

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
 - Class Q Military
 - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
 - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

SN54ALS230, SN54ALS231, SN54AS230, SN54AS231 SN74ALS230, SN74ALS231, SN74AS230, SN74AS231 OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

D2661, DECEMBER 1982—REVISED MAY 1986

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- 'ALS230 and 'AS230 have True and Complementary Outputs
- 'ALS231 and 'AS231 have Complementary G and \bar{G} Inputs
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- High Capacitive Drive Capability
- Current Sinking Capability Up to 64 mA
- Dependable Texas Instruments Quality and Reliability

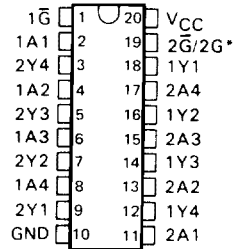
description

These octal buffers and line drivers are designed specifically to improve the performance of three-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. The designer has a choice of selected combinations of inverting and noninverting outputs, symmetrical \bar{G} (active-low output control) inputs, and complementary G and \bar{G} inputs.

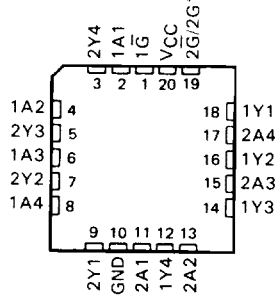
The -1 versions of the SN74ALS' parts are identical to their standard versions except that the recommended maximum I_{OL} is increased to 48 milliamperes. There are no -1 versions of the SN54ALS' parts.

The SN54' family is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74' family is characterized for operation from 0°C to 70°C .

SN54ALS', SN54AS' . . . J PACKAGE
SN74ALS', SN74AS' . . . DW OR N PACKAGE
(TOP VIEW)



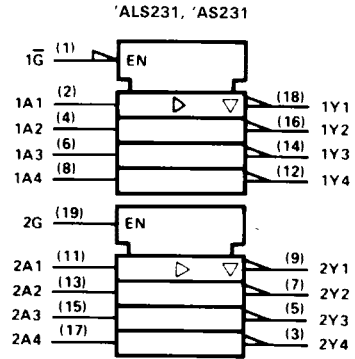
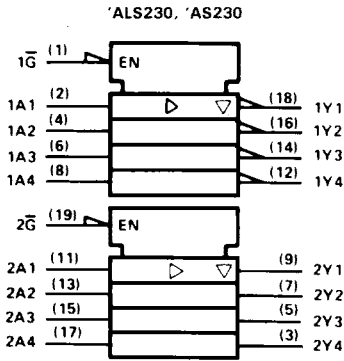
SN54ALS', SN54AS' . . . FK PACKAGE
(TOP VIEW)



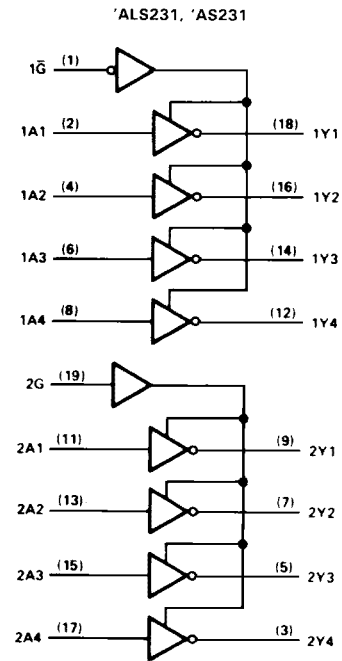
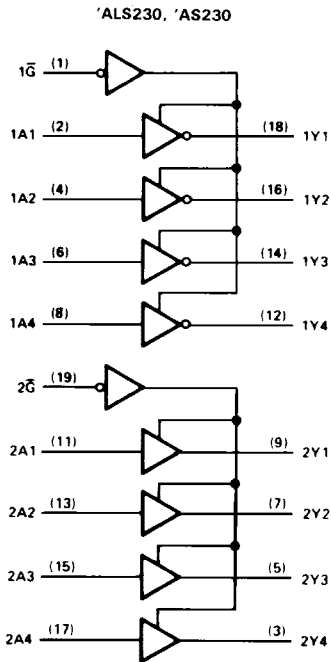
* $2\bar{G}$ for 'AS230 or 2G for 'ALS231, 'AS231

