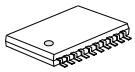
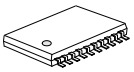
# U74HC244B

**CMOS IC**

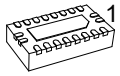
# OCTAL BUFFER AND LINE DRIVER WITH 3-STATE OUTPUT



TSSOP-20



TSSOP-20U



QFN-20(4.5×2.5)

## ■ DESCRIPTION

The **U74HC244B** are octal buffer and line drivers with non-inverting 3-state outputs. When n$\overline{OE}$ is High, the outputs nYn will be in the high impedance.

## ■ FEATURES

* Operation voltage range: 2V ~ 6V
* 3-state output
* Output Drive Capability: 15 LSTTL Loads
* Green & Pb Free

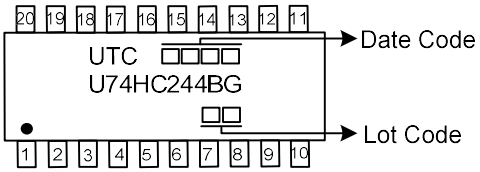
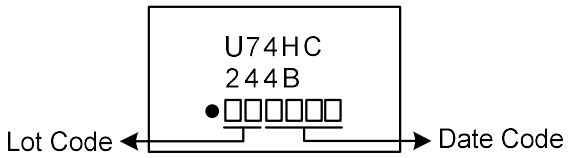
## ■ ORDERING INFORMATION

| Ordering Number | Package | Packing |
|---|---|---|
| U74HC244BG-P20-R | TSSOP-20 | Tape Reel |
| U74HC244BG-ULA-R | TSSOP-20U | Tape Reel |
| U74HC244BG-QAL-R | QFN-20(4.5×2.5) | Tape Reel |

U74HC244BG-P20-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) P20: TSSOP-20, ULA: TSSOP-20U
QAL: QFN-20(4.5×2.5)
(3) G: Halogen Free and Lead Free

## ■ MARKING

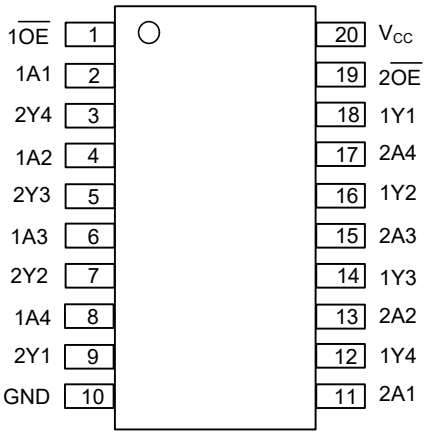
| TSSOP-20 / TSSOP-20U | QFN-20(4.5×2.5) |
|---|---|
|  |  |



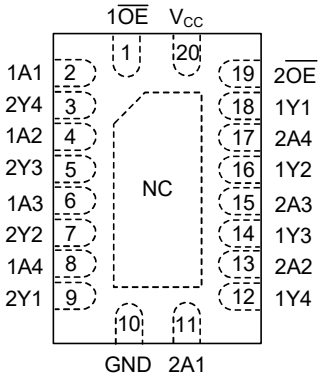



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## ■ PIN CONFIGURATION




TSSOP-20
TSSOP-20U

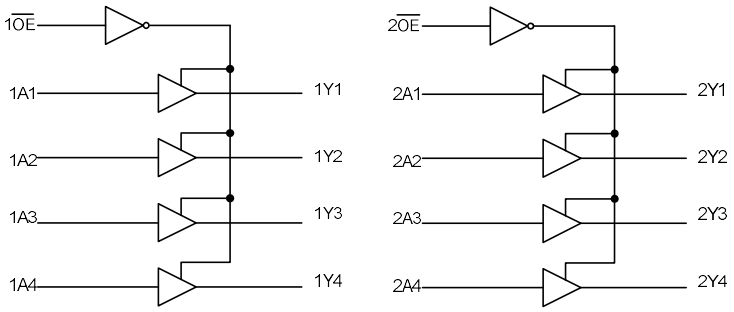



QFN-20(4.5×2.5)
(TOP VIEW)

