

DUAL BUS BUFFER

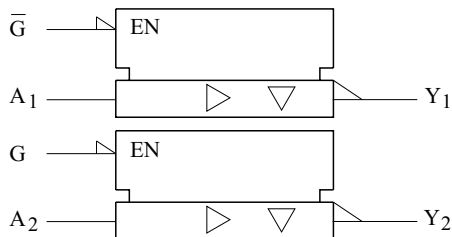
FEATURES

- Super High Speed : $t_{PD}=2.6ns$ (Typ.) into 50pF at $V_{CC}=5V$.
- High Output Driver : $\pm 24mA$ at $V_{CC}=3V$.
- Outputs are Overvoltage Tolerant in 3-STATE mode.
- Wide Operating Voltage Range : $V_{CC(oper)}=1.65\sim 5.5V$.

MAXIMUM RATINGS (Ta=25 °C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|-----------------------------|-----------|-----------|------|
| Power Supply Voltage | V_{CC} | -0.5~7 | V |
| DC Input Voltage | V_{IN} | -0.5~7 | V |
| DC Output Voltage | V_{OUT} | -0.5~7 | V |
| Input Diode Current | I_{IK} | -50 | mA |
| Output Diode Current | I_{OK} | -50 | mA |
| DC Output Current | I_{OUT} | ± 50 | mA |
| DC V_{CC} /ground Current | I_{CC} | ± 100 | mA |
| Power Dissipation | P_D | 200 | mW |
| Storage Temperature Range | T_{stg} | -65 ~ 150 | °C |
| Lead Temperature (10s) | T_L | 260 | °C |

Logic Diagram

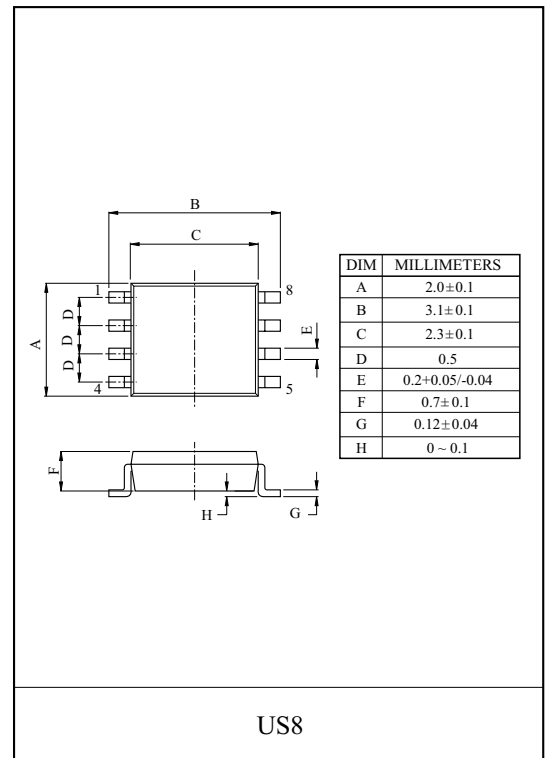


Truth Table

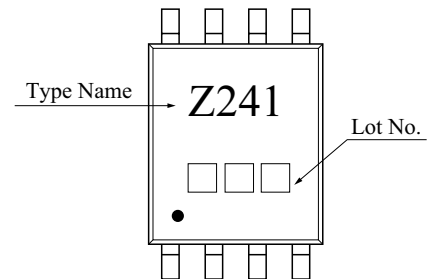
| INPUTS | | | OUTPUTS |
|-----------|---|---|---------|
| \bar{G} | G | A | Y |
| L | H | L | L |
| L | H | H | H |
| H | L | X | Z |

X : Don't Care

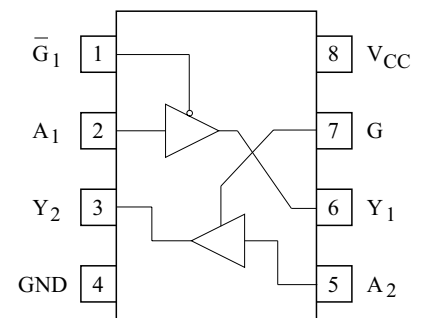
Z : High Impedance



MARKING



PIN CONNECTION(TOP VIEW)



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Recommended Operating Conditions