**SN54ALS230, SN54ALS231, SN54AS230, SN54AS231
 SN74ALS230, SN74ALS231, SN74AS230, SN74AS231
 OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS**

logic symbols†



logic diagrams (positive logic)



†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for DW, J, and N packages.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

| | |
|--|----------------|
| Supply voltage, V_{CC} | 7 V |
| Input voltage | 7 V |
| Voltage applied to a disabled 3-state output | 5.5 V |
| Operating free-air temperature range: SN54ALS230 | -55°C to 125°C |
| SN74ALS230 | 0°C to 70°C |
| Storage temperature range | -65°C to 150°C |

recommended operating conditions

| | | SN54ALS230 | | | SN74ALS230 | | | UNIT |
|----------|--------------------------------|------------|-----|-----|------------|-----|-----------------|------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V_{IH} | High-level input voltage | 2 | | | 2 | | | V |
| V_{IL} | Low-level input voltage | | | 0.7 | | | 0.8 | V |
| I_{OH} | High-level output current | | | -12 | | | -15 | mA |
| I_{OL} | Low-level output current | | | 12 | | | 24 | mA |
| | | | | | | | 48 [†] | |
| T_A | Operating free-air temperature | -55 | | 125 | 0 | | 70 | °C |

[†]The 48 mA limit applies only to the -1 versions and only if V_{CC} is maintained between 4.75 V and 5.25 V.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | SN54ALS230 | | | SN74ALS230 | | | UNIT |
|------------|---|------------------|------------------|------|--------------|------------------|------|---------|
| | | MIN | TYP [‡] | MAX | MIN | TYP [‡] | MAX | |
| V_{IK} | $V_{CC} = 4.5$ V, $I_I = -18$ mA | | | -1.2 | | | -1.2 | V |
| V_{OH} | $V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -0.4$ mA | $V_{CC} - 2$ | | | $V_{CC} - 2$ | | | V |
| | $V_{CC} = 4.5$ V, $I_{OH} = -3$ mA | 2.4 | 3.2 | | 2.4 | 3.2 | | |
| | $V_{CC} = 4.5$ V, $I_{OH} = -12$ mA | | | 2 | | | | |
| | $V_{CC} = 4.5$ V, $I_{OH} = -15$ mA | | | | | 2 | | |
| V_{OL} | $V_{CC} = 4.5$ V, $I_{OL} = 12$ mA | | 0.25 | 0.4 | | 0.25 | 0.4 | V |
| | $V_{CC} = 4.5$ V, $I_{OL} = 24$ mA | | | | | 0.35 | 0.5 | |
| | $V_{CC} = 4.75$ V, $I_{OL} = 48$ mA (-1 versions) | | | | | 0.35 | 0.5 | |
| I_{OZH} | $V_{CC} = 5.5$ V, $V_O = 2.7$ V | | | 20 | | | 20 | μ A |
| I_{OZL} | $V_{CC} = 5.5$ V, $V_O = 0.4$ V | | | -20 | | | -20 | μ A |
| I_I | $V_{CC} = 5.5$ V, $V_I = 7$ V | | | 0.1 | | | 0.1 | mA |
| I_{IH} | $V_{CC} = 5.5$ V, $V_I = 2.7$ V | | | 20 | | | 20 | μ A |
| I_{IL} | $V_{CC} = 5.5$ V, $V_I = 0.4$ V | | | -0.1 | | | -0.1 | mA |
| I_O^{\S} | $V_{CC} = 5.5$ V, $V_O = 2.25$ V | -30 | | -112 | -30 | | -112 | mA |
| I_{CC} | [‡] ALS230 $V_{CC} = 5.5$ V, | Outputs high | | 7 | | | 7 | mA |
| | | Outputs low | | 15 | | | 15 | |
| | | Outputs disabled | | 12 | | | 12 | |

[‡]All typical values are at $V_{CC} = 5$ V, $T_A = 25^\circ$ C.

