



# PO54G02A, PO74G02A

## QUADRUPLER 2-INPUT POSITIVE-NOR GATES

### 54, 74 Series Noise Cancellation GHz Logic

#### FEATURES:

- Patented technology
- Specified From  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ ,  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ , and  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
- Operating frequency up to 900MHz with 2pf load
- Operating frequency up to 700MHz with 5pf load
- Operating frequency up to 400MHz with 15pf load
- VCC Operates from 1.65V to 3.6V
- Propagation delay < 1.5ns max with 15pf load
- Low input capacitance: 4pf typical
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
- 5000-VHuman-BodyModel (A114-A)
- 200-VMachineModel (A115-A)
- Available in 14pin 150mil wide SOIC package
- Available in 14pin Ceramic Dual Flatpack
- Available in 20pin Leadless Ceramic Chip Carrier

#### DESCRIPTION:

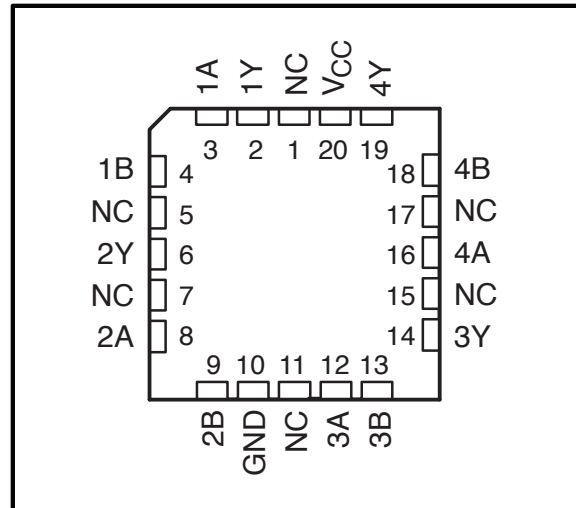
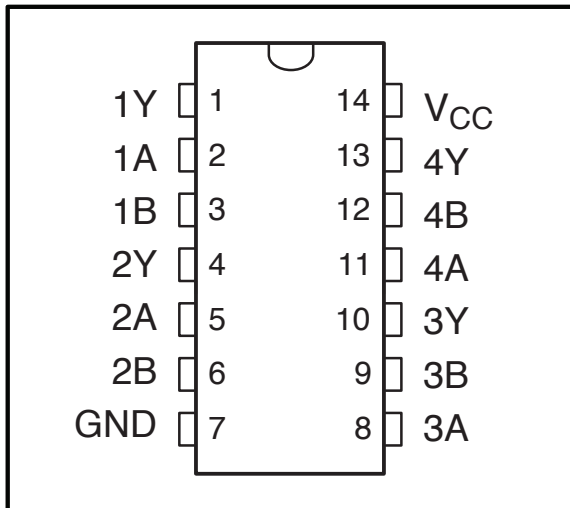
Potato Semiconductor's PO74G02A is designed for world top performance using submicron CMOS technology to achieve 900MHz TTL /CMOS output frequency with less than 1.5ns propagation delay.

This quadruple 2-input positive-NOR gate is designed for 1.65-V to 3.6-V VCC operation.

The PO74G02A performs the Boolean function  $Y = \overline{A + B}$  or  $Y = \overline{A} \cdot \overline{B}$  in positive logic.

Inputs can be driven from either 3.3V or 5V devices. This feature allows the use of these devices as translators in a mixed 3.3V/5V system environment.

