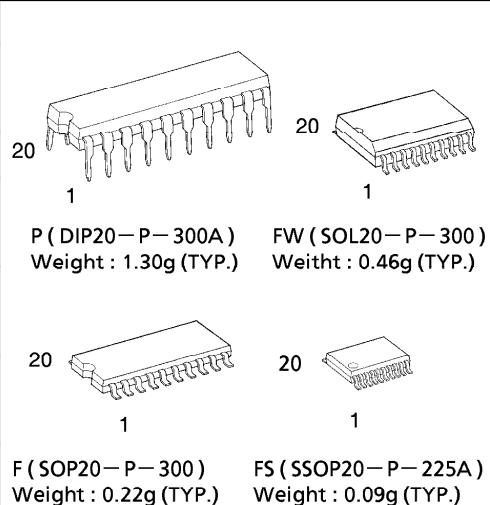
These 8 - bit D - type flip - flops are controlled by a clock input (CK) and a output enable input (OE).

When the OE input is high, the eight outputs are in a high impedance state.

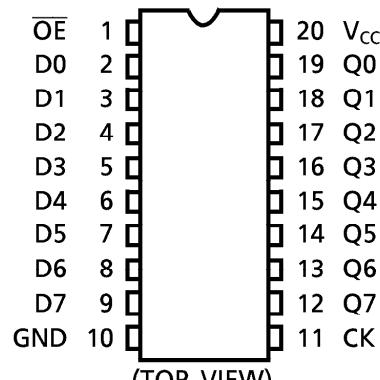
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES :

- High Speed..... $f_{MAX} = 180\text{MHz}$ (typ.) at $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 8\mu\text{A}$ (Max.) at $T_a = 25^\circ\text{C}$
- High Noise Immunity..... $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (Min.)
- Symmetrical Output Impedance... $|I_{OH}| = I_{OL} = 24\text{mA}$ (Min.) Capability of driving 50Ω transmission lines.
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range.... V_{CC} (opr) = 2V~5.5V
- Pin and Function Compatible with 74F574



PIN ASSIGNMENT



TRUTH TABLE

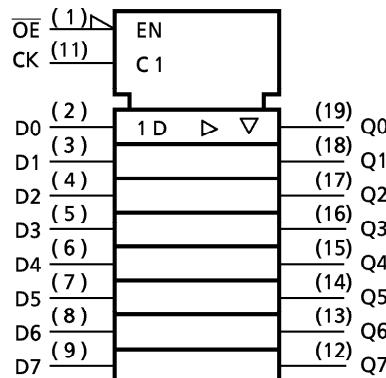
INPUTS			OUTPUTS
OE	CK	D	Q
H	X	X	Z
L	—	X	Q_n
L	↑	L	L
L	↓	H	H

X : Don't Care

Z : High Impedance

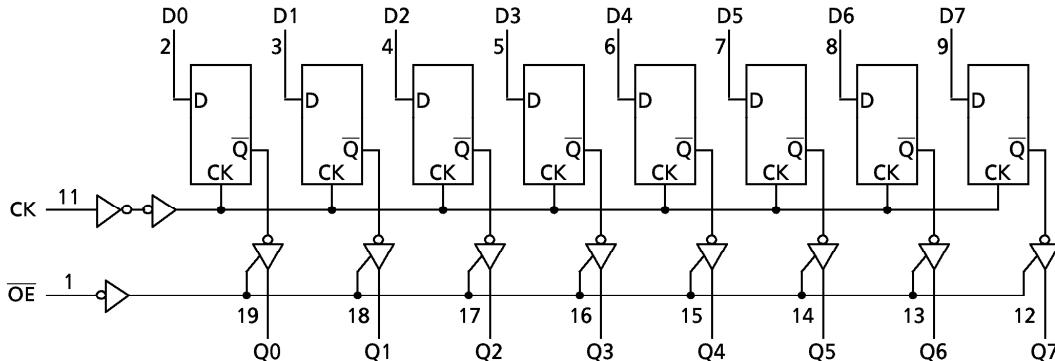
Q_n : No Change

IEC LOGIC SYMBOL



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SYSTEM DIAGRAM



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	-0.5~7.0	V
DC Input Voltage	V_{IN}	-0.5~ V_{CC} +0.5	V
DC Output Voltage	V_{OUT}	-0.5~ 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)*/ 180 (SOP/SSOP)	mW
Storage Temperature	T_{STG}	-65~150	°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 $-10\text{mW}/^{\circ}\text{C}$ should be applied up to 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0~5.5	V
Input Voltage	V_{IN}	0~ V_{CC}	V
Output Voltage	V_{OUT}	0~ V_{CC}	V
Operating Temperature	T_{opr}	-40~85	°C
Input Rise and Fall Time	dt/dV	0~ 100 ($V_{CC} = 3.3 \pm 0.3\text{V}$) 0~ 20 ($V_{CC} = 5 \pm 0.5\text{V}$)	ns/V

