



## U74AHC245

CMOS IC

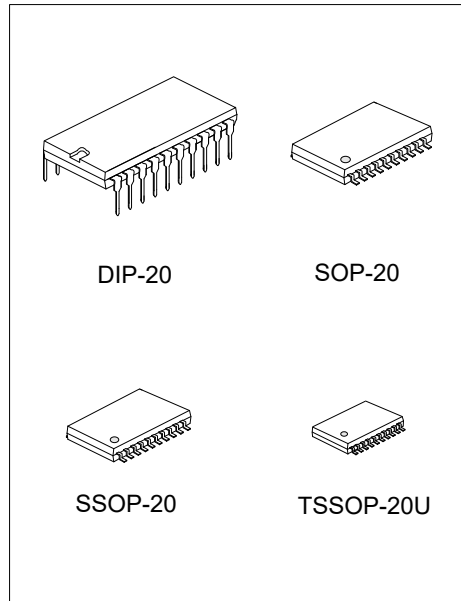
### OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

#### DESCRIPTION

The **U74AHC245** octal bus transceivers is designed for asynchronous two-way communication between data buses. The control-function implementation minimizes external timing requirements.

The device allows data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable ( $\overline{OE}$ ) input can be used to disable the device so that the buses are effectively isolated.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.



#### FEATURES

\* Operating range 2V to 5.5V  $V_{CC}$

#### ORDERING INFORMATION

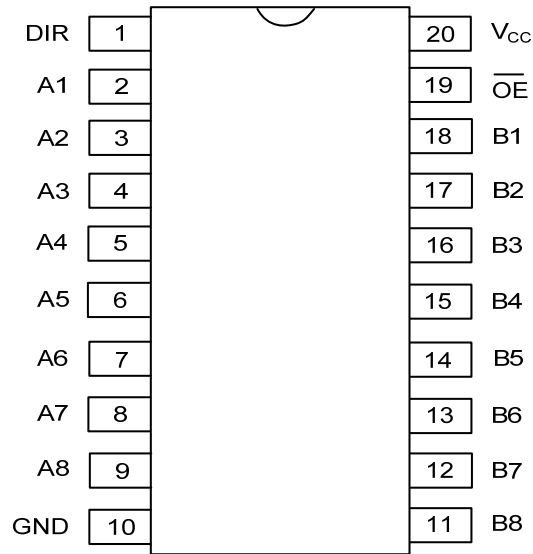
| Ordering Number  |                  | Package   | Packing   |
|------------------|------------------|-----------|-----------|
| Lead Free        | Halogen Free     |           |           |
| U74AHC245L-D20-T | U74AHC245G-D20-T | DIP-20    | Tube      |
| U74AHC245L-S20-R | U74AHC245G-S20-R | SOP-20    | Tape Reel |
| U74AHC245L-R20-R | U74AHC245G-R20-R | SSOP-20   | Tape Reel |
| U74AHC245L-ULA-R | U74AHC245G-ULA-R | TSSOP-20U | Tape Reel |

|                                                                                            |                                                                                                                                                     |
|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>U74AHC245G-D20-T</p> <p>(1) Packing Type<br/>(2) Package Type<br/>(3) Green Package</p> | <p>(1) T: Tube, R: Tape Reel<br/>(2) D20: DIP-20, S20: SOP-20, R20: SSOP-20, ULA: TSSOP-20U<br/>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|

#### MARKING

| DIP-20                                                                                          | SOP-20 / SSOP-20 / TSSOP-20U                                                                    |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <p>Date Code<br/>UTC □□□□<br/>U74AHC245 □<br/>L: Lead Free<br/>G: Halogen Free<br/>Lot Code</p> | <p>Date Code<br/>UTC □□□□<br/>U74AHC245 □<br/>L: Lead Free<br/>G: Halogen Free<br/>Lot Code</p> |

