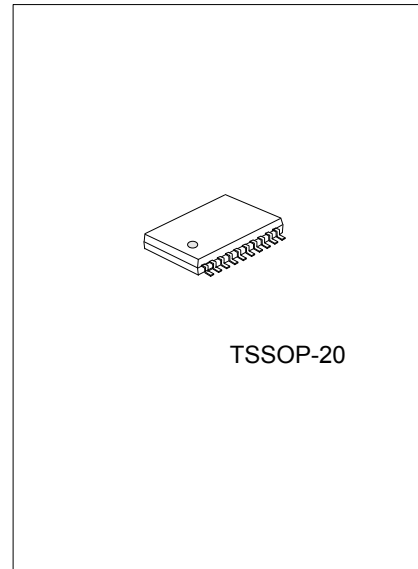




U74HC541

CMOS IC

OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS



DESCRIPTION

The **U74HC541** is a octal buffers and line drivers with 3-state outputs and 8 channels.

FEATURES

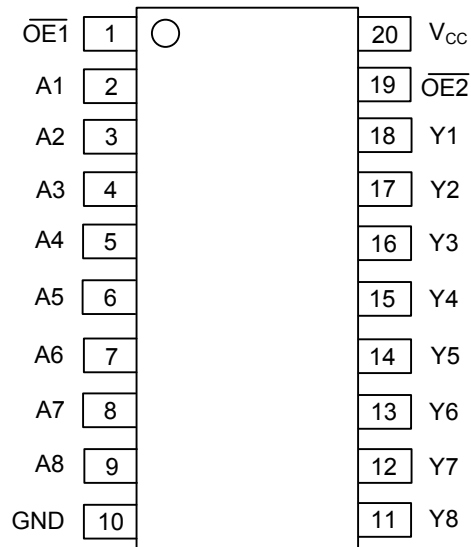
- * Operate from 2V to 6V
- * Max t_{PD} of 23ns at 4.5 V($C_L=50pF$)
- * Typical $V_{IH} < 3.15V$ at $V_{CC}=4.5V, T_a=25^\circ C$
- * Typical $V_{IL} > 1.35V$ at $V_{CC}=4.5V, T_a=25^\circ C$

ORDERING INFORMATION

| Ordering Number | Package | Packing |
|-----------------|----------|-----------|
| U74HC541G-P20-R | TSSOP-20 | Tape Reel |
| U74HC541G-P20-T | TSSOP-20 | Tube |

| | |
|--|--|
| <p>U74HC541G-P20-R</p> <p>(1) Packing Type (2) Package Type (3) Halogen Free</p> | <p>(1) R: Tape Reel, T: Tube (2) P20: TSSOP-20 (3) G: Halogen Free</p> |
|--|--|

■ PIN CONFIGURATION

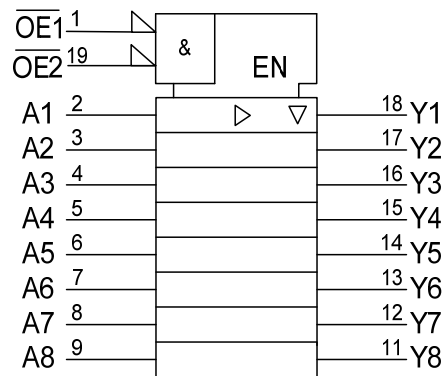


■ FUNCTION TABLE

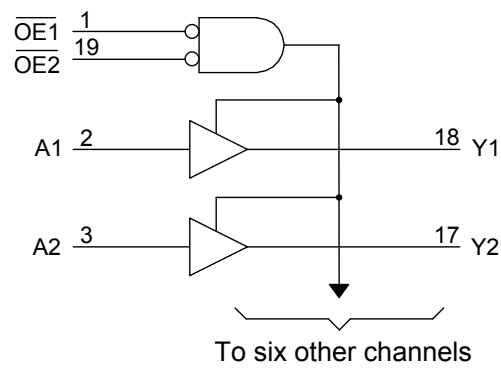
| INPUTS($\overline{OE1}$) | INPUTS($\overline{OE2}$) | INPUTS(A) | OUTPUT(Y) |
|----------------------------|----------------------------|-----------|-----------|
| L | L | L | L |
| L | L | H | H |
| H | X | X | Z |
| X | H | X | Z |

Note: H: HIGH voltage level L: LOW voltage level Z: High impedance X: Don't care

■ LOGIC SYMBOL



■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-------------------------|-----------|-------------|------|
| Supply Voltage | V_{CC} | -0.5 ~ 7 | V |
| V_{CC} or GND Current | I_{CC} | ± 70 | mA |
| Output Current | I_{OUT} | ± 35 | 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: 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.