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|--------------------------|------------|--|------|
| Supply Voltage | V_{CC} | 1.65~5.5 | V |
| | | 1.5~5.5 (Note1) | |
| Input Voltage | V_{IN} | 0~ V_{CC} | V |
| Output Voltage | V_{OUT} | 0~ V_{CC} (Note2) | V |
| | | 0~5.5 (Note3) | |
| Operating Temperature | T_{opr} | -40~85 | °C |
| Input Rise and Fall Time | t_r, t_f | 0 ~ 20 ($V_{CC}=1.8 \pm 0.15V, 2.5 \pm 0.2V$) 0 ~ 10 ($V_{CC}=3.8V \pm 0.3V$) 0 ~ 5 ($V_{CC}=5.0V \pm 0.5V$) | ns/V |

Note1 : Data retention only. Note2 : Active State. Note3 : 3-STATE

ELECTRICAL CHARACTERISTICS (DC Characteristics)

| CHARACTERISTIC | | SYMBOL | TEST CONDITION | | $T_a=25^\circ\text{C}$ | | | $T_a=-40\sim 85^\circ\text{C}$ | | UNIT | |
|--------------------------|-----------------------|---|-----------------------------|--------------------------|------------------------|-----------|----------------------|--------------------------------|----------------------|------|---|
| | | | | $V_{CC}(V)$ | MIN. | TYP. | MAX. | MIN. | MAX. | | |
| Input Voltage | High Level | V_{IH} | - | 1.65~1.95 | $0.75 \times V_{CC}$ | - | - | $0.75 \times V_{CC}$ | - | V | |
| | | | | 2.3~5.5 | $0.7 \times V_{CC}$ | - | - | $0.7 \times V_{CC}$ | - | | |
| | Low Level | V_{IL} | | 1.65~1.95 | - | - | $0.25 \times V_{CC}$ | - | $0.25 \times V_{CC}$ | | |
| | | | | 2.3~5.5 | - | - | $0.3 \times V_{CC}$ | - | $0.3 \times V_{CC}$ | | |
| Output Voltage | High Level | V_{OH} | $V_{IN}=V_{IH}$ or V_{IL} | $I_{OH}=-100\mu\text{A}$ | 1.65 | 1.55 | 1.65 | - | 1.55 | - | V |
| | | | | | 2.3 | 2.2 | 2.3 | - | 2.2 | - | |
| | | | | | 3.0 | 2.9 | 3.0 | - | 2.9 | - | |
| | | | | | 4.5 | 4.4 | 4.5 | - | 4.4 | - | |
| | | | | $I_{OH}=-4\text{mA}$ | 1.65 | 1.29 | 1.52 | - | 1.29 | - | |
| | | | | $I_{OH}=-8\text{mA}$ | 2.3 | 1.9 | 2.15 | - | 1.9 | - | |
| | | | | $I_{OH}=-16\text{mA}$ | 3.0 | 2.4 | 2.80 | - | 2.4 | - | |
| | | | | $I_{OH}=-24\text{mA}$ | 3.0 | 2.3 | 3.68 | - | 2.3 | - | |
| | $I_{OH}=-32\text{mA}$ | 4.5 | | 3.8 | 4.20 | - | 3.8 | - | | | |
| | Low Level | V_{OL} | | $I_{OL}=100\mu\text{A}$ | 1.65 | - | 0 | 0.1 | - | 0.1 | |
| | | | | | 2.3 | - | 0 | 0.1 | - | 0.1 | |
| | | | | | 3.0 | - | 0 | 0.1 | - | 0.1 | |
| | | | | | 4.5 | - | 0 | 0.1 | - | 0.1 | |
| | | | | $I_{OL}=4\text{mA}$ | 1.65 | - | 0.08 | 0.24 | - | 0.24 | |
| | | | | $I_{OL}=8\text{mA}$ | 2.3 | - | 0.10 | 0.30 | - | 0.30 | |
| | | | | $I_{OL}=16\text{mA}$ | 3.0 | - | 0.15 | 0.40 | - | 0.40 | |
| $I_{OL}=24\text{mA}$ | | | 3.0 | - | 0.22 | 0.55 | - | 0.55 | | | |
| $I_{OL}=32\text{mA}$ | 4.5 | - | 0.22 | 0.55 | - | 0.55 | | | | | |
| Input Leakage Current | I_{IN} | $V_{IN}=5.5V$ or GND | 0~5.5 | - | - | ± 0.1 | - | ± 1 | μA | | |
| 3-STATE Output Leakage | I_{OZ} | $V_{IN}=V_{IH}$ or V_{IL} $0 \leq V_{OUT} \leq 5.5V$ | 1.65~5.5 | - | - | ± 0.5 | - | ± 5 | μA | | |
| Quiescent Supply Current | I_{CC} | $V_{IN}=5.5V$ or GND | 1.65~5.5 | - | - | 1 | - | 10 | μA | | |