[§]The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

2
ALS and AS Circuits

'ALS230 switching characteristics (see Note 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = 25 °C | | | V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = MIN to MAX | | | | UNIT |
|------------------|-----------------|----------------|---|-----|-----|---|-----|------------|-----|------|
| | | | 'ALS230 | | | SN54ALS230 | | SN74ALS230 | | |
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t _{PLH} | A | Y | 5 | | | | | | | ns |
| t _{PHL} | | | 5 | | | | | | | |
| t _{PZH} | G | Y | 9 | | | | | | | ns |
| t _{PZL} | | | 10 | | | | | | | |
| t _{PHZ} | G | Y | 5 | | | | | | | ns |
| t _{PLZ} | | | 6 | | | | | | | |

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

2

ALS and AS Circuits

SN54ALS231, SN74ALS231 OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

| | |
|--|----------------|
| Supply voltage, V_{CC} | 7 V |
| Input voltage | 7 V |
| Voltage applied to a disabled 3-state output | 5.5 V |
| Operating free-air temperature range: SN54ALS231 | -55°C to 125°C |
| SN74ALS231 | 0°C to 70°C |
| Storage temperature range | -65°C to 150°C |

recommended operating conditions

| | | SN54ALS231 | | | SN74ALS231 | | | UNIT |
|----------|--------------------------------|------------|-----|-----|------------|-----|-----------------|------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V_{IH} | High-level input voltage | 2 | | | 2 | | | V |
| V_{IL} | Low-level input voltage | | | 0.7 | | | 0.8 | V |
| I_{OH} | High-level output current | | | -12 | | | -15 | mA |
| I_{OL} | Low-level output current | | | 12 | | | 24 | mA |
| | | | | | | | 48 [†] | |
| T_A | Operating free-air temperature | -55 | | 125 | 0 | | 70 | °C |

[†]The 48 mA limit applies only to the -1 versions and only if V_{CC} is maintained between 4.75 V and 5.25 V.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | SN54ALS231 | | | SN74ALS231 | | | UNIT |
|------------|---|------------------|------------------|------|------------|------------------|------|------|
| | | MIN | TYP [‡] | MAX | MIN | TYP [‡] | MAX | |
| V_{IK} | $V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$ | | | -1.2 | | | -1.2 | V |
| V_{OH} | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$, $I_{OH} = -0.4\text{ mA}$ | $V_{CC}-2$ | | | $V_{CC}-2$ | | | V |
| | $V_{CC} = 4.5\text{ V}$, $I_{OH} = -3\text{ mA}$ | 2.4 | 3.2 | | 2.4 | 3.2 | | |
| | $V_{CC} = 4.5\text{ V}$, $I_{OH} = -12\text{ mA}$ | 2 | | | | | | |
| | $V_{CC} = 4.5\text{ V}$, $I_{OH} = -15\text{ mA}$ | | | | 2 | | | |
| V_{OL} | $V_{CC} = 4.5\text{ V}$, $I_{OL} = 12\text{ mA}$ | 0.25 | 0.4 | | 0.25 | 0.4 | | V |
| | $V_{CC} = 4.5\text{ V}$, $I_{OL} = 24\text{ mA}$ | | | | 0.35 | 0.5 | | |
| | $V_{CC} = 4.75\text{ V}$, $I_{OL} = 48\text{ mA}$ (-1 versions) | | | | 0.35 | 0.5 | | |
| I_{OZH} | $V_{CC} = 5.5\text{ V}$, $V_O = 2.7\text{ V}$ | | | 20 | | | 20 | μA |
| I_{OZL} | $V_{CC} = 5.5\text{ V}$, $V_O = 0.4\text{ V}$ | | | -20 | | | -20 | μA |
| I_I | $V_{CC} = 5.5\text{ V}$, $V_I = 7\text{ V}$ | | | 0.1 | | | 0.1 | mA |
| I_{IH} | $V_{CC} = 5.5\text{ V}$, $V_I = 2.7\text{ V}$ | | | 20 | | | 20 | μA |
| I_{IL} | $V_{CC} = 5.5\text{ V}$, $V_I = 0.4\text{ V}$ | | | -0.1 | | | -0.1 | mA |
| I_O^{\S} | $V_{CC} = 5.5\text{ V}$, $V_O = 2.25\text{ V}$ | -30 | | -112 | -30 | | -112 | mA |
| I_{CC} | ALS231 $V_{CC} = 5.5\text{ V}$, | Outputs high | 7 | 11 | 7 | 11 | | mA |
| | | Outputs low | 15 | 22 | 15 | 22 | | |
| | | Outputs disabled | 12 | 19 | 12 | 19 | | |