■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------------|------------|-----------------|------|-----|----------|------|
| Supply Voltage | V_{CC} | | 2 | | 6 | V |
| High-Level Input Voltage | V_{IH} | $V_{CC}=2V$ | 1.5 | | | V |
| | | $V_{CC}=4.5V$ | 3.15 | | | |
| | | $V_{CC}=6V$ | 4.2 | | | |
| Low-Level Input Voltage | V_{IL} | $V_{CC}=2V$ | | | 0.5 | V |
| | | $V_{CC}=4.5V$ | | | 1.35 | |
| | | $V_{CC}=6V$ | | | 1.8 | |
| Input Voltage | V_{IN} | | 0 | | V_{CC} | V |
| Output Voltage | V_{OUT} | | 0 | | V_{CC} | V |
| Input Transition Rise or Fall Rate | t_R, t_F | $V_{CC}=2V$ | | | 1000 | ns |
| | | $V_{CC}=4.5V$ | | | 500 | |
| | | $V_{CC}=6V$ | | | 400 | |

■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ C$)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------|---------------|--|------|------------|-----------|---------|
| Output Voltage High-Level | V_{OH} | $V_{CC}=2V, I_{OH}=-20\mu A$ | 1.9 | 1.998 | | V |
| | | $V_{CC}=4.5V, I_{OH}=-20\mu A$ | 4.4 | 4.499 | | |
| | | $V_{CC}=6V, I_{OH}=-20\mu A$ | 5.9 | 5.999 | | |
| | | $V_{CC}=4.5V, I_{OH}=-6mA$ | 3.98 | 4.3 | | |
| | | $V_{CC}=6V, I_{OH}=-7.8mA$ | 5.48 | 5.8 | | |
| Output Voltage Low-Level | V_{OL} | $V_{CC}=2V, I_{OL}=20\mu A$ | | 0.002 | 0.1 | V |
| | | $V_{CC}=4.5V, I_{OL}=20\mu A$ | | 0.001 | 0.1 | |
| | | $V_{CC}=6V, I_{OL}=20\mu A$ | | 0.001 | 0.1 | |
| | | $V_{CC}=4.5V, I_{OL}=6mA$ | | 0.17 | 0.26 | |
| | | $V_{CC}=6V, I_{OL}=7.8mA$ | | 0.15 | 0.26 | |
| Input Leakage Current | $I_{I(LEAK)}$ | $V_{CC}=6V, V_{IN}=V_{CC}$ or GND | | ± 0.1 | ± 100 | nA |
| Output Off-state Current | I_{OZ} | $V_{CC}=6V, V_{OUT}=V_{CC}$ or GND | | ± 0.01 | ± 0.5 | μA |
| Quiescent Supply Current | I_Q | $V_{CC}=6V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ | | | 8 | μA |
| Input Capacitance | C_{IN} | $V_{CC}=2V$ to 6V | | 3 | 10 | pF |

■ SWITCHING CHARACTERISTICS (T_A=25°C, C_L=50pF)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|------------------------------------|-----------------------|-----|-----|-----|------|
| Propagation Delay From Input (A) to Output (Y) | t _{PLH} /t _{PHL} | V _{CC} =2V | | 40 | 115 | ns |
| | | V _{CC} =4.5V | | 12 | 23 | |
| | | V _{CC} =6V | | 10 | 20 | |
| Output Enable Time From \overline{OE} to Y | t _{PZL} /t _{PZH} | V _{CC} =2V | | 80 | 150 | ns |
| | | V _{CC} =4.5V | | 17 | 30 | |
| | | V _{CC} =6V | | 15 | 26 | |
| Output Disable Time From \overline{OE} to Y | t _{PLZ} /t _{PHZ} | V _{CC} =2V | | 40 | 150 | ns |
| | | V _{CC} =4.5V | | 18 | 30 | |
| | | V _{CC} =6V | | 17 | 26 | |
| Output Y | t _t | V _{CC} =2V | | 28 | 60 | ns |
| | | V _{CC} =4.5V | | 8 | 12 | |
| | | V _{CC} =6V | | 6 | 10 | |