■ PIN CONFIGURATION

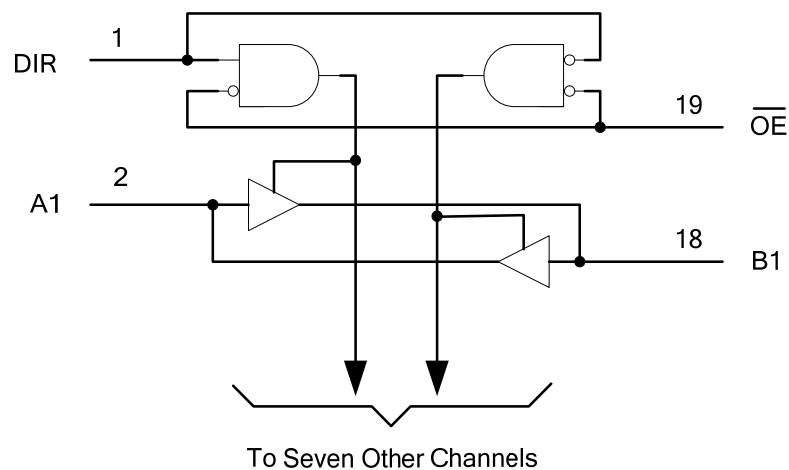


■ FUNCTION TABLE

| INPUT           |     | FUNCTION                          |
|-----------------|-----|-----------------------------------|
| $\overline{OE}$ | DIR |                                   |
| H               | X   | Isolation                         |
| L               | H   | Transmit data from A bus to B bus |
| L               | L   | Transmit data from B bus to A bus |

Note: H: HIGH voltage level;  
 L: LOW voltage level;  
 X: Don't care

■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING (Unless otherwise specified)

| PARAMETER                                        | SYMBOL    | RATINGS             | UNIT        |
|--------------------------------------------------|-----------|---------------------|-------------|
| Supply Voltage                                   | $V_{CC}$  | -0.5 ~ 7.0          | V           |
| Input Voltage Range                              | $V_I$     | -0.5 ~ 7.0          | V           |
| Output Voltage Range                             | $V_O$     | -0.5 ~ $V_{CC}+0.5$ | V           |
| Input Clamp Current ( $V_{IN}<0$ )               | $I_{IK}$  | -20                 | mA          |
| Output Clamp Current ( $V_O<0$ or $V_O>V_{CC}$ ) | $I_{OK}$  | $\pm 20$            | mA          |
| Output Current                                   | $I_{OUT}$ | $\pm 25$            | mA          |
| $V_{CC}$ or GND Current                          | $I_{CC}$  | $\pm 75$            | mA          |
| Storage Temperature                              | $T_{STG}$ | -65 ~ +150          | $^{\circ}C$ |

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. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ RECOMMENDED OPERATING CONDITIONS (Unless otherwise specified)

| PARAMETER                          | SYMBOL              | MIN                   | TYP | MAX      | UNIT        |
|------------------------------------|---------------------|-----------------------|-----|----------|-------------|
| Supply Voltage                     | $V_{CC}$            | 2                     |     | 5.5      | V           |
| Input Voltage                      | $V_{IN}$            | 0                     |     | 5.5      | V           |
| Output Voltage                     | $V_{OUT}$           | 0                     |     | $V_{CC}$ | V           |
| Input Transition Rise or Fall Rate | $\Delta t/\Delta v$ | $V_{CC}=3.3V\pm 0.3V$ |     | 100      | ns/V        |
|                                    |                     | $V_{CC}=5V\pm 0.5V$   |     | 20       |             |
| Operating Free-air Temperature     | $T_A$               | -40                   |     | +125     | $^{\circ}C$ |

■ THERMAL DATA

| PARAMETER           | SYMBOL        | RATINGS   | UNIT |               |
|---------------------|---------------|-----------|------|---------------|
| Junction to Ambient | $\theta_{JA}$ | DIP-20    | 65   | $^{\circ}C/W$ |
|                     |               | SOP-20    | 85   | $^{\circ}C/W$ |
|                     |               | SSOP-20   | 105  | $^{\circ}C/W$ |
|                     |               | TSSOP-20U | 110  | $^{\circ}C/W$ |

