

SN74ALS280, SN74AS280 9-BIT PARITY GENERATORS/CHECKERS

SDAS038C – DECEMBER 1982 – REVISED DECEMBER 1994

- Generate Either Odd or Even Parity for Nine Data Lines
- Cascadable for n-Bit Parity
- Can Be Used to Upgrade Existing Systems Using MSI Parity Circuits
- Package Options Include Plastic Small-Outline (D) Packages and Standard Plastic (N) 300-mil DIPs

description

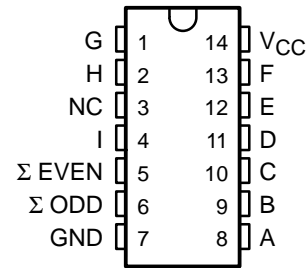
These universal 9-bit parity generators/checkers utilize advanced Schottky high-performance circuitry and feature odd (Σ ODD) and even (Σ EVEN) outputs to facilitate operation of either odd- or even-parity applications. The word-length capability is easily expanded by cascading.

These devices can be used to upgrade the performance of most systems utilizing the SN74ALS180 and SN74AS180 parity generators/checkers. Although the SN74ALS280 and SN74AS280 are implemented without expander inputs, the corresponding function is provided by the availability of an input (I) at terminal 4 and the absence of any internal connection at terminal 3. This permits the SN74ALS280 and SN74AS280 to be substituted for the SN74ALS180 and SN74AS180 in existing designs to produce an identical function even if the devices are mixed with existing SN74ALS180 and SN74AS180 devices.

All SN74AS280 inputs are buffered to lower the drive requirements.

The SN74ALS280 and SN74AS280 are characterized for operation from 0°C to 70°C.

D OR N PACKAGE
(TOP VIEW)

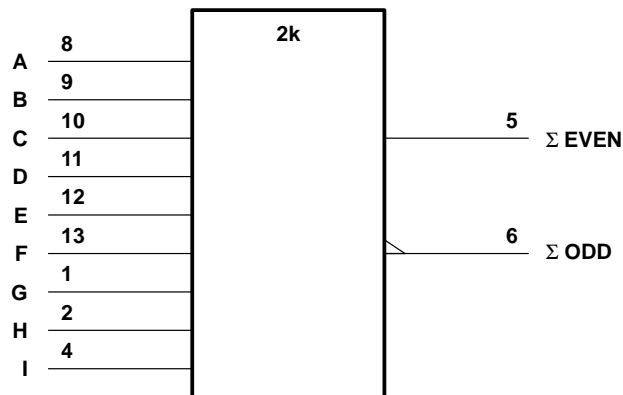


NC – No internal connection

FUNCTION TABLE

| NO. OF INPUTS A–I THAT ARE HIGH | OUTPUTS | |
|---------------------------------------|---------------|--------------|
| | Σ EVEN | Σ ODD |
| 0, 2, 4, 6, 8 | H | L |
| 1, 3, 5, 7, 9 | L | H |