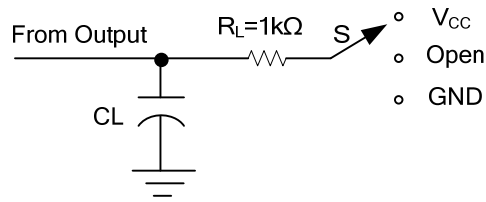
■ SWITCHING CHARACTERISTICS (T_A=25°C, C_L=150pF)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|------------------------------------|-----------------------|-----|-----|-----|------|
| Propagation Delay From Input (A) to Output (Y) | t _{PLH} /t _{PHL} | V _{CC} =2V | | 65 | 165 | ns |
| | | V _{CC} =4.5V | | 16 | 33 | |
| | | V _{CC} =6V | | 14 | 28 | |
| Output Enable Time From \overline{OE} to Y | t _{PZL} /t _{PZH} | V _{CC} =2V | | 100 | 200 | ns |
| | | V _{CC} =4.5V | | 20 | 40 | |
| | | V _{CC} =6V | | 17 | 34 | |
| Output Y | t _t | V _{CC} =2V | | 45 | 210 | ns |
| | | V _{CC} =4.5V | | 17 | 42 | |
| | | V _{CC} =6V | | 13 | 36 | |

■ OPERATING CHARACTERISTICS (T_A=25°C)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|-----------------|-----------------|-----|-----|-----|------|
| Power Dissipation Capacitance | C _{PD} | No Load | | 35 | | pF |

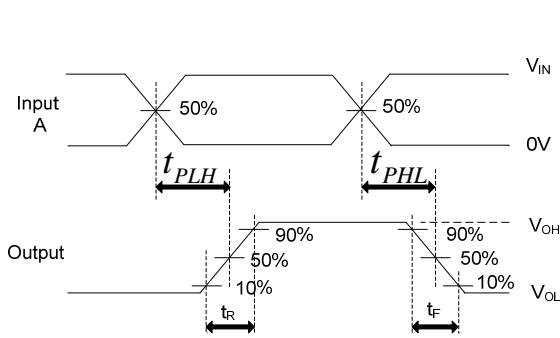
■ TEST CIRCUIT AND WAVEFORMS



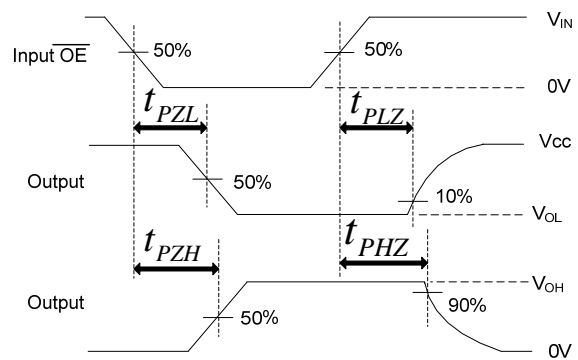
TEST CIRCUIT

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

| Parameter | RL | CL |
|-------------------|-----|-----------------|
| t_{en} | 1KΩ | 50 pF or 150 pF |
| | | 50 pF |
| t_{dis} | 1KΩ | 50 pF |
| | | 50 pF or 150 pF |
| t_{PD} or t_t | — | 50 pF or 150 pF |



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

Note: C_L includes probe and jig capacitance.

All input pulses are supplied by generators having the following characteristics: PRR \leq 1MHz, $Z_o = 50\Omega$, $t_r = 6ns$, $t_f = 6ns$.

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