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

| PARAMETER                                   | SYMBOL                 | TEST CONDITIONS                                  | MIN                                        | TYP | MAX        | UNIT    |
|---------------------------------------------|------------------------|--------------------------------------------------|--------------------------------------------|-----|------------|---------|
| HIGH-level input voltage                    | $V_{IH}$               | $V_{CC}=2V$                                      | 1.5                                        |     |            | V       |
|                                             |                        | $V_{CC}=3V$                                      | 2.1                                        |     |            |         |
|                                             |                        | $V_{CC}=5.5V$                                    | 3.85                                       |     |            |         |
| LOW-level output voltage                    | $V_{IL}$               | $V_{CC}=2V$                                      |                                            |     | 0.5        | V       |
|                                             |                        | $V_{CC}=3V$                                      |                                            |     | 0.9        |         |
|                                             |                        | $V_{CC}=5.5V$                                    |                                            |     | 1.65       |         |
| High-Level Output Voltage                   | $V_{OH}$               | $V_{CC}=2V, I_{OH}=-50\mu A$                     | 1.9                                        | 2   |            | V       |
|                                             |                        | $V_{CC}=3V, I_{OH}=-50\mu A$                     | 2.9                                        | 3   |            |         |
|                                             |                        | $V_{CC}=4.5V, I_{OH}=-50\mu A$                   | 4.4                                        | 4.5 |            |         |
|                                             |                        | $V_{CC}=3V, I_{OH}=-4mA$                         | 2.58                                       |     |            |         |
|                                             |                        | $V_{CC}=4.5V, I_{OH}=-8mA$                       | 3.94                                       |     |            |         |
| Low-Level Output Voltage                    | $V_{OL}$               | $V_{CC}=2V, I_{OL}=50\mu A$                      |                                            |     | 0.1        | V       |
|                                             |                        | $V_{CC}=3V, I_{OL}=50\mu A$                      |                                            |     | 0.1        |         |
|                                             |                        | $V_{CC}=4.5V, I_{OL}=50\mu A$                    |                                            |     | 0.1        |         |
|                                             |                        | $V_{CC}=3V, I_{OL}=4mA$                          |                                            |     | 0.36       |         |
|                                             |                        | $V_{CC}=4.5V, I_{OL}=8mA$                        |                                            |     | 0.36       |         |
| Input Leakage Current                       | A or B inputs          | $I_{I(LEAK)}$                                    | $V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND        |     | $\pm 0.1$  | $\mu A$ |
|                                             | $\overline{OE}$ or DIR |                                                  | $V_{CC}=0$ to 5.5V, $V_{IN}=V_{CC}$ or GND |     |            |         |
| Output OFF-state current                    | $I_{OZ}$               | $V_{CC}=5.5V, V_{OUT}=V_{CC}$ or GND             |                                            |     | $\pm 0.25$ | $\mu A$ |
| Quiescent Supply Current                    | $I_Q$                  | $V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ |                                            |     | 4          | $\mu A$ |
| Input Capacitance ( $\overline{OE}$ or DIR) | $C_{IN}$               | $V_{CC}=5V, V_{IN}=V_{CC}$ or GND                |                                            | 2.5 | 10         | pF      |
| Input Capacitance (A or B inputs)           | $C_{IO}$               | $V_{CC}=5V, V_{IN}=V_{CC}$ or GND                |                                            | 4   |            | pF      |

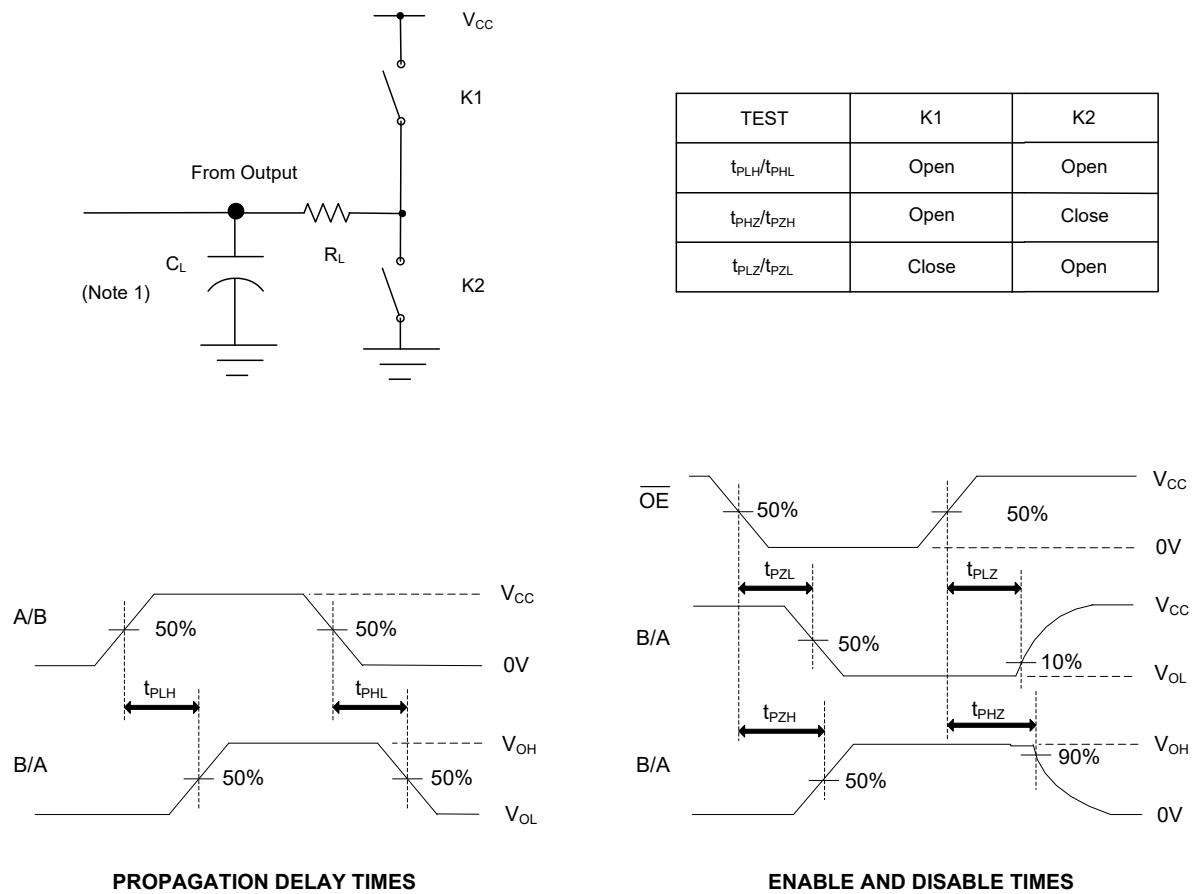
■ SWITCHING CHARACTERISTICS ( $R_L=1k\Omega$ , unless otherwise specified)