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	Ta = 25°C			Ta = -40~85°C		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
High - Level Input Voltage	V_{IH}		2.0 3.0 5.5	1.50 2.10 3.85	— — —	— — —	1.50 2.10 3.85	— — —	V
Low - Level Input Voltage	V_{IL}		2.0 3.0 5.5	— — —	— — —	0.50 0.90 1.65	— — —	0.50 0.90 1.65	V
High - Level Output Voltage	V_{OH}	$V_{IN} =$ V_{IH} or V_{IL}	$I_{OH} = -50\mu A$ $I_{OH} = -4mA$ $I_{OH} = -24mA$ $I_{OH} = -75mA^*$	2.0 3.0 4.5 3.0 4.5 —	1.9 2.9 4.4 2.58 3.94 —	2.0 3.0 4.5 — — —	— — — — — —	1.9 2.9 4.4 2.48 3.80 3.85	— — — — — —
Low - Level Output Voltage	V_{OL}	$V_{IN} =$ V_{IH} or V_{IL}	$I_{OL} = 50\mu A$ $I_{OL} = 12mA$ $I_{OL} = 24mA$ $I_{OL} = 75mA^*$	2.0 3.0 4.5 3.0 4.5 5.5	— — — — — —	0.0 0.0 0.0 — — —	0.1 0.1 0.1 0.36 0.36 —	— — — — — —	0.1 0.1 0.1 0.44 0.44 1.65
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
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC}$ or GND		5.5	—	—	8.0	—	80.0

* : 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 $t_r = t_f = 3ns$)

PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C		Ta = -40~85°C		UNIT
			V_{CC} (V)	LIMIT	LIMIT	LIMIT	
Minimum Pulse Width (CK)	$t_W(H)$ $t_W(L)$		3.3 ± 0.3 5.0 ± 0.5	7.0 5.0	7.0 5.0	7.0 5.0	ns
Minimum Set - up Time	t_s		3.3 ± 0.3 5.0 ± 0.5	9.0 4.5	9.0 4.5	9.0 4.5	
Minimum Hold Time	t_h		3.3 ± 0.3 5.0 ± 0.5	1.0 1.0	1.0 1.0	1.0 1.0	

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 _{CC} (V)	MIN.	TYP.	MAX.	MIN.	
Propagation Delay Time (CK-Q)	t_{pLH} t_{pHL}		3.3 ± 0.3	—	9.8 6.1	16.7 9.2	1.0 1.0	19.0 10.5
			5.0 ± 0.5	—				
Output Enable Time	t_{pZL} t_{pZH}		3.3 ± 0.3	—	9.2 6.1	15.8 9.3	1.0 1.0	18.0 10.6
			5.0 ± 0.5	—				
Output Disable Time	t_{pLZ} t_{pHZ}		3.3 ± 0.3	—	6.6 5.8	11.0 8.8	1.0 1.0	12.5 10.0
			5.0 ± 0.5	—				
Maximum Clock Frequency	f _{MAX}		3.3 ± 0.3	50 95	100 160	—	50 95	—
Input Capacitance	C _{IN}			—	5	10	—	10
Output Capacitance	C _{OUT}			—	10	—	—	—
Power Dissipation Capacitance	C _{PD} (1)			—	36	—	—	—

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 :

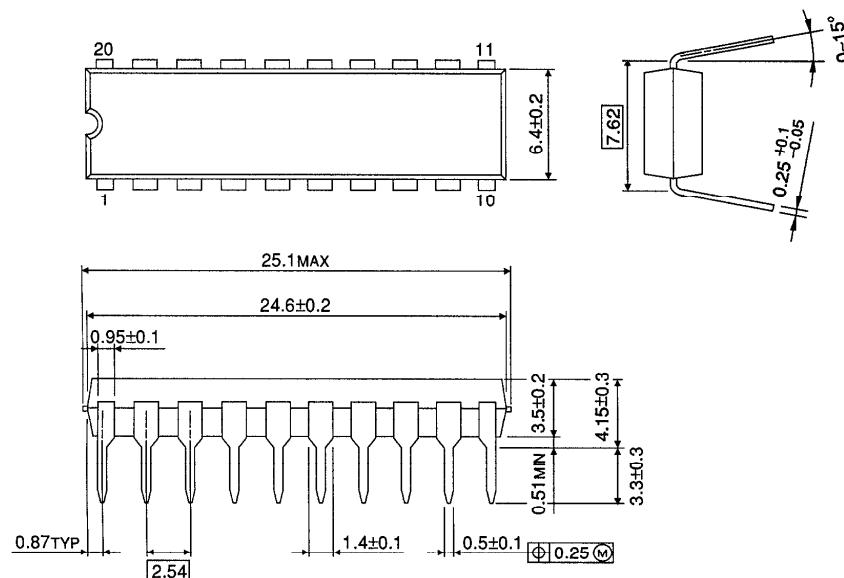
$$I_{CC}(\text{opr.}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/8 \text{ (per F/F)}$$