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Noise Characteristics

| CHARACTERISTIC | SYMBOL | TEST CONDITION | | Ta=-25℃ | | UNIT |
|--|---------------------------|----------------------|---------------------|---------|------|------|
| | | | V _{CC} (V) | TYP. | MAX. | |
| Quiet Output Maximum Dynamic V _{OL} | V _{OLP} (Note 1) | C _L =50pF | 5.0 | - | 1.0 | V |
| Quiet Output Minimum Dynamic V _{OL} | V _{OLV} (Note 1) | C _L =50pF | 5.0 | - | 1.0 | V |
| Quiet Output Minimum Dynamic V _{OH} | V _{OHV} (Note 1) | C _L =50pF | 5.0 | - | 4.0 | V |
| Minimum HIGH Level Dynamic Input Voltage | V _{IHD} (Note 1) | C _L =50pF | 5.0 | - | 3.5 | V |
| Maximum LOW Level Dynamic Input Voltage | V _{ILD} (Note 1) | C _L =50pF | 5.0 | - | 1.5 | V |

Note 1 : Characteristic guaranteed by design.

AC Characteristics

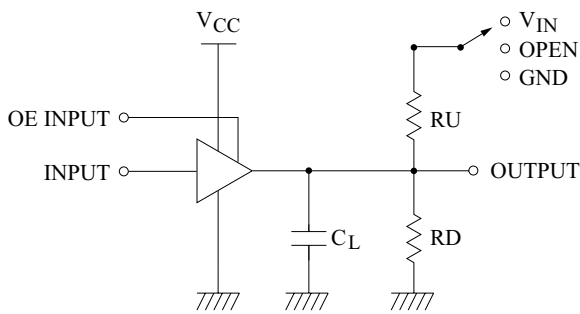
| CHARACTERISTIC | SYMBOL | TEST CONDITION | Ta=25℃ | | | Ta=-40~85℃ | | UNIT | |
|--|--|--|---------------------|------|------|------------|------|------|------|
| | | | V _{CC} (V) | MIN. | TYP. | MAX. | MIN. | | MAX. |
| Propagation Delay A _N to Y _N (Figures 1,3) | t _{PLH} t _{PHL} | C _L =15pF, R _D =1MΩ S1=Open | 1.8±0.15 | 2.0 | - | 12.0 | 2.0 | 13.0 | ns |
| | | | 2.5±0.2 | 1.0 | - | 7.5 | 1.0 | 8.0 | |
| | | | 3.3±0.3 | 0.8 | - | 5.2 | 0.8 | 5.5 | |
| | | | 5.0±0.5 | 0.5 | - | 4.5 | 0.5 | 4.8 | |
| | t _{PLH} t _{PHL} | C _L =50pF, R _D =500Ω S1=Open | 3.3±0.3 | 1.2 | - | 5.7 | 1.2 | 6.0 | ns |
| | | | 5.0±0.5 | 0.8 | - | 5.0 | 0.8 | 5.3 | |
| Output to Output Skew (Figures 1,3) (Note 2) | t _{OSLH} t _{OSHL} | C _L =50pF, R _D =500Ω S1=Open | 3.3±0.3 | - | - | 1.0 | - | 1.0 | ns |
| | | | 5.0±0.5 | - | - | 0.8 | - | 0.8 | |
| Output Enable Time (Figures 1,3) | t _{PZL} t _{PZH} | C _L =50pF, R _D , R _U =500Ω S1=GND for t _{PZH} S1=V _I for t _{PZL} V _I =2×V _{CC} | 1.8±0.15 | 3.0 | - | 14.0 | 3.0 | 15.0 | ns |
| | | | 2.5±0.2 | 1.8 | - | 8.5 | 1.8 | 9.0 | |
| | | | 3.3±0.3 | 1.2 | - | 6.2 | 1.2 | 6.5 | |
| | | | 5.0±0.5 | 0.8 | - | 5.5 | 0.8 | 5.8 | |
| Output Disable Time (Figures 1,3) | t _{PLZ} t _{PHZ} | C _L =50pF, R _D , R _U =500Ω S1=GND for t _{PHZ} S1=V _I for t _{PLZ} V _I =2×V _{CC} | 1.8±0.15 | 2.5 | - | 12.0 | 2.5 | 13.0 | ns |
| | | | 2.5±0.2 | 1.5 | - | 8.0 | 1.5 | 8.5 | |
| | | | 3.3±0.3 | 0.8 | - | 5.7 | 0.8 | 6.0 | |
| | | | 5.0±0.5 | 0.3 | - | 4.7 | 0.3 | 5.0 | |
| Input Capacitance | C _{IN} | | 0 | - | 2.5 | - | - | pF | |
| Output Capacitance | C _{OUT} | | 5.0 | - | 4 | - | - | pF | |
| Power Dissipation Capacitance (Figure 2) (Note 3) | C _{PD} | \overline{OE} =GND OE=V _{CC} | 3.3 | - | 10 | - | - | - | pF |
| | | | 5.0 | - | 12 | - | - | - | |