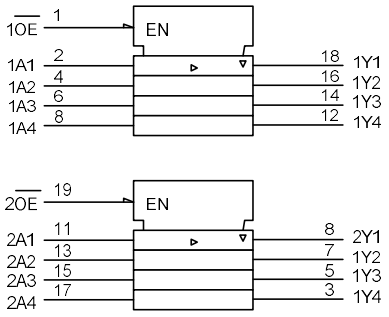
## ■ FUNCTION TABLE

| INPUT n $\overline{OE}$ | INPUT(nAn) | OUTPUT(nYn) |
|---|---|---|
| H | X | Z |
| L | H | H |
| L | L | L |

## ■ LOGIC DIAGRAM (positive logic)




Logic symbol




IEC logic symbol

## ■ ABSOLUTE MAXIMUM RATINGS ($T_A$=25°C, unless otherwise specified) (Note 1、2)

| PARAMETER | SYMBOL | CONDITIONS | RATINGS | UNIT |
|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | | -0.5 ~ 7 | V |
| $V_{CC}$ or GND Current | $I_{CC}$ | | ±70 | mA |
| Output Current | $I_{OUT}$ | $V_{OUT}$= 0 to $V_{CC}$ | ±35 | mA |
| Input Clamp Current | $I_{IK}$ | $V_{IN}$< 0 or $V_{IN}$ > $V_{CC}$ | ±20 | mA |
| Output Clamp Current | $I_{OK}$ | $V_{OUT}$ < 0 or $V_{OUT}$ > $V_{CC}$ | ±20 | mA |
| Storage Temperature | $T_{STG}$ | | -65 ~ + 150 | °C |

Notes: 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. It's guarantee by design, this parameter is not production tested.

## ■ RECOMMENDED OPERATING CONDITIONS (NOTE)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | | 2 | | 6 | V |
| Input Voltage | $V_{IN}$ | | 0 | | $V_{CC}$ | V |
| Output Voltage | $V_{OUT}$ | | 0 | | $V_{CC}$ | V |
| Input Rise or Fall Times | $t_R$, $t_F$ | $V_{CC}$=2V | | | 1000 | ns |
| | | $V_{CC}$=4.5V | | | 500 | ns |
| | | $V_{CC}$=6V | | | 400 | ns |
| Operating Temperature | $T_A$ | | -40 | | +125 | °C |

Note: It's guarantee by design, this parameter is not production tested.

## ■ STATIC CHARACTERISTICS (Unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | $T_A$=25°C | | | $T_A$=-40~+125°C | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| High-Level Input Voltage | $V_{IH}$ | $V_{CC}$=2V | 1.5 | | | 1.5 | | | V |
| | | $V_{CC}$=4.5V | 3.15 | | | 3.15 | | | V |
| | | $V_{CC}$=6V | 4.2 | | | 4.2 | | | V |
| Low-Level Input Voltage | $V_{IL}$ | $V_{CC}$=2V | | | 0.5 | | | 0.5 | V |
| | | $V_{CC}$=4.5V | | | 1.35 | | | 1.35 | V |
| | | $V_{CC}$=6V | | | 1.8 | | | 1.8 | V |
| High-Level Output Voltage | $V_{OH}$ | $V_{CC}$=2V, $I_{OH}$=-20μA | 1.9 | | | 1.9 | | | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=-20μA | 4.4 | | | 4.4 | | | V |
| | | $V_{CC}$=6V, $I_{OH}$=-20μA | 5.9 | | | 5.9 | | | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=-6mA | 3.98 | | | 3.7 | | | V |
| | | $V_{CC}$=6V, $I_{OH}$=-7.8mA | 5.48 | | | 5.2 | | | V |
| Low-Level Output Voltage | $V_{OL}$ | $V_{CC}$=2V, $I_{OL}$=20μA | | | 0.1 | | | 0.1 | V |
| | | $V_{CC}$=4.5V, $I_{OL}$=20μA | | | 0.1 | | | 0.1 | V |
| | | $V_{CC}$=6V, $I_{OL}$=20μA | | | 0.1 | | | 0.1 | V |
| | | $V_{CC}$=4.5V, $I_{OL}$=6mA | | | 0.26 | | | 0.4 | V |
| | | $V_{CC}$=6V, $I_{OL}$=7.8mA | | | 0.26 | | | 0.4 | V |
| Input Leakage Current | $I_{I(LEAK)}$ | $V_{CC}$=6V, $V_{IN}$=$V_{CC}$ or 0 | | | ±100 | | | ±1000 | nA |
| Output OFF-State Current | $I_{OZ}$ | $V_{CC}$=6V,$V_{OUT}$=$V_{CC}$ or 0,$V_{IN}$=$V_{IH}$ or $V_{IL}$ | | | ±0.5 | | | ±10 | μA |
| Quiescent Supply Current | $I_Q$ | $V_{CC}$=6V, $V_{IN}$=$V_{CC}$ or 0, $I_{OUT}$=0 | | | 8 | | | 160 | μA |

Note: It's guarantee by design, this parameter is not production tested.

