

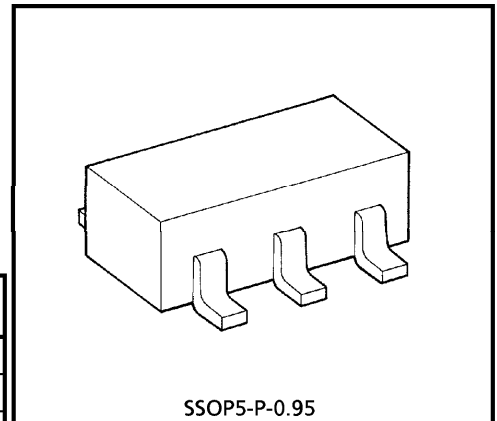
# TC4SU69F

## INVERTER GATE

The TC4SU69F is single inverter.  
Therefore, this is suitable for the applications of C, R oscillator circuits, crystal oscillator circuits and linear amplifiers in addition to its application as inverters.

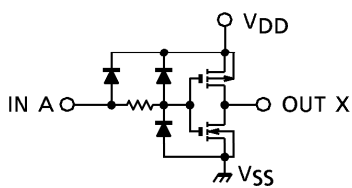
### MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC              | SYMBOL           | RATING  | UNIT |
|-----------------------------|------------------|---|------|
| DC Supply Voltage           | V <sub>DD</sub>  | V <sub>SS</sub> - 0.5 ~ V <sub>SS</sub> + 20  | V    |
| Input Voltage               | V <sub>IN</sub>  | V <sub>SS</sub> - 0.5 ~ V <sub>DD</sub> + 0.5 | V    |
| Output Voltage              | V <sub>OUT</sub> | V <sub>SS</sub> - 0.5 ~ V <sub>DD</sub> + 0.5 | V    |
| DC Input Current            | I <sub>IN</sub>  | ± 10  | mA   |
| Power Dissipation           | P <sub>D</sub>   | 200   | mW   |
| Operating Temperature Range | T <sub>opr</sub> | - 40 ~ 85                                     | °C   |
| Storage Temperature Range   | T <sub>stg</sub> | - 65 ~ 150                                    | °C   |
| Lead Temperature (10s)      | T <sub>L</sub>   | 260   | °C   |

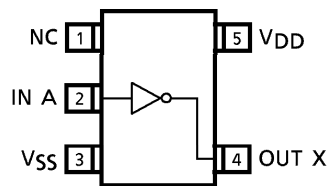


Weight : 0.016g (Typ.)

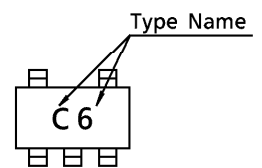
### LOGIC DIAGRAM



### PIN CONFIGURATION (TOP VIEW)



### Marking



**RECOMMENDED OPERATING CONDITIONS ( $V_{SS} = 0V$ )**

| CHARACTERISTIC    | SYMBOL   | MIN. | TYP. | MAX. | UNIT     |   |
|-------------------|----------|------|------|------|----------|---|
| DC Supply Voltage | $V_{DD}$ | —    | 3    | —    | 18       | V |
| Input Voltage     | $V_{IN}$ | —    | 0    | —    | $V_{DD}$ | V |