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

$$C_{PD}(\text{total}) = 26 + 10 \cdot n$$

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

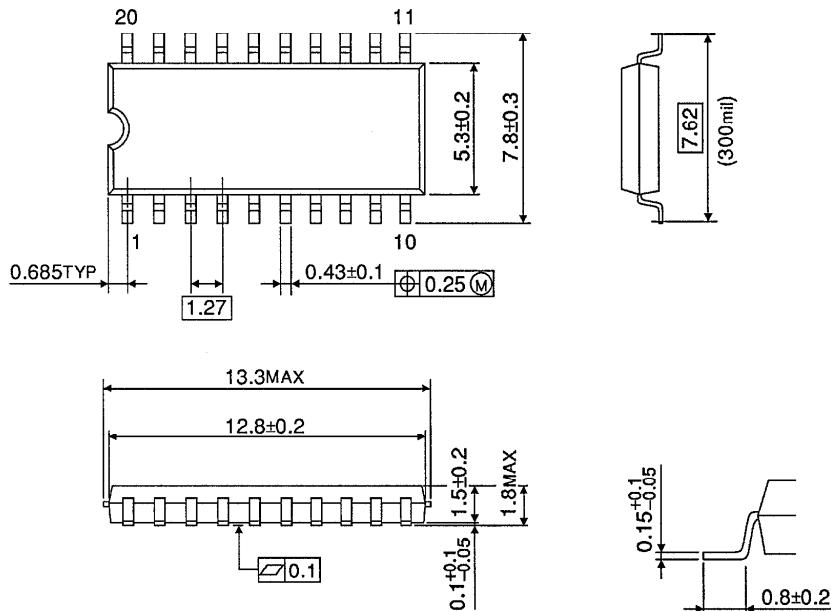
Unit in mm



Weight : 1.30g (TYP.)

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

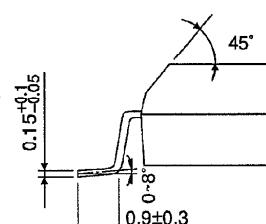
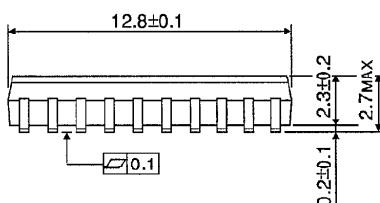
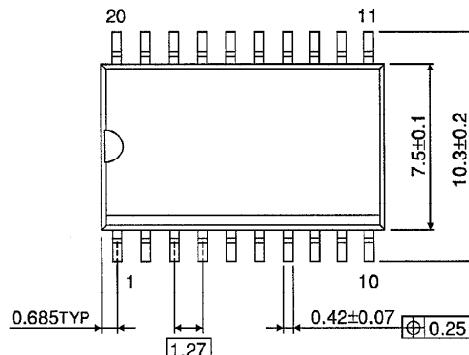
Unit in mm



Weight : 0.22g (TYP.)

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

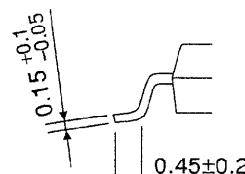
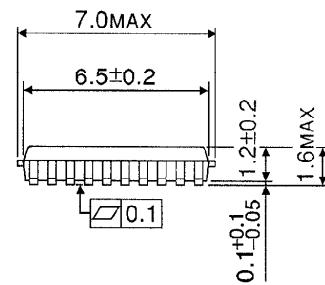
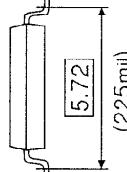
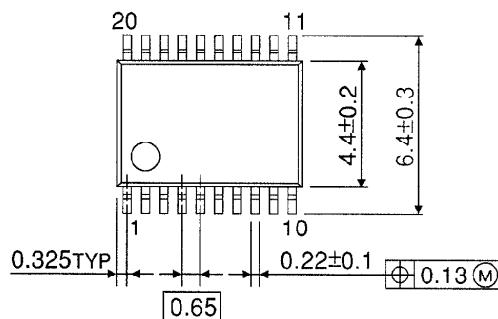
Unit in mm



Weight : 0.46g (TYP.)

SSOP 20PIN OUTLINE DRAWING (SSOP20-P-225A)

Unit in mm



Weight : 0.09g (TYP.)