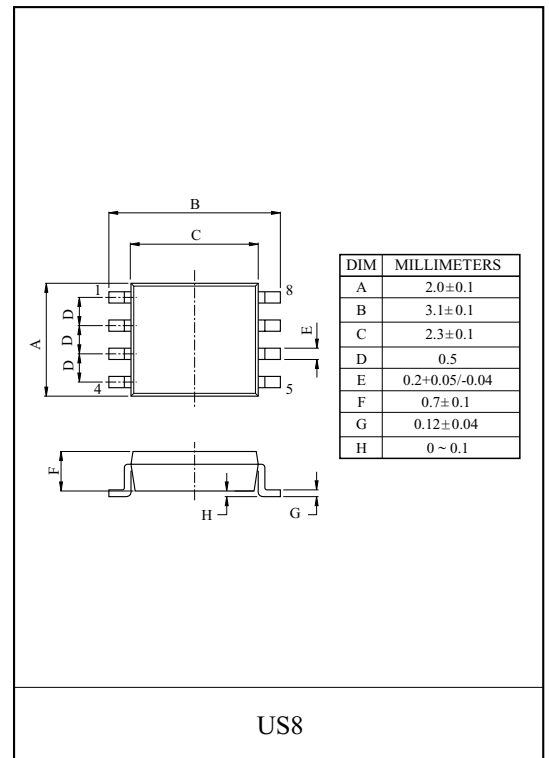
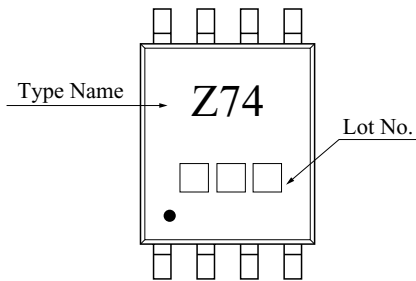


## D-TYPE FLIP FLOP WITH PRESET AND CLEAR

### FEATURES

- High output drive :  $\pm 24\text{mA}(\text{min.}) @ V_{CC}=3\text{V}$ .
- Super high speed operation :  $t_{pd} 2.8\text{ns}(\text{typ.}) @ V_{CC}=3\text{V}, 50\text{pF}$ .
- Operation voltage range :  $V_{CC(\text{opr})}=1.65\sim 5.5\text{V}$ .
- Latch-up performance :  $\pm 500\text{mA}$  or more
- ESD performance :  $\pm 200\text{V}$  or more (EIAJ)  
 $\pm 2000\text{V}$  or more (MIL)
- Power down protection is provided on all inputs and outputs.

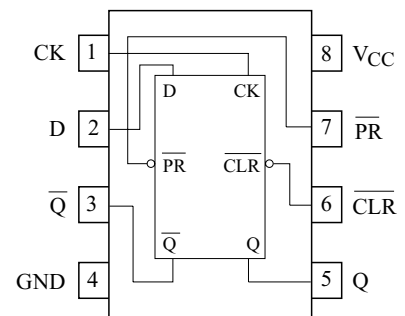
### MARKING



### MAXIMUM RATINGS (Ta=25 °C)

| CHARACTERISTIC              | SYMBOL    | RATING    | UNIT |
|-----------------------------|-----------|-----------|------|
| Power Supply Voltage        | $V_{CC}$  | -0.5~6    | V    |
| DC Input Voltage            | $V_{IN}$  | -0.5~6    | V    |
| DC Output Voltage           | $V_{OUT}$ | -0.5~6    | V    |
| Input Diode Current         | $I_{IK}$  | -20       | mA   |
| Output Diode Current        | $I_{OK}$  | -20       | mA   |
| DC Output Current           | $I_{OUT}$ | ±50       | mA   |
| DC $V_{CC}$ /ground Current | $I_{CC}$  | ±50       | mA   |
| Power Dissipation           | $P_D$     | 200       | mW   |
| Storage Temperature Range   | $T_{stg}$ | -65 ~ 150 | °C   |
| Lead Temperature (10s)      | $T_L$     | 260       | °C   |