| PARAMETER                                                                     | SYMBOL                             | TEST CONDITIONS                 | MIN | TYP  | MAX  | UNIT |
|-------------------------------------------------------------------------------|------------------------------------|---------------------------------|-----|------|------|------|
| Propagation delay from input (A or B) to output (B or A)                      | $t_{pd}$<br>( $t_{PLH}/t_{PHL}$ )  | $V_{CC}=3.3V\pm 0.3V, C_L=15pF$ |     | 5.8  | 8.4  | ns   |
|                                                                               |                                    | $V_{CC}=3.3V\pm 0.3V, C_L=50pF$ |     | 8.3  | 11.9 |      |
|                                                                               |                                    | $V_{CC}=5V\pm 0.5V, C_L=15pF$   |     | 4    | 5.5  |      |
|                                                                               |                                    | $V_{CC}=5V\pm 0.5V, C_L=50pF$   |     | 5.5  | 7.5  |      |
| 3-state output enable time from input ( $\overline{OE}$ ) to output (A or B)  | $t_{en}$<br>( $t_{PZL}/t_{PZH}$ )  | $V_{CC}=3.3V\pm 0.3V, C_L=15pF$ |     | 8.5  | 13.2 | ns   |
|                                                                               |                                    | $V_{CC}=3.3V\pm 0.3V, C_L=50pF$ |     | 11   | 16.7 |      |
|                                                                               |                                    | $V_{CC}=5V\pm 0.5V, C_L=15pF$   |     | 5.8  | 8.5  |      |
|                                                                               |                                    | $V_{CC}=5V\pm 0.5V, C_L=50pF$   |     | 7.3  | 10.6 |      |
| 3-state output disable time from input ( $\overline{OE}$ ) to output (A or B) | $t_{dis}$<br>( $t_{PLZ}/t_{PHZ}$ ) | $V_{CC}=3.3V\pm 0.3V, C_L=15pF$ |     | 8.9  | 12.5 | ns   |
|                                                                               |                                    | $V_{CC}=3.3V\pm 0.3V, C_L=50pF$ |     | 11.5 | 15.8 |      |
|                                                                               |                                    | $V_{CC}=5V\pm 0.5V, C_L=15pF$   |     | 5.6  | 7.8  |      |
|                                                                               |                                    | $V_{CC}=5V\pm 0.5V, C_L=50pF$   |     | 7    | 9.7  |      |

■ OPERATING CHARACTERISTICS ( $V_{CC}=5V$ , unless otherwise specified)

| PARAMETER                     | SYMBOL   | TEST CONDITIONS   | MIN | TYP | MAX | UNIT |
|-------------------------------|----------|-------------------|-----|-----|-----|------|
| Power Dissipation Capacitance | $C_{PD}$ | No load, $f=1MHz$ |     | 14  |     | pF   |

■ TEST CIRCUIT AND WAVEFORMS



- Notes: 1.  $C_L$  includes probe and jig capacitance.  
 2. All input pulses are supplied by generators having the following characteristics:  
 $PRR \leq 1\text{MHz}$ ,  $Z_O = 50\Omega$ ,  $t_r \leq 3\text{ns}$ ,  $t_f \leq 3\text{ns}$ .  
 3. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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