logic symbol†



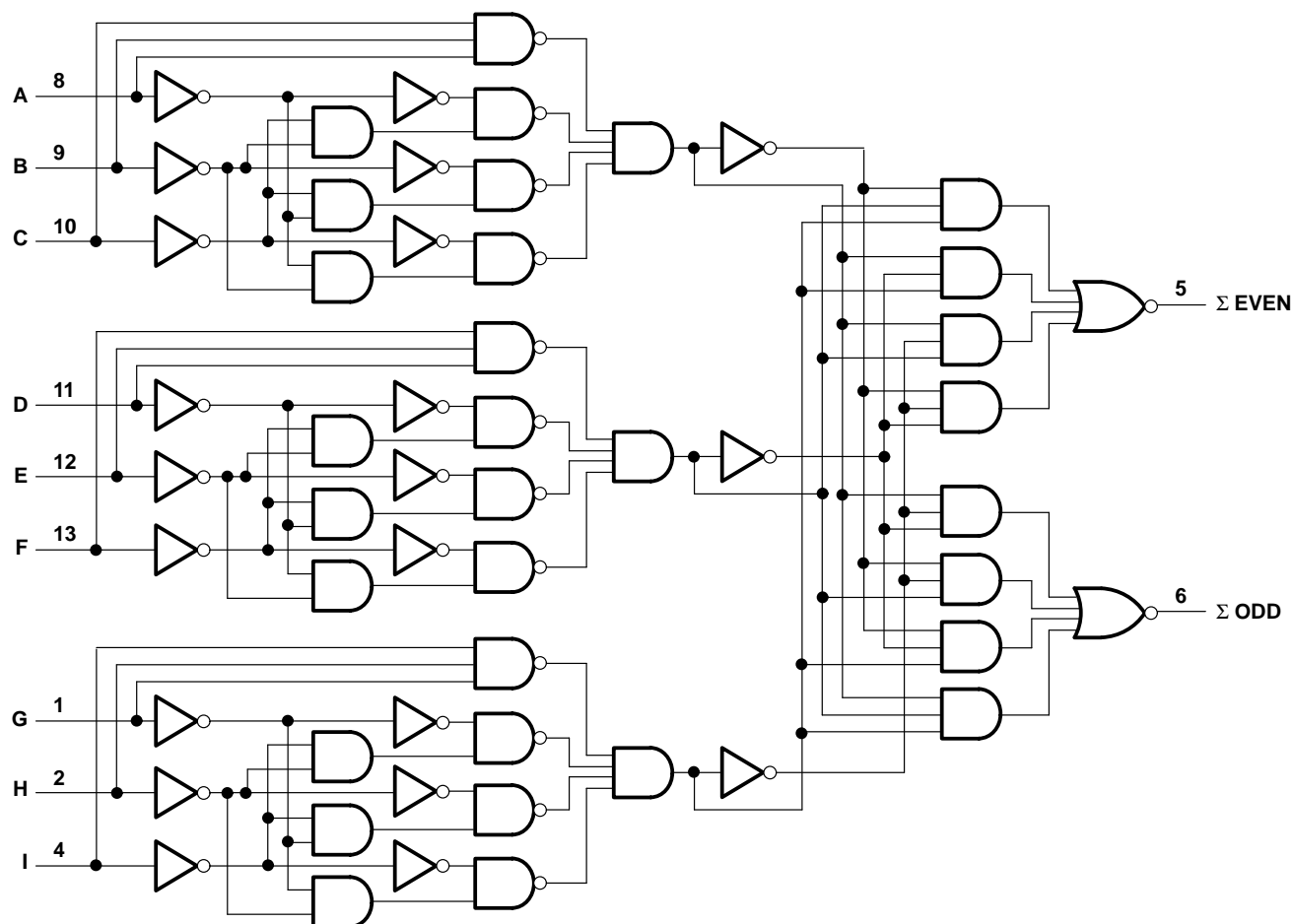
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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logic diagram (positive logic)



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

| | |
|--|----------------|
| Supply voltage, V_{CC} | 7 V |
| Input voltage, V_I | 7 V |
| Operating free-air temperature range, T_A : SN74ALS280 | 0°C to 70°C |
| Storage temperature range | –65°C to 150°C |

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

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recommended operating conditions

| | | SN74ALS280 | | | UNIT |
|----------|--------------------------------|------------|-----|------|------|
| | | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | V |
| V_{IH} | High-level input voltage | 2 | | | V |
| V_{IL} | Low-level input voltage | | | 0.8 | V |
| I_{OH} | High-level output current | | | -2.6 | mA |
| I_{OL} | Low-level output current | | | 24 | mA |
| T_A | Operating free-air temperature | 0 | | 70 | °C |

