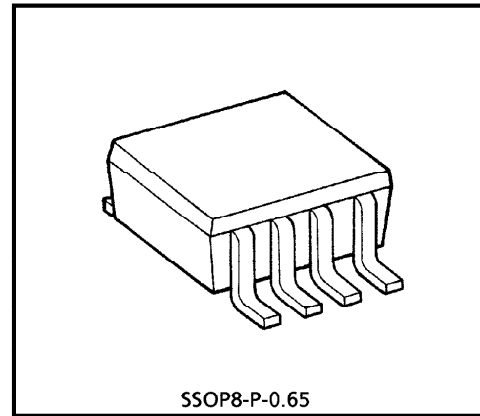


TC7WT74FU

(UNDER DEVELOPMENT)

D-TYPE FLIP FLOP WITH PRESET AND CLEAR

The TC7WT74FU is a high speed CMOS D-FLIP FLOP fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent Bipolar schottky TTL while maintaining the CMOS low power dissipation. The input threshold levels are compatible with TTL output voltage. The signal level applied to the D-INPUT is tranferred to Q-OUTPUT during the positive going transition of the CK pulse. CLEAR and PRESET are independent of the CK and are accomplished by setting the appropriate input low. All inputs are equipped with protection circuits against static discharge or transient excess voltage.



Weight : 0.02g (Typ.)

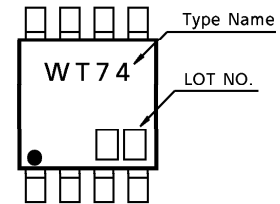
FEATURES

- High Speed $f_{MAX} = 53\text{MHz}$ (Typ.) at $V_{CC} = 5\text{V}$
- Low Power Dissipation $I_{CC} = 2\mu\text{A}$ (Max.) at $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs $V_{IL} = 0.8\text{V}$ (Max.), $V_{IH} = 2.0\text{V}$ (Min.)
- Output Drive Capability 10 LSTTL Loads
- Symmetrical Output Impedance ... $|I_{OH}| = |I_{OL}| = 4\text{mA}$ (Min.)

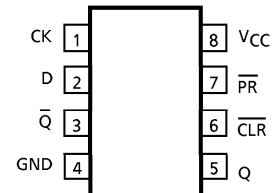
MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|------------------------------|-----------|----------------------|------|
| Supply Voltage Range | V_{CC} | -0.5~7 | 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} | ± 20 | mA |
| DC Output Current | I_{OUT} | ± 25 | mA |
| DC V_{CC} / Ground Current | I_{CC} | ± 25 | mA |
| Power Dissipation | P_D | 300 | mW |
| Storage Temperature | T_{stg} | -65~150 | °C |
| Lead Temperature (10 s) | T_L | 260 | °C |

MARKING



PIN ASSIGNMENT (TOP VIEW)



961001EBA1

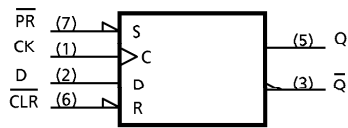
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● The information contained herein is subject to change without notice.

LOGIC DIAGRAM



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

RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTIC | SYMBOL | RATING | 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} | -40~85 | °C |
| Input Rise and Fall Time | t _r , t _f | 0~500 | ns |

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} | | 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 _{IL} or V _{IL} | I _{OH} = -20μA | 4.5 | 4.4 | 4.5 | — | 4.4 | — | V |
| | | | I _{OH} = -4mA | 4.5 | 4.18 | 4.31 | — | 4.13 | — | |
| Low-Level Output Voltage | V _{OL} | V _{IN} = V _{IH} | I _{OL} = 20μA | 4.5 | — | 0.0 | 0.10 | — | 0.10 | V |
| | | | I _{OL} = 4mA | 4.5 | — | 0.17 | 0.26 | — | 0.33 | |
| 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 | — | — | 2.0 | — | 20.0 | μA | |
| | I _{CC} T | PER INPUT: V _{IN} = 0.5V 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) | $T_a = 25^\circ\text{C}$ | | $T_a = -40\sim 85^\circ\text{C}$ | UNIT |
|---|------------------|----------------|--------------|--------------------------|-------|----------------------------------|------|
| | | | | TYP. | LIMIT | LIMIT | |
| Minimum Pulse Width (CLOCK) | t_W (L) | | 4.5 | — | 25 | 29 | ns |
| | t_W (H) | | 5.5 | — | 20 | 23 | |
| Minimum Pulse Width (CLR, $\overline{\text{PR}}$) | t_W (L) | | 4.5 | — | 30 | 34 | ns |
| | | | 5.5 | — | 25 | 28 | |
| Minimum Set-up Time | t_s | | 4.5 | — | 25 | 29 | ns |
| | | | 5.5 | — | 20 | 23 | |
| Minimum Hold Time | t_h | | 4.5 | — | 10 | 10 | ns |
| | | | 5.5 | — | 8 | 8 | |
| Minimum Removal Time (CLR, $\overline{\text{PR}}$) | t_{rem} | | 4.5 | — | 10 | 10 | ns |
| | | | 5.5 | — | 10 | 10 | |
| Clock Frequency | f | | 4.5 | — | 22 | 16 | MHz |
| | | | 5.5 | — | 25 | 19 | |