[‡]All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

^{\S}The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

SN54ALS231, SN74ALS231

OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

'ALS231 switching characteristics (see Note 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $R_1 = 500\ \Omega$, $R_2 = 500\ \Omega$, $T_A = 25^\circ\text{C}$ | | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$, $C_L = 50\text{ pF}$, $R_1 = 500\ \Omega$, $R_2 = 500\ \Omega$, $T_A = \text{MIN to MAX}$ | | | UNIT |
|-----------|-----------------|----------------|---|------------|--|------------|-----|------|
| | | | 'ALS231 | SN54ALS231 | | SN74ALS231 | | |
| | | | TYP | MIN | MAX | MIN | MAX | |
| t_{PLH} | A | Y | 5 | 2 | 12 | 2 | 9 | ns |
| t_{PHL} | | | 5 | 2 | 11 | 2 | 9 | |
| t_{PZH} | $1\bar{G}$ | Y | 9 | 4 | 17 | 4 | 14 | ns |
| t_{PZL} | | | 10 | 5 | 21 | 5 | 18 | |
| t_{PHZ} | $1\bar{G}$ | Y | 5 | 2 | 12 | 2 | 10 | ns |
| t_{PLZ} | | | 6 | 3 | 18 | 3 | 12 | |
| t_{PZH} | 2G | Y | 11 | 5 | 18 | 5 | 16 | ns |
| t_{PZL} | | | 12 | 5 | 22 | 5 | 19 | |
| t_{PHZ} | 2G | Y | 6 | 2 | 12 | 2 | 10 | ns |
| t_{PLZ} | | | 7 | 3 | 19 | 3 | 13 | |

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

2 ALS and AS Circuits

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

SN54AS230, SN54AS231, SN74AS230, SN74AS231 OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

| | |
|--|----------------|
| Supply voltage, V_{CC} | 7 V |
| Input voltage | 7 V |
| Voltage applied to a disabled 3-state output | 5.5 V |
| Operating free-air temperature range: SN54AS230, SN54AS231 | -55°C to 125°C |
| SN74AS230, SN74AS231 | 0°C to 70°C |
| Storage temperature range | -65°C to 150°C |

recommended operating conditions

| | | SN54AS230 SN54AS231 | | | SN74AS230 SN74AS231 | | | UNIT |
|----------|--------------------------------|------------------------|-----|-----|------------------------|-----|-----|------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V_{IH} | High-level input voltage | 2 | | | 2 | | | V |
| V_{IL} | Low-level input voltage | | | 0.8 | | | 0.8 | V |
| I_{OH} | High-level output current | | | -12 | | | -15 | mA |
| I_{OL} | Low-level output current | | | 48 | | | 64 | mA |
| T_A | Operating free-air temperature | -55 | | 125 | 0 | | 70 | °C |

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | SN54AS230 SN54AS231 | | | SN74AS230 SN74AS231 | | | UNIT |
|----------------|---|------------------------|------------------|------|------------------------|------|------|------|
| | | MIN | TYP† | MAX | MIN | TYP† | MAX | |
| V_{IK} | $V_{CC} = 4.5$ V, $I_I = -18$ mA | | | -1.2 | | | -1.2 | V |
| V_{OH} | $V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -2$ mA | $V_{CC} - 2$ | | | $V_{CC} - 2$ | | | V |
| | $V_{CC} = 4.5$ V, $I_{OH} = -3$ mA | 2.4 | 3.4 | | 2.4 | 3.4 | | |
| | $V_{CC} = 4.5$ V, $I_{OH} = -12$ mA | 2.4 | | | | | | |
| | $V_{CC} = 4.5$ V, $I_{OH} = -15$ mA | | | | 2.4 | | | |
| V_{OL} | $V_{CC} = 4.5$ V, $I_{OL} = 48$ mA | 0.27 0.55 | | | | | | V |
| | $V_{CC} = 4.5$ V, $I_{OL} = 64$ mA | | | | 0.31 0.55 | | | |
| I_{OZH} | $V_{CC} = 5.5$ V, $V_O = 2.7$ V | 50 | | | 50 | | | μA |
| I_{OZL} | $V_{CC} = 5.5$ V, $V_O = 0.4$ V | -50 | | | -50 | | | μA |
| I_I | $V_{CC} = 5.5$ V, $V_I = 7$ V | 0.1 | | | 0.1 | | | mA |
| I_{IH} | $V_{CC} = 5.5$ V, $V_I = 2.7$ V | 20 | | | 20 | | | μA |
| I_{IL} | 'AS230 2A | -1 | | | -1 | | | mA |
| | All others | -0.5 | | | -0.5 | | | |
| I_O^\ddagger | $V_{CC} = 5.5$ V, $V_O = 2.25$ V | -50 | | -150 | -50 | | -150 | mA |
| I_{CC} | 'AS230 | $V_{CC} = 5.5$ V | Outputs high | 16 | 25 | 16 | 25 | mA |
| | | | Outputs low | 55 | 87 | 55 | 87 | |
| | | | Outputs disabled | 29 | 46 | 29 | 46 | |
| | 'AS231 | $V_{CC} = 5.5$ V | Outputs high | 12 | 18 | 12 | 18 | mA |
| | | | Outputs low | 52 | 82 | 52 | 82 | |
| | | | Outputs disabled | 25 | 39 | 25 | 39 | |

