

TC74VHCT74AF, TC74VHCT74AFN, TC74VHCT74AFT

DUAL D - TYPE FLIP - FLOP WITH PRESET AND CLEAR

The TC74VHCT74 is an advanced high speed CMOS D - FLIP FLOP fabricated with silicon gate 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 $\overline{PR}$ are independent of the CK and are accomplished by setting the appropriate input low.

The input voltage are compatible with TTL output voltage.

This device may be used as a level converter for interfacing 3.3V to 5V system.

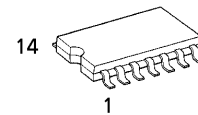
Input protection and output circuit ensure that 0 to 5.5V can be applied to the input and output*¹ pins without regard to the supply voltage. These structure prevents device destruction due to mismatched supply and input / output voltages such as battery back up, hot board insertion, etc.

*1 : $V_{CC}=0V$

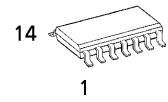
FEATURES :

- High Speed $f_{MAX} = 160MHz(typ.)$
at $V_{CC} = 5V$
- Low Power Dissipation $I_{CC} = 2\mu A(Max.)$ at $T_a = 25^\circ C$
- Compatible with TTL outputs ... $V_{IL} = 0.8V (Max.)$
 $V_{IH} = 2.0V (Min.)$
- Power Down Protection is provided on all inputs and outputs
- Balanced Propagation Delays $t_{PLH} \approx t_{PHL}$
- Pin and Function Compatible with the 74 series (74AC / HC / F / ALS / LS etc.) 74 type.

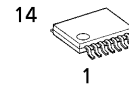
(Note) The JEDEC SOP (FN) is not available in Japan.



F (SOP14-P-300-1.27)
Weight : 0.18g (Typ.)

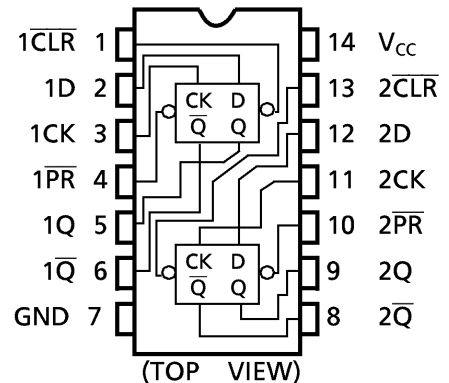


FN (SOL14-P-150-1.27)
Weight : 0.12g (Typ.)



FT (TSSOP14-P-0044-0.65)
Weight : 0.06g (Typ.)

PIN ASSIGNMENT

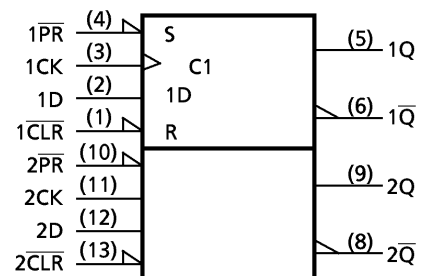


TRUTH TABLE

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



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	$-0.5 \sim 7.0$	V
DC Input Voltage	V_{IN}	$-0.5 \sim 7.0$	V
DC Output Voltage	V_{OUT}	$-0.5 \sim 7.0$ (Note 1)	V
		$-0.5 \sim V_{CC} + 0.5$ (Note 2)	
Input Diode Current	I_{IK}	-20	mA
Output Diode Current	I_{OK}	± 20 (Note 3)	mA
DC Output Current	I_{OUT}	± 25	mA
DC V_{CC} /Ground Current	I_{CC}	± 50	mA
Power Dissipation	P_D	180	mW
Storage Temperature	T_{stg}	$-65 \sim 150$	$^{\circ}\text{C}$

(Note 1) $V_{CC} = 0\text{V}$ (Note 2) High or Low State. I_{OUT} absolute maximum rating must be observed.(Note 3) $V_{OUT} < \text{GND}$, $V_{OUT} > V_{CC}$ **RECOMMENDED OPERATING CONDITIONS**

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	4.5~5.5	V
Input Voltage	V_{IN}	0~5.5	V
Output Voltage	V_{OUT}	0~5.5 (Note 4)	V
		0~ V_{CC} (Note 5)	
Operating Temperature	T_{opr}	$-40 \sim 85$	$^{\circ}\text{C}$
Input Rise and Fall Time	dt/dV	0~20	ns/V

(Note 4) $V_{CC} = 0\text{V}$

(Note 5) High or Low State.