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

| PARAMETER | TEST CONDITIONS | SN74ALS280 | | | UNIT |
|--------------------|--|--------------|------|------|------|
| | | MIN | TYP† | MAX | |
| V_{IK} | $V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$ | | | -1.5 | V |
| V_{OH} | $V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $I_{OH} = -0.4\text{ mA}$ | $V_{CC} - 2$ | | | V |
| | $V_{CC} = 4.5\text{ V}$, $I_{OH} = -2.6\text{ mA}$ | 2.4 | 3.3 | | |
| V_{OL} | $V_{CC} = 4.5\text{ V}$ | | | 0.25 | V |
| | | | | 0.4 | |
| | | | | 0.35 | 0.5 |
| I_I | $V_{CC} = 5.5\text{ V}$, $V_I = 7\text{ V}$ | | | 0.1 | mA |
| I_{IH} | $V_{CC} = 5.5\text{ V}$, $V_I = 2.7\text{ V}$ | | | 20 | μA |
| I_{IL} | $V_{CC} = 5.5\text{ V}$, $V_I = 0.4\text{ V}$ | | | -0.1 | mA |
| I_{O}^{\ddagger} | $V_{CC} = 5.5\text{ V}$, $V_O = 2.25\text{ V}$ | -30 | | -112 | mA |
| I_{CC} | $V_{CC} = 5.5\text{ V}$ | | 10 | 16 | mA |

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

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

switching characteristics (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX§ | | UNIT |
|------------------|-----------------|----------------|---|-----|------|
| | | | SN74ALS280 | | |
| | | | MIN | MAX | |
| t _{PLH} | Any | Σ EVEN | 3 | 20 | ns |
| t _{PHL} | | | 3 | 20 | |
| t _{PLH} | Any | Σ ODD | 3 | 20 | ns |
| t _{PHI} | | | 4 | 22 | |

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

| | |
|---|----------------|
| Supply voltage, V_{CC} | 7 V |
| Input voltage, V_I | 7 V |
| Operating free-air temperature range, T_A : SN74AS280 | 0°C to 70°C |
| Storage temperature range | –65°C to 150°C |

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

recommended operating conditions

| | | SN74AS280 | | | UNIT |
|----------|--------------------------------|-----------|-----|-----|------|
| | | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | V |
| V_{IH} | High-level input voltage | 2 | | | V |
| V_{IL} | Low-level input voltage | | | 0.8 | V |
| I_{OH} | High-level output current | | | –2 | mA |
| I_{OL} | Low-level output current | | | 20 | mA |
| T_A | Operating free-air temperature | 0 | | 70 | °C |

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

| PARAMETER | TEST CONDITIONS | SN74AS280 | | | UNIT |
|-----------------|---|--------------|------------------|------|------|
| | | MIN | TYP [‡] | MAX | |
| V_{IK} | $V_{CC} = 4.5$ V, $I_I = -18$ mA | | | –1.5 | V |
| V_{OH} | $V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -2$ mA | $V_{CC} - 2$ | | | V |
| V_{OL} | $V_{CC} = 4.5$ V, $I_{OL} = 20$ mA | 0.35 | 0.5 | | V |
| I_I | $V_{CC} = 5.5$ V, $V_I = 7$ V | | 0.1 | | mA |
| I_{IH} | $V_{CC} = 5.5$ V, $V_I = 2.7$ V | | 20 | | μA |
| I_{IL} | $V_{CC} = 5.5$ V, $V_I = 0.4$ V | | –0.5 | | mA |
| $I_{O\text{§}}$ | $V_{CC} = 5.5$ V, $V_O = 2.25$ V | –30 | | –112 | mA |
| I_{CC} | $V_{CC} = 5.5$ V | | 25 | 35 | mA |

[‡] 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} .

switching characteristics (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX† | | UNIT |
|------------------|-----------------|----------------|---|------|------|
| | | | SN74AS280 | | |
| | | | MIN | MAX | |
| t _{PLH} | Any | Σ EVEN | 3 | 12 | ns |
| t _{PHL} | | | 3 | 11 | |
| t _{PLH} | Any | Σ ODD | 3 | 12 | ns |
| t _{PHL} | | | 3 | 11.5 | |