## ■ DYNAMIC CHARACTERISTICS (Input: $t_R$, $t_F$=6ns, unless otherwise specified)

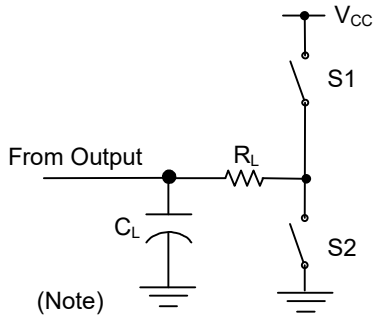
| PARAMETER | SYMBOL | TEST CONDITIONS | $T_A$=25°C | | | $T_A$=-40~+125°C | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| Propagation Delay From Input (nAn) to Output (nYn) | $t_{PLH}$ /$t_{PHL}$ | $V_{CC}$=2V, $C_L$=50pF | | 17 | 115 | | | 145 | ns |
| | | $V_{CC}$=2V, $C_L$=150pF | | 27 | 165 | | | 245 | ns |
| | | $V_{CC}$=4.5V, $C_L$=50pF | | 7 | 23 | | | 34 | ns |
| | | $V_{CC}$=4.5V, $C_L$=150pF | | 11 | 33 | | | 49 | ns |
| | | $V_{CC}$=6V, $C_L$=50pF | | 6 | 20 | | | 25 | ns |
| | | $V_{CC}$=6V, $C_L$=150pF | | 10 | 28 | | | 42 | ns |
| 3-State Output Enable Time n$\overline{OE}$ to nYn | $t_{PZH}$ /$t_{PZL}$ | $V_{CC}$=2V, $C_L$=50pF | | 19 | 150 | | | 190 | ns |
| | | $V_{CC}$=2V, $C_L$=150pF | | 32 | 200 | | | 300 | ns |
| | | $V_{CC}$=4.5V, $C_L$=50pF | | 8 | 30 | | | 45 | ns |
| | | $V_{CC}$=4.5V, $C_L$=150pF | | 12 | 40 | | | 60 | ns |
| | | $V_{CC}$=6V, $C_L$=50pF | | 5 | 26 | | | 32 | ns |
| | | $V_{CC}$=6V, $C_L$=150pF | | 9 | 34 | | | 51 | ns |
| 3-State Output Disable Time n$\overline{OE}$ to nYn | $t_{PHZ}$ /$t_{PLZ}$ | $V_{CC}$=2V, $C_L$=50pF | | 12 | 150 | | | 190 | ns |
| | | $V_{CC}$=4.5V, $C_L$=50pF | | 8 | 30 | | | 45 | ns |
| | | $V_{CC}$=6V, $C_L$=50pF | | 7 | 26 | | | 32 | ns |
| Propagation Delay From Input (Y) | $t_t$ | $V_{CC}$=2V, $C_L$=50pF | | 19 | 60 | | | 90 | ns |
| | | $V_{CC}$=2V, $C_L$=150pF | | 35 | 210 | | | 315 | ns |
| | | $V_{CC}$=4.5V, $C_L$=50pF | | 7 | 12 | | | 18 | ns |
| | | $V_{CC}$=4.5V, $C_L$=150pF | | 17 | 42 | | | 63 | ns |
| | | $V_{CC}$=6V, $C_L$=50pF | | 6 | 10 | | | 15 | ns |
| | | $V_{CC}$=6V, $C_L$=150pF | | 16 | 36 | | | 53 | ns |

Note: It's guarantee by design, this parameter is not production tested.

