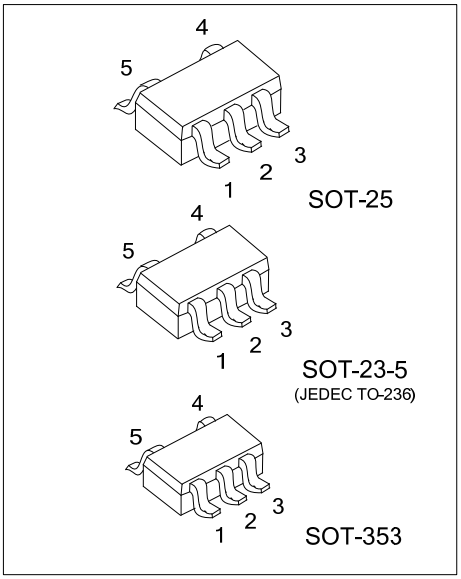
# U74AHCT1G04

**CMOS IC**

## SINGLE INVERTER GATE




### ■ DESCRIPTION

The UTC **U74AHCT1G04** is a single inverter gate, which provides the Function $Y = \overline{A}$

### ■ FEATURES

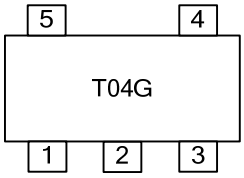
* Inputs are TTL voltage compatible
* Operation Voltage Range: 4.5V~5.5V
* Low Power Dissipation: $I_{CC}$=10μA(Max)
* High Speed: tpd=7.5ns(Typ)
* Halogen Free

### ■ ORDERING INFORMATION

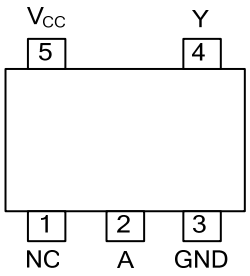
| Ordering Number | Package | Packing |
|---|---|---|
| U74AHCT1G04G-AE5-R | SOT-23-5 | Tape Reel |
| U74AHCT1G04G-AF5-R | SOT-25 | Tape Reel |
| U74AHCT1G04G-AL5-R | SOT-353 | Tape Reel |

| | |
|---|---|
| U74AHCT1G04G-AE5-R<br>(1)Packing Type<br>(2)Package Type<br>(3)Green Package | <br>(1) R: Tape Reel<br>(2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353<br>(3) G: Halogen Free and Lead Free |

### ■ MARKING



## ■ PIN CONFIGURATION

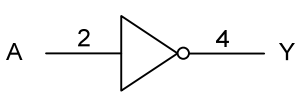


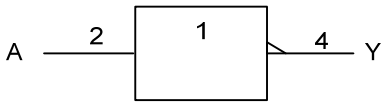

## ■ FUNCTION TABLE

| INPUT(A) | OUTPUT(Y) |
|---|---|
| H | L |
| L | H |

Note: H: high voltage level; L: low voltage level.

## ■ LOGIC DIAGRAM



## ■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage | $V_{CC}$ | -0.5~+7.0 | V |
| Input Voltage (Note 2) | $V_{IN}$ | -0.5~+7.0 | V |
| Output Voltage (Note 2) | $V_{OUT}$ | -0.5~$V_{CC}$+0.5 | V |
| $V_{CC}$ or GND Current | $I_{CC}$ | ±50 | mA |
| Output Current | $I_{OUT}$ | ±25 | mA |
| Input Clamp Current | $I_{IK}$ | -20 | mA |
| Output Clamp Current | $I_{OK}$ | ±20 | mA |
| Operating Temperature | $T_{OPR}$ | -40 ~ +85 | °C |
| Storage Temperature | $T_{STG}$ | -65 ~ +150 | °C |

Note: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

## ■ THERMAL DATA

| PARAMETER | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Junction to Ambient | SOT-23-5 | $\theta_{JA}$ | 280 | °C/W |
| | SOT-25 | | 230 | °C/W |
| | SOT-353 | | 350 | °C/W |

## ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | | 4.5 | | 5.5 | V |
| Input Voltage | $V_{IN}$ | | 0 | | 5.5 | V |
| Output Voltage | $V_{OUT}$ | | 0 | | $V_{CC}$ | V |
| High-level Input Voltage | $V_{IH}$ | | 2 | | | V |
| Low-level Input Voltage | $V_{IL}$ | | | | 0.8 | V |
| High-level Output Current | $I_{OH}$ | | | | -8 | mA |
| Low-level Output Current | $I_{OL}$ | | | | 8 | mA |
| Input Transition Rise or Fall Rate | $t_R$, $t_F$ | | | | 20 | ns/V |

