

TC74AC74P, TC74AC74F, TC74AC74FN, TC74AC74FT**DUAL D-TYPE FLIP FLOP WITH PRESET AND CLEAR**

The TC74AC74 is an advanced high speed CMOS D - 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.

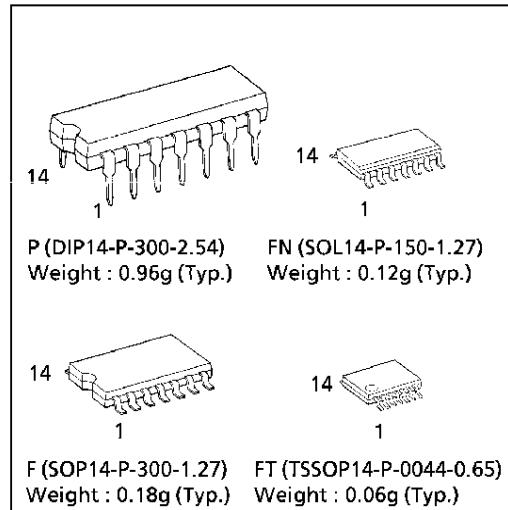
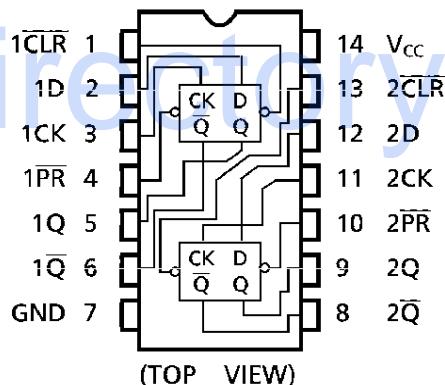
The signal level applied to the D INPUT is transferred to Q OUTPUT during the positive going transition of the CK pulse.

CLR and PR are independent of the CK and are accomplished by setting the appropriate input to an "L" level. All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES :

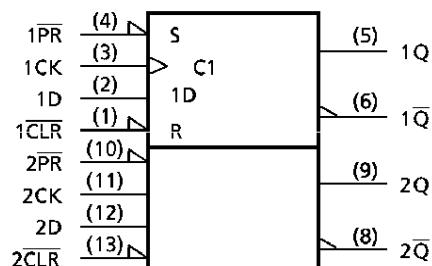
- High Speed.....f_{MAX} = 200MHz (typ.) at V_{CC} = 5V
- Low Power Dissipation.....I_{CC} = 4μA(Max.) at Ta = 25°C
- High Noise Immunity.....V_{NIIH} = V_{NIL} = 28% V_{CC} (Min.)
- Symmetrical Output Impedance... | I_{OH} | = I_{OL} = 24mA(Min.) Capability of driving 50Ω transmission lines.
- Balanced Propagation Delays.....t_{PLH} ≈ t_{PHL}
- Wide Operating Voltage Range.... V_{CC} (opr) = 2V ~ 5.5V
- Pin and Function Compatible with 74F74

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

**PIN ASSIGNMENT****TRUTH TABLE**

INPUTS				OUTPUTS		FUNCTION
CLR	PR	D	CK	Q	Q̄	
L	H	X	X	L	H	CLEAR
H	L	X	X	H	L	PRESET
L	L	X	X	H	H	—
H	H	L	—	L	H	—
H	H	H	—	H	L	—
H	H	X	—	Q _n	Q̄ _n	NO CHANGE