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITON		V _{CC} (V)	Ta = 25°C			Ta = -40~85°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
High - Level Input Voltage	V _{IH}			4.5~5.5	2.0	—	—	2.0	—	V
Low - Level Input Voltage	V _{IL}			4.5~5.5	—	—	0.8	—	0.8	V
High - Level Output Voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -50μA	4.5	4.40	4.50	—	4.40	—	V
			I _{OH} = -8mA	4.5	3.94	—	—	3.80	—	
Low - Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 50μA	4.5	—	0.0	0.1	—	0.1	V
			I _{OL} = 8mA	4.5	—	—	0.36	—	0.44	
Input Leakage Current	I _{IN}	V _{IN} = 5.5V or GND		0~5.5	—	—	±0.1	—	±1.0	μA
Quiescent Supply Current	I _{CC}	V _{IN} = V _{CC} or GND		5.5	—	—	2.0	—	20.0	
	I _{CCT}	PER INPUT : V _{IN} = 3.4V OTHER INPUT : V _{CC} or GND		5.5	—	—	1.35	—	1.50	mA
Output Leakage Current	I _{OPD}	V _{OUT} = 5.5V		0	—	—	0.5	—	5.0	μA

TIMING REQUIREMENTS (Input $t_r = t_f = 3\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C		Ta = -40~85°C		UNIT
			V _{CC} (V)	LIMIT	LIMIT	LIMIT	
Minimum Pulse Width (CK)	t _W (L) t _W (H)		5.0 ± 0.5	5.0	5.0		ns
Minimum Pulse Width (CLR, PR)	t _W (L)		5.0 ± 0.5	5.0	5.0		
Minimum Set - up Time	t _s		5.0 ± 0.5	5.0	5.0		
Minimum Hold Time	t _h		5.0 ± 0.5	0.0	0.0		
Minimum Removal Time (CLR, PR)	t _{rem}		5.0 ± 0.5	3.5	3.5		

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = -40~85°C		UNIT
		V _{CC} (V)	CL (pF)	MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time (CK - Q, $\bar{Q}$)	t _{pLH} t _{pHL}	5.0 ± 0.5	15	—	5.8	7.8	1.0	9.0	ns
			50	—	6.3	8.8	1.0	10.0	
Propagation Delay Time (CLR, $\bar{PR}$ - Q, $\bar{Q}$)	t _{pLH} t _{pHL}	5.0 ± 0.5	15	—	7.6	10.4	1.0	12.0	
			50	—	8.1	11.4	1.0	13.0	
Maximum Clock Frequency	f _{MAX}	5.0 ± 0.5	15	100	160	—	80	—	MHz
			50	80	140	—	65	—	
Input Capacitance	C _{IN}			—	4	10	—	10	pF
Power Dissipation Capacitance	C _{PD}	(Note 6)		—	24	—	—	—	

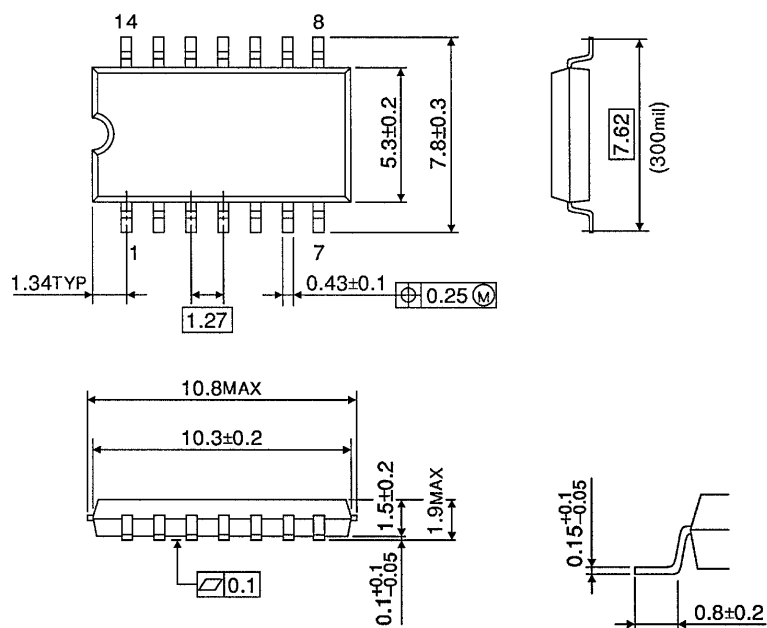
Note (6) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

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

SOP 14PIN (200mil BODY) PACKAGE DIMENSIONS (SOP14-P-300-1.27)