## ■ OPERATING CHARACTERISTICS

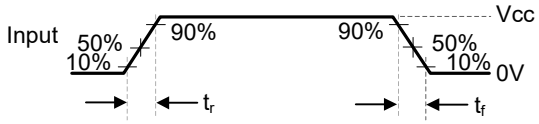
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Input Capacitance | $C_{IN}$ | $V_{CC}$=2V~6V | | | 10 | pF |
| Power Dissipation Capacitance | $C_{PD}$ | No load | | 35 | | pF |

## ■ TEST CIRCUIT AND WAVEFORMS

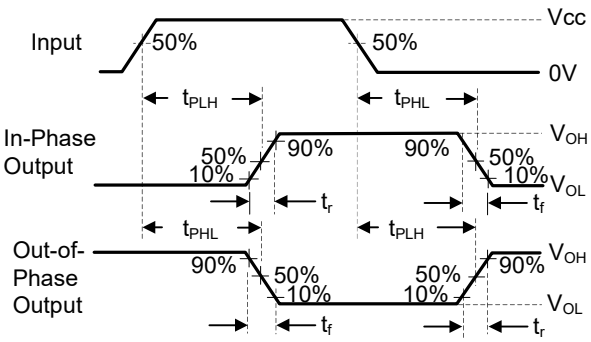



| TEST | | RL | CL | S1 | S2 |
|---|---|---|---|---|---|
| $t_{en}$ | $t_{PZH}$ | 1kΩ | 50pF or 150pF | Open | Close |
| | $t_{PZL}$ | | | Close | Open |
| $t_{dis}$ | $t_{PHZ}$ | 1kΩ | 50pF | Open | Close |
| | $t_{PLZ}$ | | | Close | Open |
| $t_{PD}$ or $t_t$ | | - | 50pF or 150pF | Open | Open |

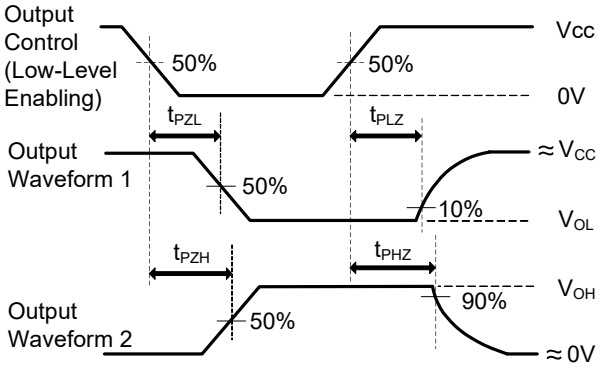
Notes: 1. $C_L$ includes probe and jig capacitance.
2. $P_{RR} \leq 1MHz$, $Z_O = 50\Omega$, $t_R \leq 6ns$, $t_F \leq 6ns$.




**Voltag Waveform**

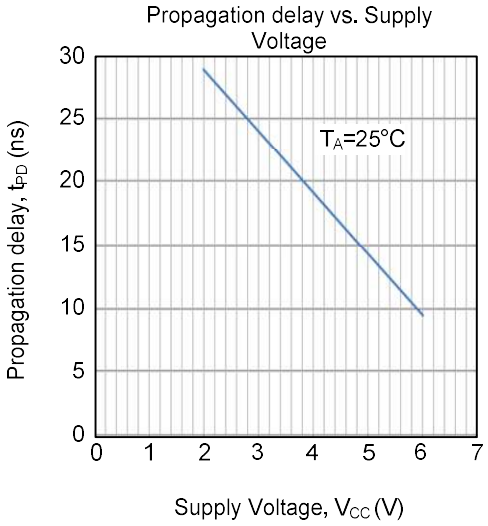


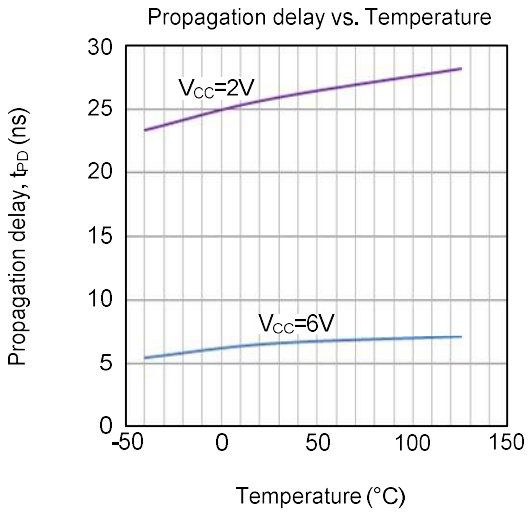

**Propagation Delay Times**




**Enable and Disable Times**

## ■ TYPICAL CHARACTERISTICS




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