### PIN CONNECTION(TOP VIEW)

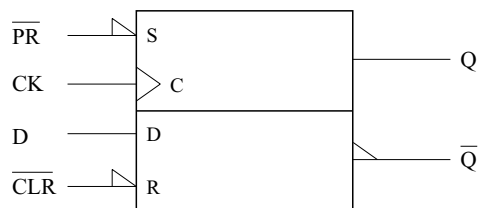


# KIC7WZ74FK

Truth Table

| Inputs                  |                        |   |              | Outputs |                       | Function  |
|-------------------------|------------------------|---|--------------|---------|-----------------------|-----------|
| $\overline{\text{CLR}}$ | $\overline{\text{PR}}$ | D | CK           | Q       | $\overline{\text{Q}}$ |           |
| L                       | H                      | X | X            | L       | H                     | Clear     |
| H                       | L                      | X | X            | H       | L                     | Preset    |
| L                       | L                      | X | X            | H       | H                     | -         |
| H                       | H                      | L | $\downarrow$ | L       | H                     | -         |
| H                       | H                      | H | $\downarrow$ | H       | L                     | -         |
| H                       | H                      | X | $\downarrow$ | Qn      | Qn                    | No Change |

Logic Diagram



Recommended Operating Conditions

| CHARACTERISTIC           | SYMBOL    | RATING   | UNIT |
|--------------------------|-----------|--|------|
| Supply Voltage           | $V_{CC}$  | 1.65~5.5   | V    |
|                          |           | 1.5~5.5 (Note1)                                      |      |
| Input Voltage            | $V_{IN}$  | 0~5.5  | V    |
| Output Voltage           | $V_{OUT}$ | 0~5.5 (Note2)  | V    |
|                          |           | 0~ $V_{CC}$ (Note3)                                  |      |
| Operating Temperature    | $T_{opr}$ | -40~85   | °C   |
| Input Rise and Fall Time | $d_i/d_v$ | 0~20 ( $V_{CC}=1.8V \pm 0.15V,$<br>2.5V $\pm 0.2V$ ) | ns/V |
|                          |           | 0~10 ( $V_{CC}=3.3V \pm 0.3V$ )                      |      |
|                          |           | 0~5 ( $V_{CC}=5.5V \pm 0.5V$ )                       |      |

Note1 : Data retention only.

Note2 :  $V_{CC}=0V$ .

