

TOSHIBA

TC4SU69F

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

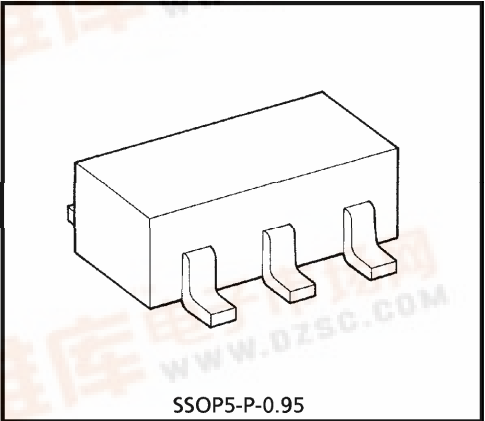
TC4SU69F

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.

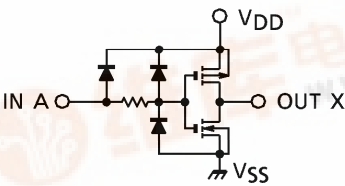
MAXIMUM RATINGS (Ta = 25°C)

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

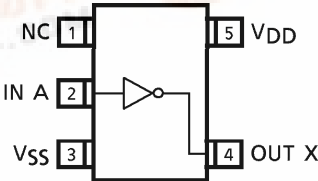


Weight : 0.016g (Typ.)

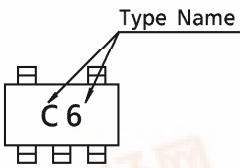
LOGIC DIAGRAM



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 ($V_{SS} = 0V$)

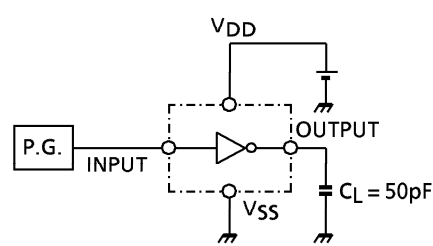
| CHARACTERISTIC | SYM-BOL | TEST CONDITION | V_{DD} (V) | - 40°C | | 25°C | | | 85°C | | UNIT |
|---------------------------|----------|---|-----------------|--------|------|-------|-------|------------|-------|------|---------|
| | | | | MIN. | MAX. | MIN. | TYP. | MAX. | MIN. | MAX. | |
| High-Level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

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C, VSS = 0V, CL = 50pF)

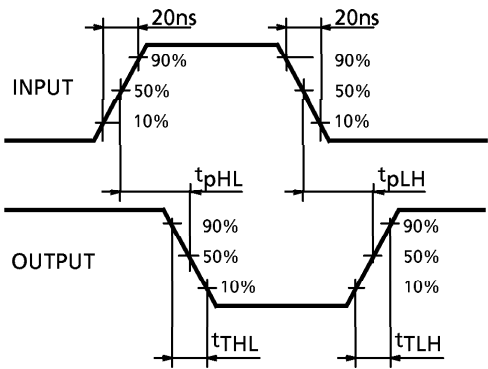
| CHARACTERISTIC | SYMBOL | TEST CONDITION | VDD (V) | MIN. | TYP. | MAX. | UNIT |
|---|--------|----------------|---------|------|------|------|------|
| | | | | | | | |
| Output Transition Time (Low to High) | tTLH | — | 5 | — | 70 | 200 | ns |
| | | | 10 | — | 35 | 100 | |
| | | | 15 | — | 30 | 80 | |
| Output Transition Time (High to Low) | tTHL | — | 5 | — | 70 | 200 | ns |
| | | | 10 | — | 35 | 100 | |
| | | | 15 | — | 30 | 80 | |
| Propagation Delay Time | tpLH | — | 5 | — | 55 | 110 | ns |
| | | | 10 | — | 30 | 60 | |
| | | | 15 | — | 25 | 50 | |
| Propagation Delay Time | tpHL | — | 5 | — | 55 | 110 | ns |
| | | | 10 | — | 30 | 60 | |
| | | | 15 | — | 25 | 50 | |
| Input Capacitance | CIN | — | | — | 7.5 | 15 | pF |

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

TEST CIRCUIT

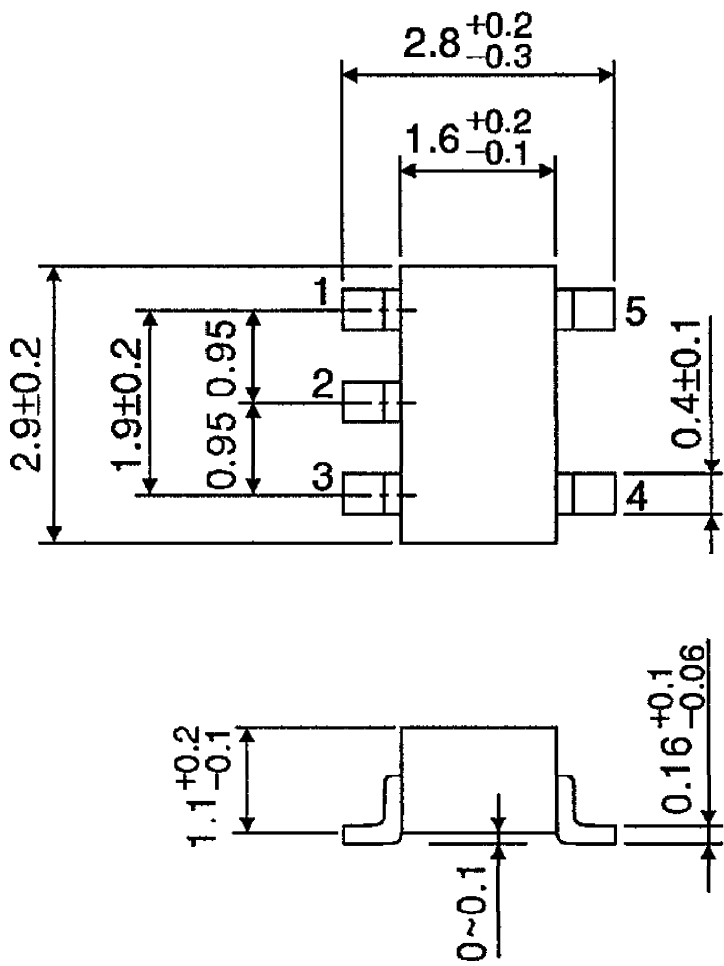


WAVEFORM



PACKAGE DIMENSIONS
SSOP5-P-0.95

Unit : mm



Weight : 0.016g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

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