Note 2 : Characteristic guaranteed by design. t_{OSLH}=|t_{PLHmax}-t_{PLHmin}| ; t_{OSHL}=|t_{PHLmax}-t_{PHLmin}|.

Note 3 : C_{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I_{CCD}) at no output loading and operating at 50% duty cycle. (See Figure 2.) C_{PD} is related to I_{CCD} dynamic operating current by the expression : I_{CCD}=C_{PD} · V_{CC} · f_{IN}+I_{CC}

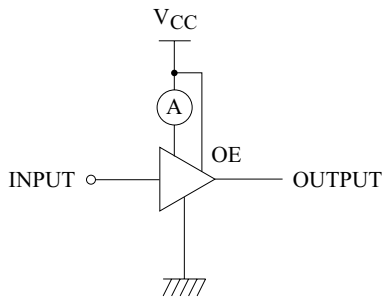
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AC Loading and Waveforms



C_L includes load and stray capacitance
Input PRR=1.0MHz ; $t_w = 500\text{ns}$

FIGURE 1. AC Test Circuit



Input=AC Waveform ; $t_r = t_f = 1.8\text{ns}$;
PRR=10MHz ; Duty Cycle=50%

FIGURE 2. ICCD Test Circuit

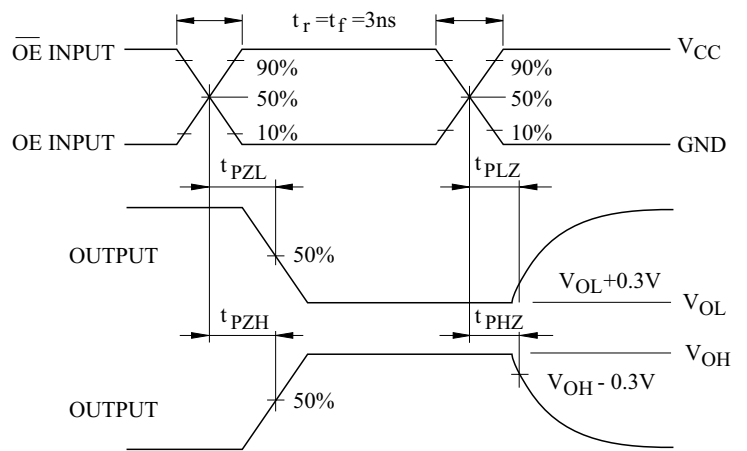
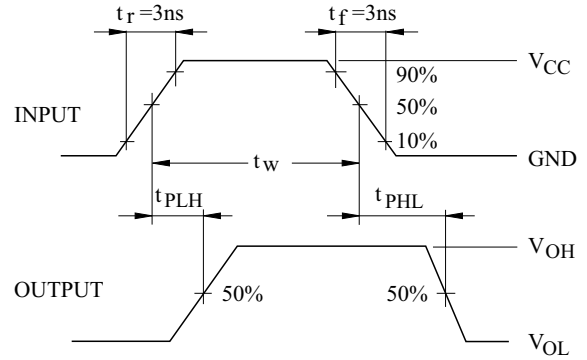


FIGURE 3. AC Waveforms