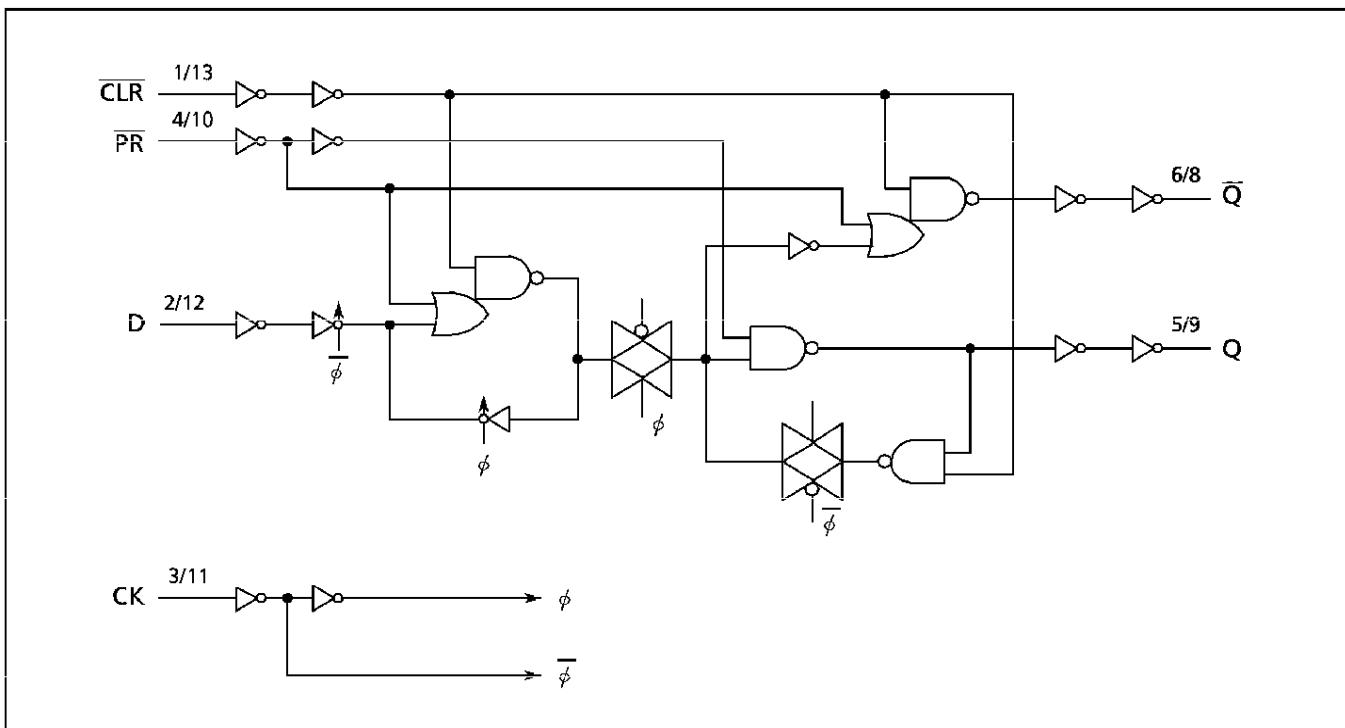
X : Don't Care

IEC LOGIC SYMBOL

961001EBA2

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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}	±100	mA
Power Dissipation	P _D	500 (DIP)* / 180 (SOP/TSSOP)	mW
Storage Temperature	T _{STG}	-65~150	°C

*500mW in the range of Ta = -40°C~65°C. From Ta = 65°C to 85°C a derating factor of -10mW/°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	d _t / dV	0~ 100 (V _{CC} = 3.3 ± 0.3V) 0~ 20 (V _{CC} = 5 ± 0.5V)	ns/V

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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}	$I_{OH} = -50\mu A$	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5	— — —	1.9 2.9 4.4	— — —	
			$I_{OH} = -4mA$ $I_{OH} = -24mA$ $I_{OH} = -75mA^*$	3.0 4.5 5.5	2.58 3.94 —	— — —	— — —	2.48 3.80 3.85	— — —	
Low - Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 50\mu A$	2.0 3.0 4.5	— 0.0 0.0	0.0 0.1 0.1	— — —	0.1 0.1 0.1	— — —	
			$I_{OL} = 12mA$ $I_{OL} = 24mA$ $I_{OL} = 75mA^*$	3.0 4.5 5.5	— — —	— 0.36 —	— — —	0.44 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	—	—	4.0	—	40.0	