Note3 : High or low

# KIC7WZ74FK

## ELECTRICAL CHARACTERISTICS

### DC Characteristics

| CHARACTERISTIC            |                        | SYMBOL           | TEST CONDITION  |                          | Ta=25 °C               |      |                        | Ta=-40~85 °C           |                        | UNIT |      |
|---------------------------|------------------------|------------------|---|--------------------------|------------------------|------|------------------------|------------------------|------------------------|------|------|
|                           |                        |                  |   |                          | V <sub>CC</sub> (V)    | MIN. | TYP.                   | MAX.                   | MIN.                   |      | MAX. |
| Input Voltage             | High Level             | V <sub>IH</sub>  | -   | 1.65~1.8                 | 0.75 × V <sub>CC</sub> | -    | -                      | 0.75 × V <sub>CC</sub> | -                      | V    |      |
|                           |                        |                  |   | 2.3~5.5                  | 0.7 × V <sub>CC</sub>  | -    | -                      | 0.7 × V <sub>CC</sub>  | -                      |      |      |
|                           | Low Level              | V <sub>IL</sub>  | -   | 1.65~1.95                | -                      | -    | 0.25 × V <sub>CC</sub> | -                      | 0.25 × V <sub>CC</sub> |      |      |
|                           |                        |                  |   | 2.3~5.5                  | -                      | -    | 0.3 × V <sub>CC</sub>  | -                      | 0.3 × V <sub>CC</sub>  |      |      |
| Output Voltage            | High Level             | V <sub>OH</sub>  | V <sub>IN</sub> =<br>V <sub>IH</sub> or V <sub>IL</sub> | I <sub>OH</sub> =-100 μA | 1.65                   | 1.55 | 1.65                   | -                      | 1.55                   | -    | V    |
|                           |                        |                  |   |                          | 2.3                    | 2.2  | 2.3                    | -                      | 2.2                    | -    |      |
|                           |                        |                  |   |                          | 3.0                    | 2.9  | 3.0                    | -                      | 2.9                    | -    |      |
|                           |                        |                  |   |                          | 4.5                    | 4.4  | 4.5                    | -                      | 4.4                    | -    |      |
|                           |                        |                  |   | I <sub>OH</sub> =-4mA    | 1.65                   | 1.29 | 1.52                   | -                      | 1.29                   | -    |      |
|                           |                        |                  |   | I <sub>OH</sub> =-8mA    | 2.3                    | 1.9  | 2.15                   | -                      | 1.9                    | -    |      |
|                           |                        |                  |   | I <sub>OH</sub> =-16mA   | 3.0                    | 2.4  | 2.8                    | -                      | 2.4                    | -    |      |
|                           |                        |                  |   | I <sub>OH</sub> =-24mA   | 3.0                    | 2.3  | 2.68                   | -                      | 2.3                    | -    |      |
|                           | I <sub>OH</sub> =-32mA | 4.5              | 3.8   | 4.2                      | -                      | 3.8  | -                      |                        |                        |      |      |
|                           | Low Level              | V <sub>OL</sub>  | V <sub>IN</sub> =V <sub>IL</sub>                        | I <sub>OH</sub> =100 μA  | 1.8                    | -    | 0                      | 0.1                    | -                      | 0.1  | V    |
|                           |                        |                  |   |                          | 2.3                    | -    | 0                      | 0.1                    | -                      | 0.1  |      |
|                           |                        |                  |   |                          | 3.0                    | -    | 0                      | 0.1                    | -                      | 0.1  |      |
|                           |                        |                  |   |                          | 4.5                    | -    | 0                      | 0.1                    | -                      | 0.1  |      |
|                           |                        |                  |   | I <sub>OH</sub> =4mA     | 1.65                   | -    | 0.08                   | 0.24                   | -                      | 0.24 |      |
|                           |                        |                  |   | I <sub>OH</sub> =8mA     | 2.3                    | -    | 0.1                    | 0.3                    | -                      | 0.3  |      |
|                           |                        |                  |   | I <sub>OH</sub> =16mA    | 3.0                    | -    | 0.15                   | 0.4                    | -                      | 0.4  |      |
| I <sub>OH</sub> =24mA     |                        |                  |   | 3.0                      | -                      | 0.22 | 0.55                   | -                      | 0.55                   |      |      |
| I <sub>OH</sub> =32mA     | 4.5                    | -                | 0.22  | 0.55                     | -                      | 0.55 |                        |                        |                        |      |      |
| Input Leakage Current     |                        | I <sub>IN</sub>  | V <sub>IN</sub> =5.5V or GND                            | 0~5.5                    | -                      | -    | ±1                     | -                      | ±10                    | μA   |      |
| Power Off Leakage Current |                        | I <sub>OFF</sub> | V <sub>IN</sub> or V <sub>OUT</sub> =5.5V               | 0.0                      | -                      | -    | 1                      | -                      | 10                     | μA   |      |
| Quiescent Supply Current  |                        | I <sub>CC</sub>  | V <sub>IN</sub> =5.5V or GND                            | 1.65~5.5                 | -                      | -    | 1                      | -                      | 10                     | μA   |      |

# KIC7WZ74FK

AC Characteristics (unless otherwise specified, Input :  $t_r=t_f=3ns$ )

