# 54AC244/54ACT244 Octal Buffer/Line Driver with TRI-STATE Outputs

**Check for Samples: 54AC244-N, 54ACT244-N**

## FEATURES

- **$I_{CC}$ and $I_{OZ}$ Reduced by 50%**
- **TRI-STATE Outputs Drive Bus Lines or Buffer Memory Address Registers**
- **Outputs Source/Sink 24 mA**
- **'ACT244 has TTL-Compatible Inputs**
- **Standard Microcircuit Drawing (SMD)**
  - **'AC244: 5962-87552**
  - **'ACT244: 5962-87760**
- **54AC244 Now Qualified to 300Krad RHA Designation, Refer to the SMD for More Information**

## DESCRIPTION

The 'AC/'ACT244 is an octal buffer and line driver designed to be employed as a memory address driver, clock driver and bus-oriented transmitter/receiver which provides improved PC board density.

## LOGIC SYMBOL

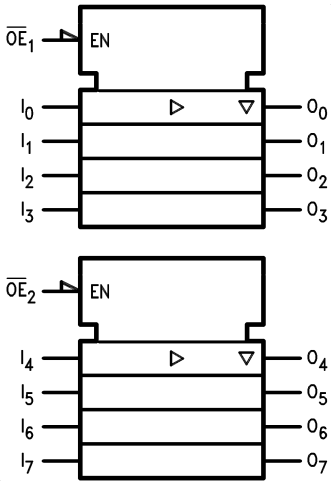


**Figure 1. IEEE/IEC**

| Pin Names | Description |
|---|---|
| $\overline{OE}_1$, $\overline{OE}_2$ | TRI-STATE Output Enable Inputs |
| $I_0$–$I_7$ | Inputs |
| $O_0$–$O_7$ | Outputs |

## Connection Diagrams

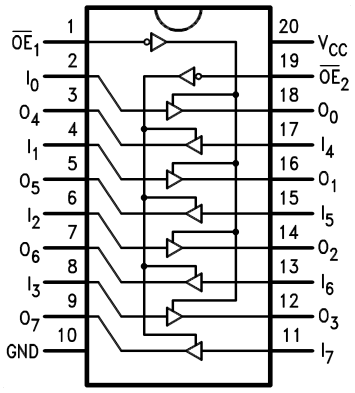


**Figure 2. 20-Pin CERDIP or CLGA**
**See NAF0020A Package**

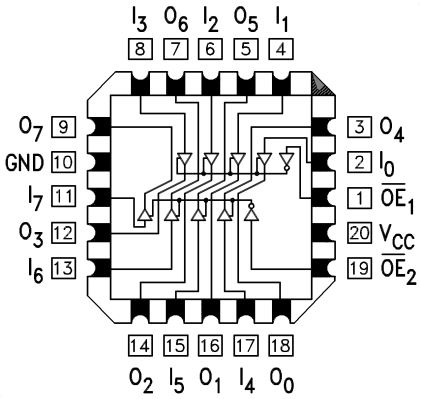


**Figure 3. 20-Pin LCCC**
**See NAJ0020A Package**

### TRUTH TABLE

| Inputs (1) | | Outputs |
|---|---|---|
| $\overline{OE}_1$ | $I_n$ | (Pins 12, 14, 16, 18) |
| L | L | L |
| L | H | H |
| H | X | Z |

(1) H = HIGH Voltage Level
L = LOW Voltage Level

| Inputs (1) | | Outputs |
|---|---|---|
| $\overline{OE}_2$ | $I_n$ | (Pins 3, 5, 7, 9) |
| L | L | L |
| L | H | H |
| H | X | Z |

(1) X = Immaterial
Z = High Impedance

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

## ABSOLUTE MAXIMUM RATINGS(1)(2)

| | | |
|---|---|---|
| Supply Voltage ($V_{CC}$) | | −0.5V to +7.0V |
| DC Input Diode Current ($I_{IK}$) | $V_I$ = −0.5V | −20 mA |
| | $V_I$ = $V_{CC}$ + 0.5V | +20 mA |
| DC Input Voltage ($V_I$) | | −0.5V to $V_{CC}$ + 0.5V |
| DC Output Diode Current ($I_{OK}$) | $V_O$ = −0.5V | −20 mA |
| | $V_O$ = $V_{CC}$ + 0.5V | +20 mA |
| DC Output Voltage ($V_O$) | | −0.5V to $V_{CC}$ + 0.5V |
| DC Output Source or Sink Current ($I_O$) | | ±50 mA |
| DC $V_{CC}$ or Ground Current per Output Pin ($I_{CC}$ or $I_{GND}$) | | ±50 mA |
| Storage Temperature ($T_{STG}$) | | −65°C to +150°C |
| Junction Temperature ($T_J$) | CDIP | 175°C |

(1) Absolute Maximum Ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Texas Instruments does not recommend operation of FACT® circuits outside databook specifications.