## ■ ELECTRICAL CHARACTERISTICS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| High-Level Output Voltage | $V_{OH}$ | $V_{CC}$=4.5V, $I_{OH}$=-50μA | 4.4 | 4.5 | | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=-8mA | 3.94 | | | |
| Low-Level Output Voltage | $V_{OL}$ | $V_{CC}$=4.5V, $I_{OH}$=50μA | | | 0.1 | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=8mA | | | 0.36 | |
| Input Leakage Current | $I_{I(LEAK)}$ | $V_{CC}$=0~5.5V, $V_{IN}$=5.5V or GND | | | ±0.1 | μA |
| Quiescent Supply Current | $I_Q$ | $V_{CC}$=5.5V, $V_{IN}$=$V_{CC}$ or GND, $I_{OUT}$=0 | | | 1 | μA |
| Additional Quiescent Supply Current | $\Delta I_Q$ | $V_{CC}$=5.5V, One input at 3.4V, Other inputs at $V_{CC}$ or GND | | | 1.35 | mA |
| Input Capacitance | $C_I$ | $V_{CC}$=5V, $V_{IN}$=$V_{CC}$ or GND | | 4 | 10 | pF |

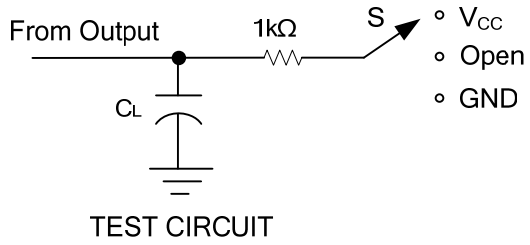
## ■ DYNAMIC CHARACTERISTICS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Propagation Delay Time Input(A) to Output(Y) | $t_{PLH}$ | $V_{CC}$=5V±0.5V, $C_L$=15pF | | 4.7 | 6.7 | ns |
| | $t_{PHL}$ | | | 4.7 | 6.7 | |
| | $t_{PLH}$ | $V_{CC}$=5V±0.5V, $C_L$=50pF | | 5.5 | 7.7 | |
| | $t_{PHL}$ | | | 5.5 | 7.7 | |

## ■ OPERATING CHARACTERISTICS ($T_A$=25°C)

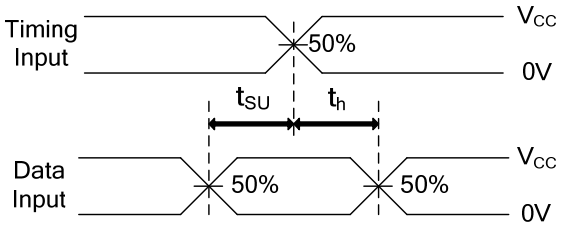
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Power Dissipation Capacitance | Cpd | No load, $V_{CC}$=5V, f=1MHz | | 14 | | pF |

## ■ TEST CIRCUIT AND WAVEFORMS

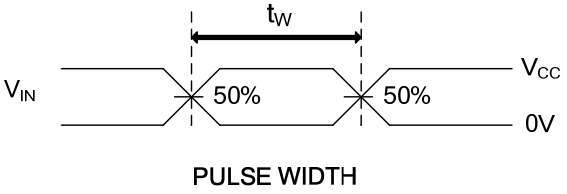



TEST CIRCUIT

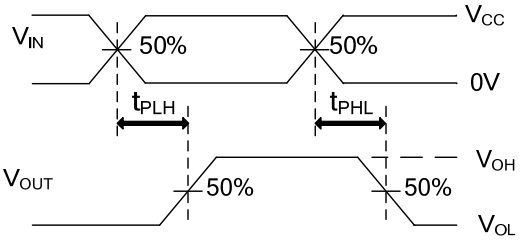
| TEST | S |
|---|---|
| $t_{PLH}/t_{PHL}$ | Open |
| $t_{PHZ}/t_{PZH}$ | GND |
| $t_{PLZ}/t_{PZL}$ | $V_{CC}$ |



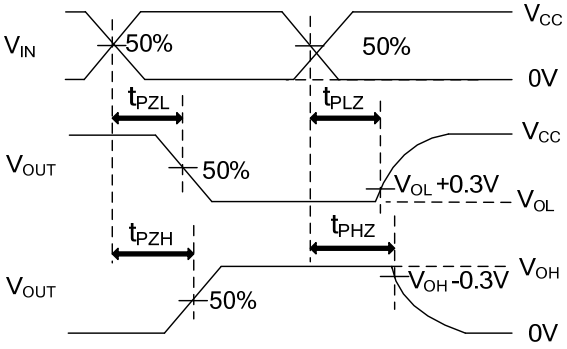

SETUP TIME AND HOLD TIME




PULSE WIDTH




PROPAGATION DELAY TIMES




ENABLE AND DISABLE TIMES

Note: $C_L$ includes probe and jig capacitance.
PRR≦1MHz, $Z_O$=50Ω, $t_R$≦3ns, $t_F$≦3ns