* : 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}	LIMIT	LIMIT	LIMIT	
Minimum Pulse Width (CK)	$t_W(L)$ $t_W(H)$		3.3 ± 0.3 5.0 ± 0.5	7.0 5.0	7.0 5.0	7.0 5.0	ns
Minimum Pulse Width (CLR, PR)	$t_W(L)$		3.3 ± 0.3 5.0 ± 0.5	7.0 5.0	7.0 5.0	7.0 5.0	
Minimum Set - up Time	t_s		3.3 ± 0.3 5.0 ± 0.5	6.0 3.5	6.0 3.5	6.0 3.5	
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	
Minimum Removal Time (CLR, PR)	t_{rem}		3.3 ± 0.3 5.0 ± 0.5	4.0 2.0	4.0 2.0	4.0 2.0	

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, \bar{Q})	t_{pLH}		3.3 ± 0.3	—	8.2	13.9	1.0	16.0
	t_{pHL}		5.0 ± 0.5	—	6.1	8.7	1.0	10.0
Propagation Delay Time (\bar{CLR} , \bar{PR} -Q, \bar{Q})	t_{pLH}		3.3 ± 0.3	—	8.0	13.1	1.0	15.0
	t_{pHL}		5.0 ± 0.5	—	5.7	8.2	1.0	9.4
Maximum Clock Frequency	f _{MAX}		3.3 ± 0.3	60 100	120 160	—	60 100	—
Input Capacitance	C _{IN}			—	5	10	—	10
Power Dissipation Capacitance	C _{PD} (1)			—	77	—	—	—

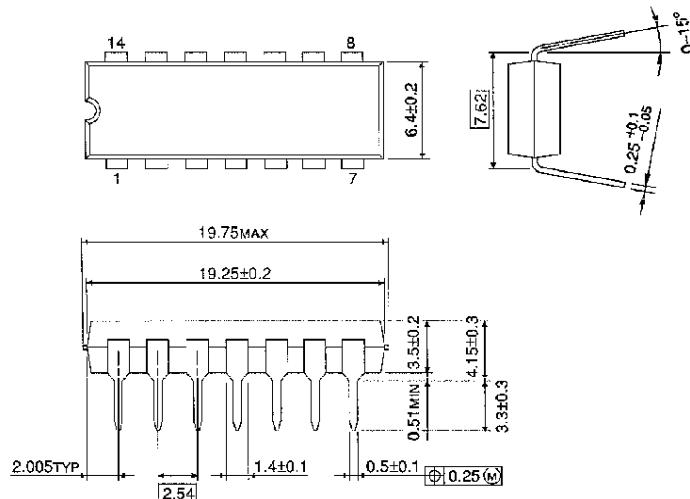
Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

$$I_{CC}(\text{opr.}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/2 \text{ (per F/F)}$$

DIP 14PIN OUTLINE DRAWING (DIP14-P-300-2.54)

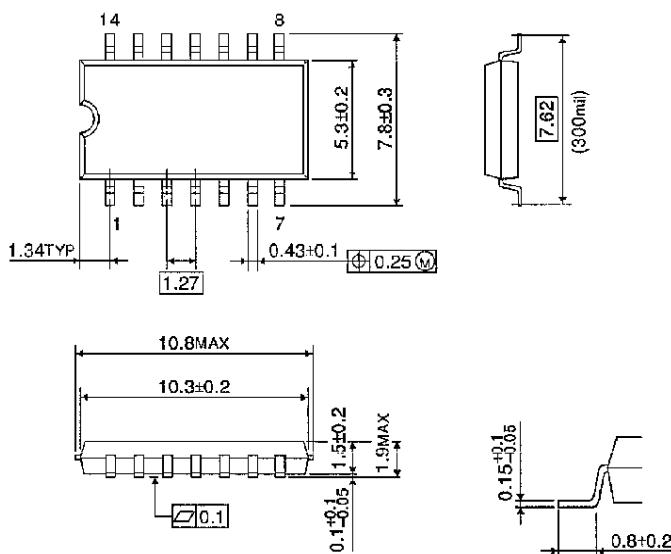
Unit in mm



Weight : 0.96g (Typ.)