†All typical values are at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$.

‡The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

SN54AS230, SN54AS231, SN74AS230, SN74AS231

OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

*AS230 switching characteristics (see Note 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V},$ $C_L = 50 \text{ pF},$ $R_1 = 500 \Omega,$ $R_2 = 500 \Omega,$ $T_A = \text{MIN to MAX}$ | | | | UNIT |
|-----------|-----------------|----------------|--|------|-----------|-----|------|
| | | | SN54AS230 | | SN74AS230 | | |
| | | | MIN | MAX | MIN | MAX | |
| t_{PLH} | 1A | 1Y | 2.5 | 7 | 2.5 | 6.5 | ns |
| t_{PHL} | | | 2 | 6 | 2 | 5.7 | |
| t_{PLH} | 2A | 2Y | 2.5 | 9 | 2.5 | 6.2 | ns |
| t_{PHL} | | | 2 | 7 | 2 | 6.2 | |
| t_{PZH} | $\overline{1G}$ | 1Y | 2 | 7 | 2 | 6.4 | ns |
| t_{PZL} | | | 2 | 9 | 2 | 8.5 | |
| t_{PHZ} | | | 2 | 5.5 | 2 | 5 | |
| t_{PLZ} | | | 2 | 12.5 | 2 | 9.5 | |
| t_{PZH} | $\overline{2G}$ | 2Y | 2 | 10 | 2 | 9 | ns |
| t_{PZL} | | | 2 | 8 | 2 | 7.5 | |
| t_{PHZ} | | | 2 | 6.5 | 2 | 6 | |
| t_{PLZ} | | | 2 | 10.5 | 2 | 9 | |

*AS231 switching characteristics (see Note 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V},$ $C_L = 50 \text{ pF},$ $R_1 = 500 \Omega,$ $R_2 = 500 \Omega,$ $T_A = \text{MIN to MAX}$ | | | | UNIT |
|-----------|-----------------|----------------|--|------|-----------|-----|------|
| | | | SN54AS231 | | SN74AS231 | | |
| | | | MIN | MAX | MIN | MAX | |
| t_{PLH} | A | Y | 2 | 7 | 2 | 6.5 | ns |
| t_{PHL} | | | 2 | 6 | 2 | 5.7 | |
| t_{PZH} | $\overline{1G}$ | Y | 2 | 7 | 2 | 6.4 | ns |
| t_{PZL} | | | 2 | 9 | 2 | 8.5 | |
| t_{PHZ} | | | 2 | 5.5 | 2 | 5 | |
| t_{PLZ} | | | 2 | 12.5 | 2 | 9.5 | |
| t_{PZH} | G | Y | 3 | 7 | 3 | 6 | ns |
| t_{PZL} | | | 3 | 10 | 3 | 9 | |
| t_{PHZ} | | | 3 | 6.5 | 3 | 6 | |
| t_{PLZ} | | | 3 | 13.5 | 3 | 7 | |

NOTE 1. Load circuit and voltage waveforms are shown in Section 1.