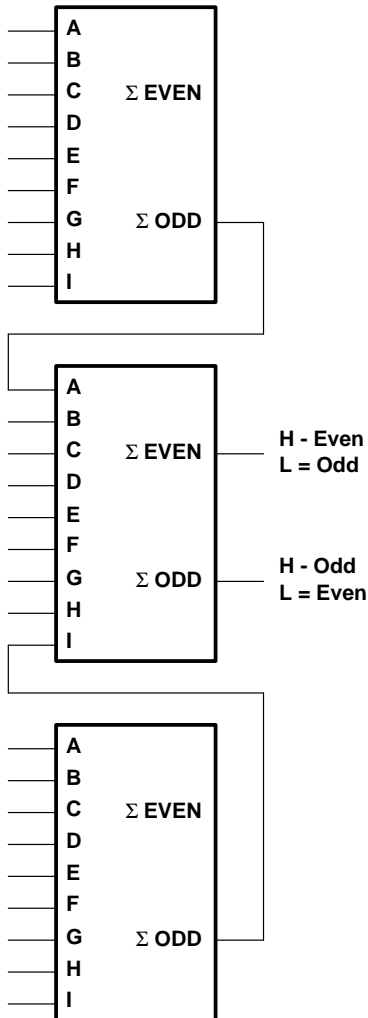
^{††} For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.



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APPLICATION INFORMATION

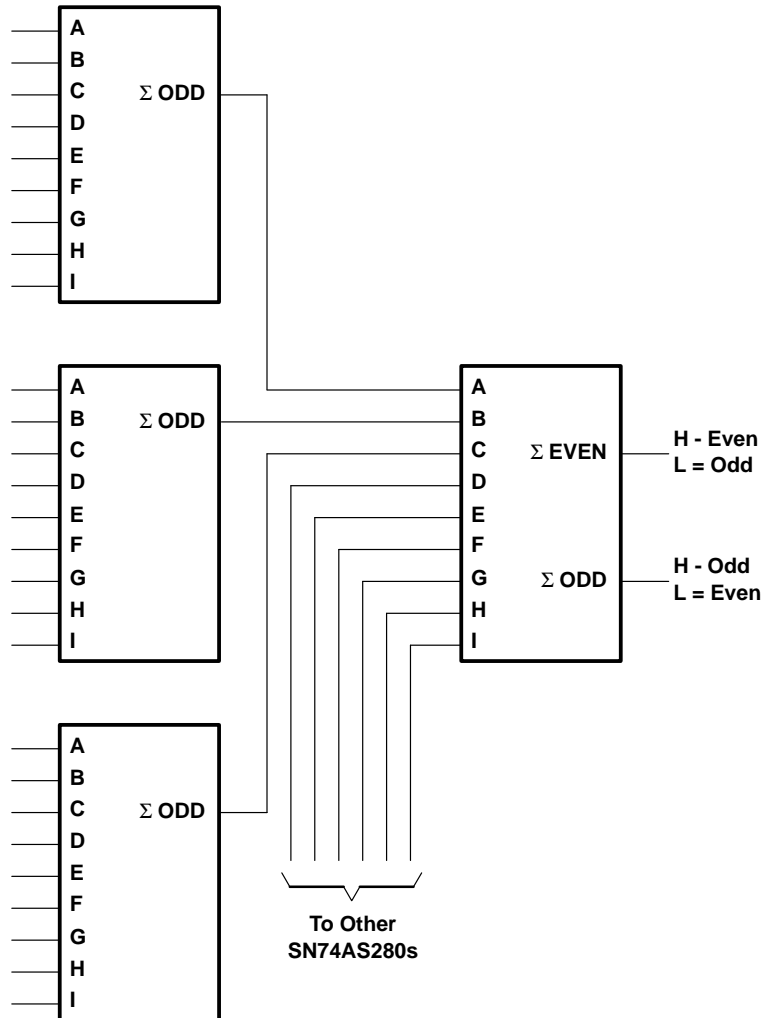
**25-LINE
PARITY GENERATOR/CHECKER**



Three SN74ALS280/SN74AS280 devices can be used to implement a 25-line parity generator/checker.

As an alternative, the Σ ODD outputs of two or three parity generators/checkers can be decoded with a 2-input ('AS86A or 'ALS86) exclusive-OR gate for 18- or 27-line parity applications.