SOP 14PIN (200mil BODY) OUTLINE DRAWING (SOP14-P-300-1.27)

Unit in mm

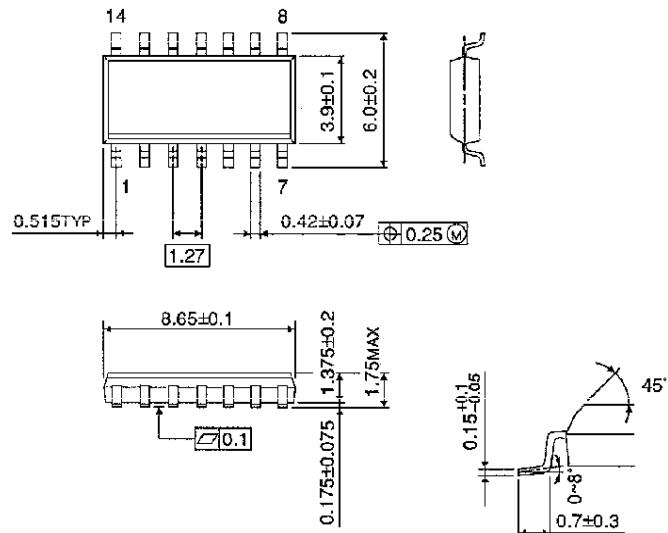


Weight : 0.18g (Typ.)

SOP 14PIN (150mil BODY) OUTLINE DRAWING (SOL14-P-150-1.27)

Unit in mm

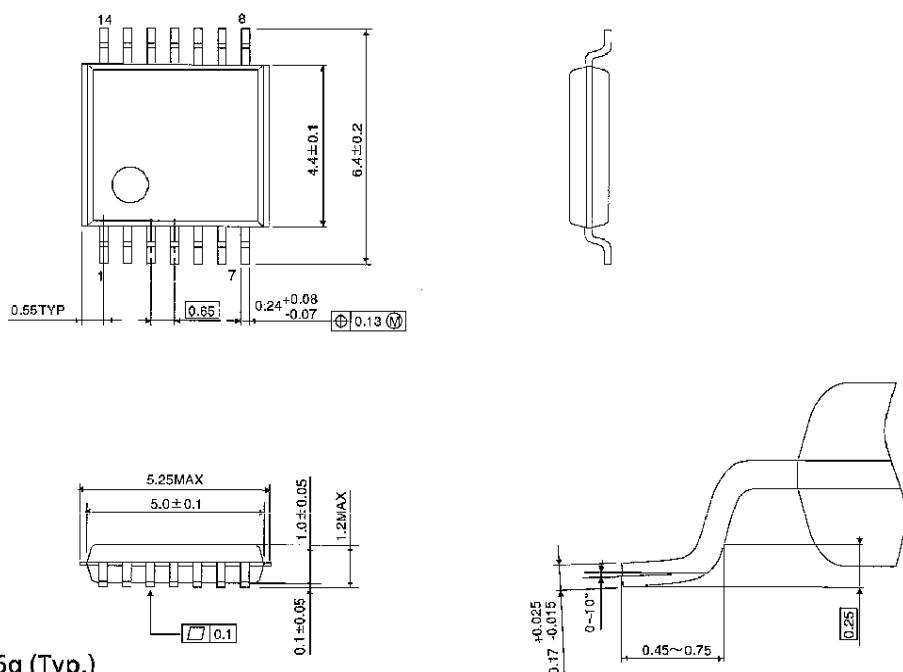
(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)

TSSOP 14PIN (170mil BODY) OUTLINE DRAWING (TSSOP14-P-0044-0.65)

Unit in mm



Weight : 0.06g (Typ.)