(2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/Distributors for availability and specifications.

## RECOMMENDED OPERATING CONDITIONS

| | | |
|---|---|---|
| Supply Voltage ($V_{CC}$) | 'AC | 2.0V to 6.0V |
| | 'ACT | 4.5V to 5.5V |
| Input Voltage ($V_I$) | | 0V to $V_{CC}$ |
| Output Voltage ($V_O$) | | 0V to $V_{CC}$ |
| Operating Temperature ($T_A$) | 54AC/ACT | −55°C to +125°C |
| Minimum Input Edge Rate (ΔV/Δt) 'AC Devices | $V_{IN}$ from 30% to 70% of $V_{CC}$ | |
| | $V_{CC}$ @ 3.3V, 4.5V, 5.5V | 125 mV/ns |
| Minimum Input Edge Rate (ΔV/Δt) 'ACT Devices | $V_{IN}$ from 0.8V to 2.0V | |
| | $V_{CC}$ @ 4.5V, 5.5V | 125 mV/ns |

## DC CHARACTERISTICS FOR 'AC FAMILY DEVICES

| Symbol | Parameter | $V_{CC}$ (V) | 54AC $T_A$ = −55°C to +125°C Specified Limits | Units | Conditions |
|---|---|---|---|---|---|
| $V_{IH}$ | Minimum High Level Input Voltage | 3.0 | 2.1 | V | $V_{OUT}$ = 0.1V or $V_{CC}$ − 0.1V |
| | | 4.5 | 3.15 | | |
| | | 5.5 | 3.85 | | |
| $V_{IL}$ | Maximum Low Level Input Voltage | 3.0 | 0.9 | V | $V_{OUT}$ = 0.1V or $V_{CC}$ − 0.1V |
| | | 4.5 | 1.35 | | |
| | | 5.5 | 1.65 | | |
| $V_{OH}$ | Minimum High Level Output Voltage | 3.0 | 2.9 | V | $I_{OUT}$ = −50 µA |
| | | 4.5 | 4.4 | | |
| | | 5.5 | 5.4 | | |
| | | | | | See(1) $V_{IN}$ = $V_{IL}$ or $V_{IH}$ |
| | | 3.0 | 2.4 | V | $I_{OH}$ −12 mA |
| | | 4.5 | 3.7 | | $I_{OH}$ −24 mA |
| | | 5.5 | 4.7 | | $I_{OH}$ −24 mA |
| $V_{OL}$ | Maximum Low Level Output Voltage | 3.0 | 0.1 | V | $I_{OUT}$ = 50 µA |
| | | 4.5 | 0.1 | | |
| | | 5.5 | 0.1 | | |
| | | | | | See(1) $V_{IN}$ = $V_{IL}$ or $V_{IH}$ |
| | | 3.0 | 0.50 | V | $I_{OL}$ 12 mA |
| | | 4.5 | 0.50 | | $I_{OL}$ 24 mA |
| | | 5.5 | 0.50 | | $I_{OL}$ 24 mA |
| $I_{IN}$ | Maximum Input Leakage Current | 5.5 | ±1.0 | µA | $V_I$ = $V_{CC}$, GND |
| $I_{OZ}$ | Maximum TRI-STATE Current | 5.5 | ±5.0 | µA | $V_I$ (OE) = $V_{IL}$, $V_{IH}$<br>$V_I$ = $V_{CC}$, $V_{GND}$<br>$V_O$ = $V_{CC}$, GND |
| $I_{OLD}$ | See(2) Minimum Dynamic Output Current | 5.5 | 50 | mA | $V_{OLD}$ = 1.65V Max |
| $I_{OHD}$ | | 5.5 | −50 | mA | $V_{OHD}$ = 3.85V Min |
| $I_{CC}$ | Maximum Quiescent Supply Current | 5.5 | 80.0 | µA | $V_{IN}$ = $V_{CC}$ or GND |

(1) All outputs loaded; thresholds on input associated with output under test.
(2) Maximum test duration 2.0 ms, one output loaded at a time.