**STATIC ELECTRICAL CHARACTERISTICS ( $V_{SS} = 0V$ )**

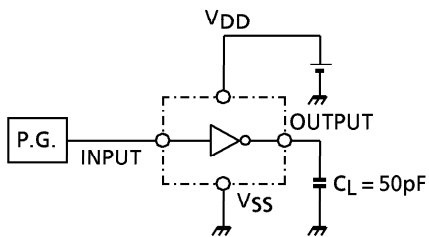
| CHARACTERISTIC            | SYM-BOL  | TEST CONDITION   | $V_{DD}$<br>(V) | - 40°C |      | 25°C  |       |            | 85°C  |      | UNIT    |         |
|---------------------------|----------|--|-----------------|--------|------|-------|-------|------------|-------|------|---------|---------|
|                           |          |  |                 | MIN.   | MAX. | MIN.  | TYP.  | MAX.       | MIN.  | MAX. |         |         |
| High-Level Output Voltage | $V_{OH}$ | $ I_{OUT}  < 1\mu A$<br>$V_{IN} = V_{SS}$  | 5               | 4.95   | —    | 4.95  | 5.00  | —          | 4.95  | —    | V       |         |
|                           |          |  | 10              | 9.95   | —    | 9.95  | 10.00 | —          | 9.95  | —    |         |         |
|                           |          |  | 15              | 14.95  | —    | 14.95 | 15.00 | —          | 14.95 | —    |         |         |
| Low-Level Output Voltage  | $V_{OL}$ | $ I_{OUT}  < 1\mu A$<br>$V_{IN} = V_{DD}$  | 5               | —      | 0.05 | —     | 0.00  | 0.05       | —     | 0.05 | V       |         |
|                           |          |  | 10              | —      | 0.05 | —     | 0.00  | 0.05       | —     | 0.05 |         |         |
|                           |          |  | 15              | —      | 0.05 | —     | 0.00  | 0.05       | —     | 0.05 |         |         |
| Output High Current       | $I_{OH}$ | $V_{OH} = 4.6V$<br>$V_{OH} = 2.5V$<br>$V_{OH} = 9.5V$<br>$V_{OH} = 13.5V$<br>$V_{IN} = V_{SS}$ | 5               | -0.61  | —    | -0.51 | -1.0  | —          | -0.42 | —    | mA      |         |
|                           |          |  | 5               | -2.5   | —    | -2.1  | -4.0  | —          | -1.7  | —    |         |         |
|                           |          |  | 10              | -1.5   | —    | -1.3  | -2.2  | —          | -1.1  | —    |         |         |
|                           |          |  | 15              | -4.0   | —    | -3.4  | -9.0  | —          | -2.8  | —    |         |         |
| Output Low Current        | $I_{OL}$ | $V_{OL} = 0.4V$<br>$V_{OL} = 0.5V$<br>$V_{OL} = 1.5V$<br>$V_{IN} = V_{DD}$                     | 5               | 0.61   | —    | 0.51  | 1.2   | —          | 0.42  | —    | mA      |         |
|                           |          |  | 10              | 1.5    | —    | 1.3   | 3.2   | —          | 1.1   | —    |         |         |
|                           |          |  | 15              | 4.0    | —    | 3.4   | 12.0  | —          | 2.8   | —    |         |         |
|                           |          |  | 5               | 4.0    | —    | 4.0   | —     | —          | 4.0   | —    |         |         |
| Input High Voltage        | $V_{IH}$ | $V_{OUT} = 0.5V$<br>$V_{OUT} = 1.0V$<br>$V_{OUT} = 1.5V$<br>$ I_{OUT}  < 1\mu A$               | 10              | 8.0    | —    | 8.0   | —     | —          | 8.0   | —    | V       |         |
|                           |          |  | 15              | 12.0   | —    | 12.0  | —     | —          | 12.0  | —    |         |         |
|                           |          |  | 5               | —      | 1.0  | —     | —     | 1.0        | —     | 1.0  |         | —       |
| Input Low Voltage         | $V_{IL}$ | $V_{OUT} = 4.5V$<br>$V_{OUT} = 9.0V$<br>$V_{OUT} = 13.5V$<br>$ I_{OUT}  < 1\mu A$              | 10              | —      | 2.0  | —     | —     | 2.0        | —     | 2.0  | V       |         |
|                           |          |  | 15              | —      | 3.0  | —     | —     | 3.0        | —     | 3.0  |         |         |
|                           |          |  | 5               | —      | —    | —     | —     | —          | —     | —    |         |         |
| Input Current             | H Level  | $I_{IH}$   | $V_{IH} = 18V$  | 18     | —    | 0.1   | —     | $10^{-5}$  | 0.1   | —    | 1.0     | $\mu A$ |
|                           | L Level  | $I_{IL}$   | $V_{IL} = 0V$   | 18     | —    | -0.1  | —     | $-10^{-5}$ | -0.1  | —    | -1.0    |         |
| Quiescent Device Current  | $I_{DD}$ | $V_{IN} = V_{SS}, V_{DD}$  | 5               | —      | 0.25 | —     | 0.001 | 0.25       | —     | 7.5  | $\mu A$ |         |
|                           |          |  | 10              | —      | 0.5  | —     | 0.001 | 0.5        | —     | 15   |         |         |
|                           |          |  | 15              | —      | 1.0  | —     | 0.002 | 1.0        | —     | 30   |         |         |