**81-LINE
PARITY GENERATOR/CHECKER**

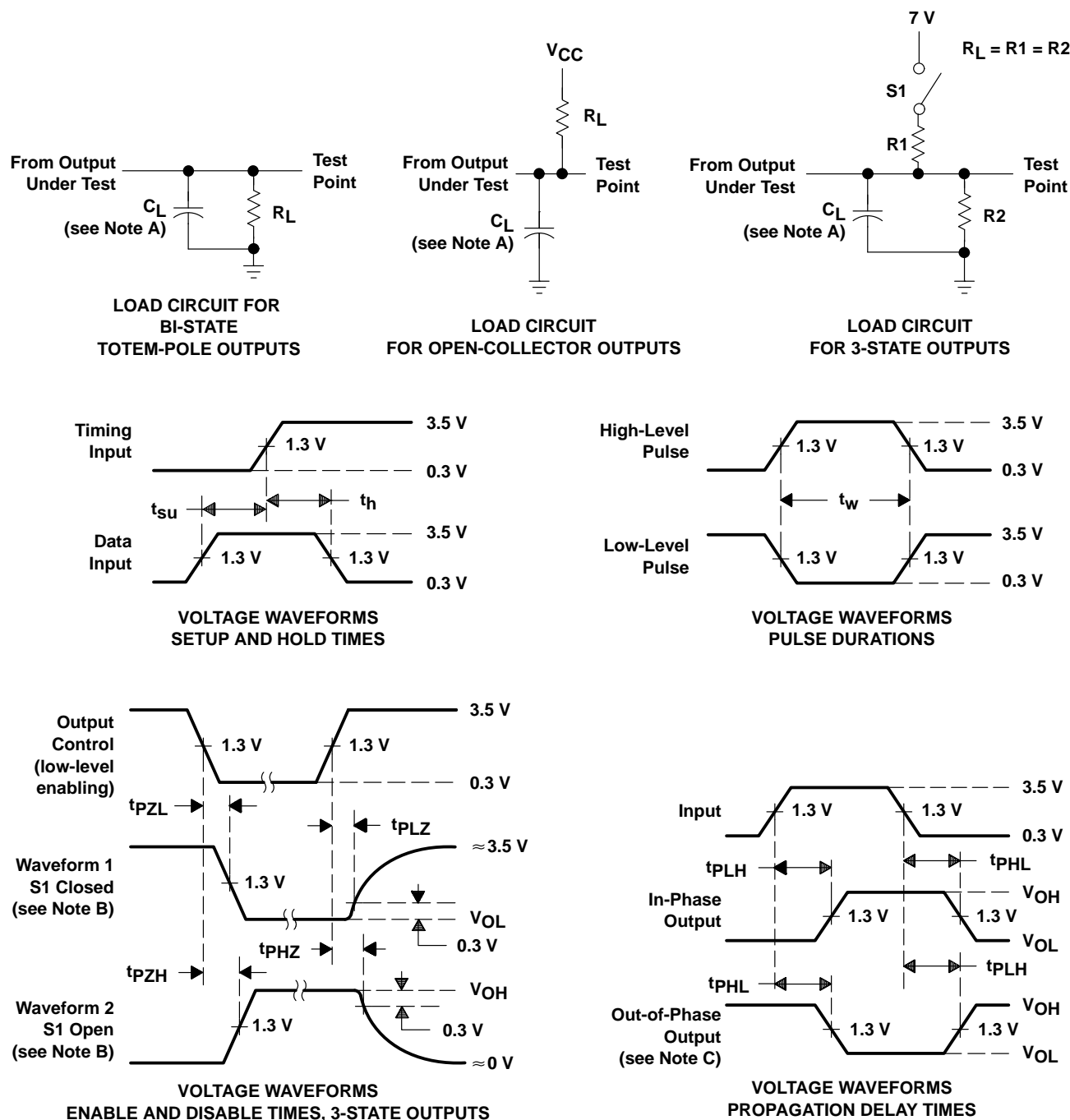


Longer word lengths can be implemented by cascading SN74ALS280/SN74AS280 devices. Parity can be generated for word lengths up to 81 bits.

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PARAMETER MEASUREMENT INFORMATION SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- NOTES: A. C_L includes probe and jig capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 C. When measuring propagation delay items of 3-state outputs, switch S1 is open.
 D. All input pulses have the following characteristics: $PRR \leq 1$ MHz, $t_r = t_f = 2$ ns, duty cycle = 50%.
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

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