| CHARACTERISTIC  | SYMBOL                                   | TEST CONDITION                              |                     | Ta=25 °C |      |      | Ta=-40~85 °C |      | UNIT |
|---|--|---|---------------------|----------|------|------|--------------|------|------|
|   |  |   | V <sub>CC</sub> (V) | MIN.     | TYP. | MAX. | MIN.         | MAX. |      |
| Maximum Clock Frequency   | f <sub>MAX</sub>                         | C <sub>L</sub> =50pF, R <sub>L</sub> =500 Ω | 1.8 ± 0.15          | 51       | -    | -    | 38           | -    | MHz  |
|   |  |   | 2.5 ± 0.2           | 130      | -    | -    | 100          | -    |      |
|   |  |   | 3.3 ± 0.3           | 200      | -    | -    | 150          | -    |      |
|   |  |   | 5.0 ± 0.5           | 200      | -    | -    | 180          | -    |      |
| Propagation Delay Time (CK-Q, $\bar{Q}$ )                                     | t <sub>PLH</sub><br>t <sub>PHL</sub>     | C <sub>L</sub> =15pF, R <sub>L</sub> =1M Ω  | 1.8 ± 0.15          | 2.5      | 10.0 | 18.0 | 2.1          | 23.0 | ns   |
|   |  |   | 2.5 ± 0.2           | 2.0      | 4.9  | 7.5  | 1.7          | 9.0  |      |
|   |  |   | 3.3 ± 0.3           | 1.5      | 3.3  | 4.8  | 1.3          | 5.6  |      |
|   |  |   | 5.0 ± 0.5           | 1.0      | 2.4  | 3.5  | 1.0          | 3.9  |      |
|   |  | C <sub>L</sub> =50pF, R <sub>L</sub> =500 Ω | 3.3 ± 0.3           | 2.0      | 4.3  | 5.7  | 1.5          | 7.0  |      |
|   |  |   | 5.0 ± 0.5           | 1.5      | 2.8  | 4.0  | 1.3          | 4.4  |      |
| Propagation Delay Time ( $\overline{CLR}$ , $\overline{PR}$ , -Q, $\bar{Q}$ ) | t <sub>PLH</sub><br>t <sub>PHL</sub>     | C <sub>L</sub> =15pF, R <sub>L</sub> =1M Ω  | 1.8 ± 0.15          | 2.5      | 10.0 | 17.0 | 2.1          | 21.0 | ns   |
|   |  |   | 2.5 ± 0.2           | 2.0      | 5.0  | 7.3  | 1.7          | 8.8  |      |
|   |  |   | 3.3 ± 0.3           | 1.5      | 3.4  | 4.8  | 1.3          | 5.6  |      |
|   |  |   | 5.0 ± 0.5           | 1.5      | 2.2  | 3.5  | 1.0          | 3.9  |      |
|   |  | C <sub>L</sub> =50pF, R <sub>L</sub> =500 Ω | 3.3 ± 0.3           | 2.0      | 4.3  | 5.7  | 1.5          | 7.0  |      |
|   |  |   | 5.0 ± 0.5           | 1.0      | 3.1  | 3.9  | 1.0          | 4.3  |      |
| Minimum Setup Time  | t <sub>s</sub>                           | C <sub>L</sub> =50pF, R <sub>L</sub> =500 Ω | 2.5 ± 0.2           | 3.4      | -    | -    | 4.1          | -    | ns   |
|   |  |   | 3.3 ± 0.3           | 2.1      | -    | -    | 2.5          | -    |      |
|   |  |   | 5.0 ± 0.5           | 1.5      | -    | -    | 1.7          | -    |      |
| Minimum Hold Time   | t <sub>h</sub>                           | C <sub>L</sub> =50pF, R <sub>L</sub> =500 Ω | 2.5 ± 0.2           | 2.4      | -    | -    | 2.9          | -    | ns   |
|   |  |   | 3.3 ± 0.3           | 1.4      | -    | -    | 1.5          | -    |      |
|   |  |   | 5.0 ± 0.5           | 1.0      | -    | -    | 1.1          | -    |      |
| Minimum Pulse Width (CK)  | t <sub>w</sub> (L)<br>t <sub>w</sub> (H) | C <sub>L</sub> =50pF, R <sub>L</sub> =500 Ω | 2.5 ± 0.2           | 3.0      | -    | -    | 3.6          | -    | ns   |
|   |  |   | 3.3 ± 0.3           | 3.0      | -    | -    | 3.3          | -    |      |
|   |  |   | 5.0 ± 0.5           | 3.0      | -    | -    | 3.2          | -    |      |
| Minimum Pulse Width ( $\overline{CLR}$ , $\overline{PR}$ )                    | t <sub>w</sub> (L)                       | C <sub>L</sub> =50pF, R <sub>L</sub> =500 Ω | 2.5 ± 0.2           | 3.0      | -    | -    | 3.6          | -    | ns   |
|   |  |   | 3.3 ± 0.3           | 3.0      | -    | -    | 3.3          | -    |      |
|   |  |   | 5.0 ± 0.5           | 3.0      | -    | -    | 3.2          | -    |      |
| Minimum Removal Time  | t <sub>rem</sub>                         | C <sub>L</sub> =50pF, R <sub>L</sub> =500 Ω | 2.5 ± 0.2           | 3.6      | -    | -    | 4.4          | -    | ns   |
|   |  |   | 3.3 ± 0.3           | 2.2      | -    | -    | 2.5          | -    |      |
|   |  |   | 5.0 ± 0.5           | 1.3      | -    | -    | 1.4          | -    |      |
| Input Capacitance   | C <sub>IN</sub>                          | -   | 0~0.5               | -        | 3.0  | -    | -            | -    | pF   |
| Output Capacitance  | C <sub>OUT</sub>                         | -   | 0~0.5               | -        | 5.0  | -    | -            | -    | pF   |
| Power Dissipation Capacitance   | C <sub>PD</sub>                          | (Note 4)                                    | 3.3                 | -        | 30   | -    | -            | -    | pF   |
|   |  |   | 5.5                 | -        | 47   | -    | -            | -    |      |

Note 4 : C<sub>PD</sub> 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 :  $I_{CC(opr)}=C_{PD} \cdot V_{CC} \cdot f_{IN}+I_{CC}$