**DYNAMIC ELECTRICAL CHARACTERISTICS** ( $T_a = 25^\circ\text{C}$ ,  $V_{SS} = 0\text{V}$ ,  $C_L = 50\text{pF}$ )

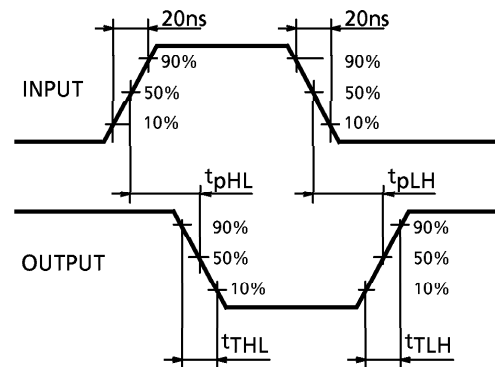
| CHARACTERISTIC                          | SYMBOL           | TEST CONDITION | V <sub>DD</sub> (V) | MIN. | TYP. | MAX. | UNIT |
|---|------------------|----------------|---------------------|------|------|------|------|
|   |                  |                |                     |      |      |      |      |
| Output Transition Time<br>(Low to High) | t <sub>TLH</sub> | —              | 5                   | —    | 70   | 200  | ns   |
|   |                  |                | 10                  | —    | 35   | 100  |      |
|   |                  |                | 15                  | —    | 30   | 80   |      |
| Output Transition Time<br>(High to Low) | t <sub>THL</sub> | —              | 5                   | —    | 70   | 200  | ns   |
|   |                  |                | 10                  | —    | 35   | 100  |      |
|   |                  |                | 15                  | —    | 30   | 80   |      |
| Propagation Delay Time                  | t <sub>pLH</sub> | —              | 5                   | —    | 55   | 110  | ns   |
|   |                  |                | 10                  | —    | 30   | 60   |      |
|   |                  |                | 15                  | —    | 25   | 50   |      |
| Propagation Delay Time                  | t <sub>pHL</sub> | —              | 5                   | —    | 55   | 110  | ns   |
|   |                  |                | 10                  | —    | 30   | 60   |      |
|   |                  |                | 15                  | —    | 25   | 50   |      |
| Input Capacitance                       | C <sub>IN</sub>  | —              | —                   | 7.5  | 15   | pF   |      |

**CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS**

TEST CIRCUIT

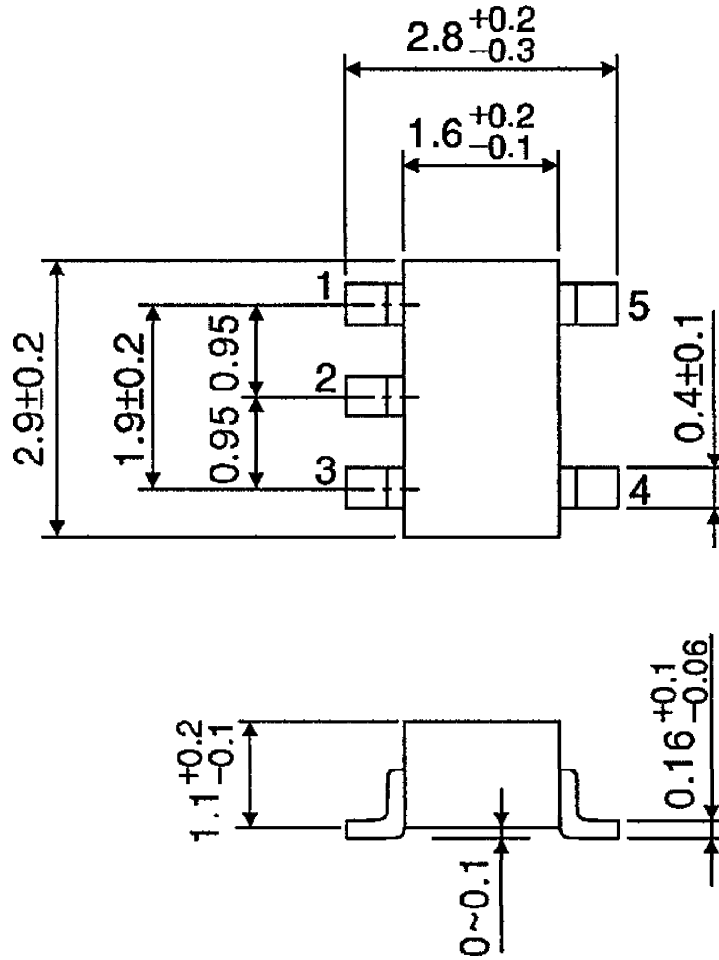


WAVEFORM



PACKAGE DIMENSIONS  
SSOP5-P-0.95

Unit : mm



Weight : 0.016g (Typ.)

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000707EBA

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