## DC CHARACTERISTICS FOR 'ACT FAMILY DEVICES

| Symbol | Parameter | $V_{CC}$ (V) | 54ACT $T_A$ = −55°C to +125°C Specified Limits | Units | Conditions |
|---|---|---|---|---|---|
| $V_{IH}$ | Minimum High Level Input Voltage | 4.5<br>5.5 | 2.0<br>2.0 | V | $V_{OUT}$ = 0.1V or $V_{CC}$ − 0.1V |
| $V_{IL}$ | Maximum Low Level Input Voltage | 4.5<br>5.5 | 0.8<br>0.8 | V | $V_{OUT}$ = 0.1V or $V_{CC}$ − 0.1V |
| $V_{OH}$ | Minimum High Level Output Voltage | 4.5<br>5.5 | 4.4<br>5.4 | V | $I_{OUT}$ = −50 µA |
| | | | | | See(1) $V_{IN}$ = $V_{IL}$ or $V_{IH}$ |
| | | 4.5<br>5.5 | 3.70<br>4.70 | V | $I_{OH}$ −24 mA<br>−24 mA |
| $V_{OL}$ | Maximum Low Level Output Voltage | 4.5<br>5.5 | 0.1<br>0.1 | V | $I_{OUT}$ = 50 µA |
| | | | | | See(1) $V_{IN}$ = $V_{IL}$ or $V_{IH}$ |
| | | 4.5<br>5.5 | 0.50<br>0.50 | V | $I_{OL}$ 24 mA<br>24 mA |
| $I_{IN}$ | Maximum Input Leakage Current | 5.5 | ±1.0 | µA | $V_I$ = $V_{CC}$, GND |
| $I_{OZ}$ | Maximum TRI-STATE Current | 5.5 | ±5.0 | µA | $V_I$ = $V_{IL}$, $V_{IH}$<br>$V_O$ = $V_{CC}$, GND |
| $I_{CCT}$ | Maximum $I_{CC}$/Input | 5.5 | 1.6 | mA | $V_I$ = $V_{CC}$ − 2.1V |
| $I_{OLD}$ | See(2) Minimum Dynamic | 5.5 | 50 | mA | $V_{OLD}$ = 1.65V Max |
| $I_{OHD}$ | Output Current | 5.5 | −50 | mA | $V_{OHD}$ = 3.85V Min |
| $I_{CC}$ | Maximum Quiescent Supply Current | 5.5 | 80.0 | µA | $V_{IN}$ = $V_{CC}$ or GND |

(1) All outputs loaded; thresholds on input associated with output under test.
(2) Maximum test duration 2.0 ms, one output loaded at a time.

## AC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | $V_{CC}$ (V)[1] | 54AC $T_A$ = −55°C to +125°C $C_L$ = 50 pF | | Units | Fig. No. |
|---|---|---|---|---|---|---|
| | | | Min | Max | | |
| $t_{PLH}$ | Propagation Delay | 3.3 | 1.0 | 12.5 | ns | |
| | Data to Output | 5.0 | 1.0 | 9.5 | | |
| $t_{PHL}$ | Propagation Delay | 3.3 | 1.0 | 12.0 | ns | |
| | Data to Output | 5.0 | 1.0 | 9.0 | | |
| $t_{PZH}$ | Output Enable Time | 3.3 | 1.0 | 11.5 | ns | |
| | | 5.0 | 1.0 | 9.0 | | |
| $t_{PZL}$ | Output Enable Time | 3.3 | 1.0 | 13.0 | ns | |
| | | 5.0 | 1.0 | 10.5 | | |
| $t_{PHZ}$ | Output Disable Time | 3.3 | 1.0 | 12.5 | ns | |
| | | 5.0 | 1.0 | 10.5 | | |
| $t_{PLZ}$ | Output Disable Time | 3.3 | 1.0 | 13.0 | ns | |
| | | 5.0 | 1.0 | 11.0 | | |

(1) Voltage Range 3.3 is 3.3V ±0.3V
Voltage Range 5.0 is 5.0V ±0.5V.

## AC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | $V_{CC}$ (V)[1] | 54ACT $T_A$ = −55°C to +125°C $C_L$ = 50 pF | | Units | Fig. No. |
|---|---|---|---|---|---|---|
| | | | Min | Max | | |
| $t_{PLH}$ | Propagation Delay | 5.0 | 1.0 | 10.0 | ns | |
| | Data to Output | | | | | |
| $t_{PHL}$ | Propagation Delay | 5.0 | 1.0 | 10.0 | ns | |
| | Data to Output | | | | | |
| $t_{PZH}$ | Output Enable Time | 5.0 | 1.0 | 9.5 | ns | |
| $t_{PZL}$ | Output Enable Time | 5.0 | 1.0 | 11.0 | ns | |
| $t_{PHZ}$ | Output Disable Time | 5.0 | 1.0 | 11.0 | ns | |
| $t_{PLZ}$ | Output Disable Time | 5.0 | 1.0 | 11.5 | ns | |

(1) Voltage Range 5.0 is 5.0V ±0.5V

## CAPACITANCE

| Symbol | Parameter | Typ | Units | Conditions |
|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | 4.5 | pF | $V_{CC}$ = OPEN |
| $C_{PD}$ | Power Dissipation Capacitance | 45.0 | pF | $V_{CC}$ = 5.0V |

## REVISION HISTORY

| Changes from Revision B (April 2013) to Revision C | Page |
|---|---|
| • Changed layout of National Data Sheet to TI format | 6 |

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