AC ELECTRICAL CHARACTERISTICS ($C_L = 15\text{pF}$, $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|--|--------------------------------------|----------------|------|------|------|------|
| Output Transition Time | t_{TLH} t_{THL} | — | — | 6 | 12 | ns |
| Propagation Delay Time (CLOCK-Q, Q) | t_{pLH} t_{pHL} | — | — | 17 | 28 | ns |
| Propagation Delay Time (CLR, $\overline{\text{PR}}$ -Q, Q) | t_{pLH} t_{pHL} | — | — | 20 | 30 | ns |
| Maximum Clock Frequency | f_{MAX} | — | 24 | 53 | — | MHz |

AC ELECTRICAL CHARACTERISTICS ($C_L = 15\text{pF}$, Input $t_r = t_f = 6\text{ns}$)

| PARAMETER | SYMBOL | TEST CONDITION | Ta = 25°C | | | Ta = -40~85°C | | UNIT | |
|---|------------------|----------------|---------------------|------|------|---------------|------|------|------|
| | | | V _{CC} (V) | MIN. | TYP. | MAX. | MIN. | | MAX. |
| Output Transition Time | t _{TLH} | — | 4.5 | — | 8 | 15 | — | 19 | ns |
| | t _{THL} | | 5.5 | — | 7 | 13 | — | 16 | |
| Propagation Delay Time (CLOCK-Q, \bar{Q}) | t _{pLH} | — | 4.5 | — | 21 | 33 | — | 41 | ns |
| | t _{pHL} | | 5.5 | — | 19 | 30 | — | 37 | |
| Propagation Delay Time ($\bar{\text{CLR}}$, PR-Q, \bar{Q}) | t _{pLH} | — | 4.5 | — | 23 | 35 | — | 43 | ns |
| | t _{pHL} | | 5.5 | — | 20 | 32 | — | 40 | |
| Maximum Clock Frequency | f _{MAX} | — | 4.5 | 22 | 48 | — | 16 | — | MHz |
| | | | 5.5 | 25 | 53 | — | 19 | — | |
| Input Capacitance | C _{IN} | — | — | 5 | 10 | — | 10 | pF | |
| Power Dissipation Capacitance | C _{PD} | (Note 1) | — | 34 | — | — | — | pF | |

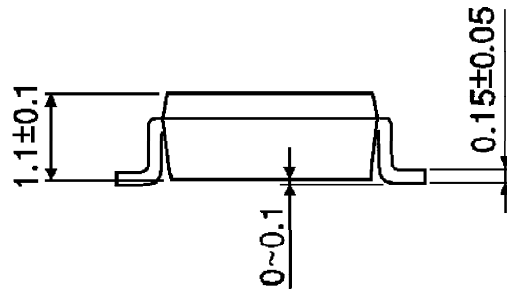
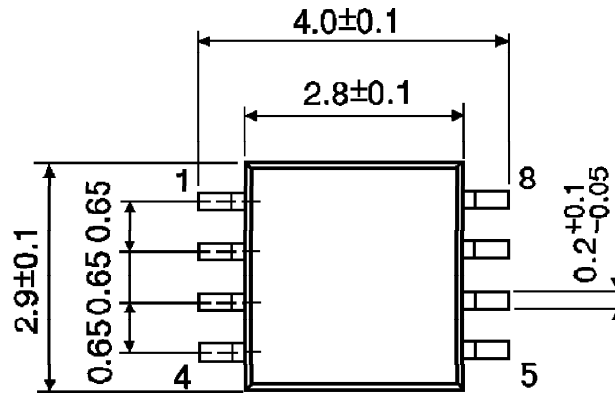
(Note 1) : C_{PD} is defined as the value of internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation.

$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

OUTLINE DRAWING
SSOP8-P-0.65

Unit : mm



Weight : 0.02g (Typ.)