Unit in mm

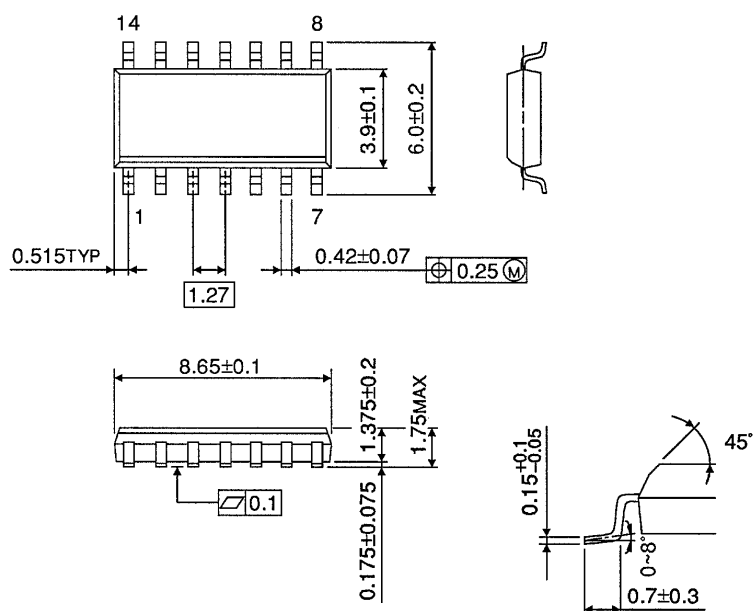


Weight : 0.18g (Typ.)

SOP 14PIN (150mil BODY) PACKAGE DIMENSIONS (SOP14-P-150-1.27)

Unit in mm

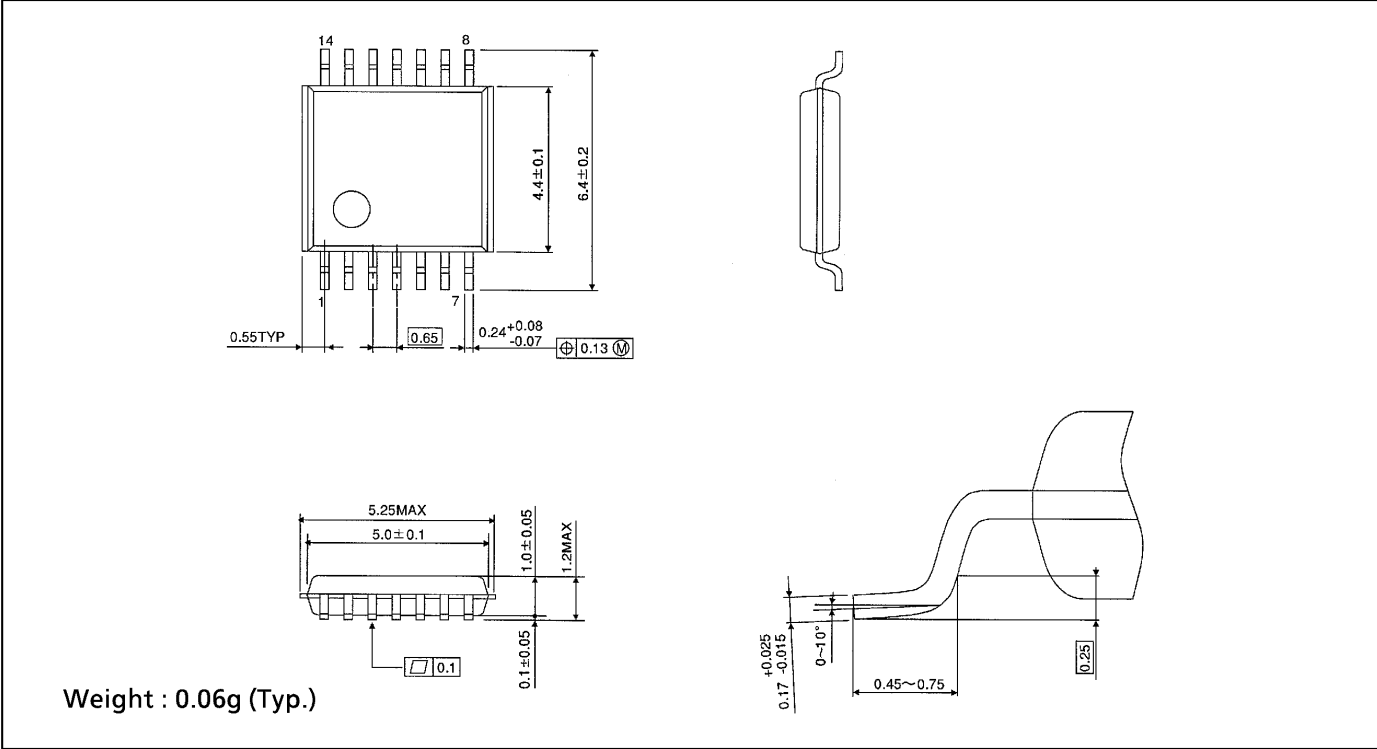
(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)

TSSOP 14PIN PACKAGE DIMENSIONS (TSSOP14-P-0044-0.65)

Unit in mm



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000707EBA

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