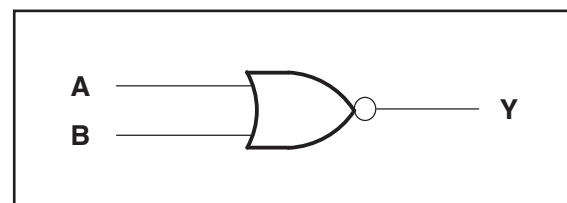
#### Pin Configuration



#### Pin Description

| INPUTS |   | OUTPUT<br>Y |
|--------|---|-------------|
| A      | B |             |
| H      | X | L           |
| X      | H | L           |
| L      | L | H           |

#### Logic Block Diagram



**54, 74 Series Noise Cancellation GHz Logic****Maximum Ratings**

| Description           | Max                          | Unit |
|-----------------------|------------------------------|------|
| Storage Temperature   | -65 to 150                   | °C   |
| Operation Temperature | -55 to 125                   | °C   |
| Operation Voltage     | -0.5 to +4.6                 | V    |
| Input Voltage         | -0.5 to +5.5                 | V    |
| Output Voltage        | -0.5 to V <sub>cc</sub> +0.5 | V    |

**Note:**

stresses greater than listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability specification is not implied.

**DC Electrical Characteristics**

| Symbol                | Description         | Test Conditions                                                                      | Min         | Typ         | Max         | Unit      |
|-----------------------|---------------------|--------------------------------------------------------------------------------------|-------------|-------------|-------------|-----------|
| <b>V<sub>OH</sub></b> | Output High voltage | V <sub>cc</sub> =3V Vin=V <sub>IH</sub> or V <sub>IL</sub> , I <sub>OH</sub> = -12mA | <b>2.4</b>  | <b>3</b>    | -           | <b>V</b>  |
| <b>V<sub>OL</sub></b> | Output Low voltage  | V <sub>cc</sub> =3V Vin=V <sub>IH</sub> or V <sub>IL</sub> , I <sub>OH</sub> =12mA   | -           | <b>0.3</b>  | <b>0.5</b>  | <b>V</b>  |
| <b>V<sub>IH</sub></b> | Input High voltage  | Guaranteed Logic HIGH Level (Input Pin)                                              | <b>2</b>    | -           | <b>5.5</b>  | <b>V</b>  |
| <b>V<sub>IL</sub></b> | Input Low voltage   | Guaranteed Logic LOW Level (Input Pin)                                               | <b>-0.5</b> | -           | <b>0.8</b>  | <b>V</b>  |
| <b>I<sub>IH</sub></b> | Input High current  | V <sub>cc</sub> = 3.6V and Vin = 5.5V                                                | -           | -           | <b>5</b>    | <b>uA</b> |
| <b>I<sub>IL</sub></b> | Input Low current   | V <sub>cc</sub> = 3.6V and Vin = 0V                                                  | -           | -           | <b>-5</b>   | <b>uA</b> |
| <b>V<sub>IK</sub></b> | Clamp diode voltage | V <sub>cc</sub> = Min. And I <sub>IN</sub> = -18mA                                   | -           | <b>-0.7</b> | <b>-1.2</b> | <b>V</b>  |

**Notes:**

1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V<sub>cc</sub> = 3.3V, 25 °C ambient.
3. This parameter is guaranteed but not tested.
4. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
5. V<sub>OH</sub> = V<sub>cc</sub> - 0.6V at rated current

**54, 74 Series Noise Cancellation GHz Logic****Power Supply Characteristics**

| Symbol      | Description                    | Test Conditions (1)     | Min | Typ        | Max       | Unit      |
|-------------|--------------------------------|-------------------------|-----|------------|-----------|-----------|
| <b>IccQ</b> | Quiescent Power Supply Current | Vcc=Max, Vin=Vcc or GND | -   | <b>0.1</b> | <b>40</b> | <b>uA</b> |

**Notes:**

1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at Vcc = 3.3V, 25°C ambient.
3. This parameter is guaranteed but not tested.
4. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.

**Capacitance**

| Parameters (1) | Description        | Test Conditions | Typ      | Unit      |
|----------------|--------------------|-----------------|----------|-----------|
| <b>Cin</b>     | Input Capacitance  | Vin = 0V        | <b>4</b> | <b>pF</b> |
| <b>Cout</b>    | Output Capacitance | Vout = 0V       | <b>6</b> | <b>pF</b> |

**Notes:**

- 1 This parameter is determined by device characterization but not production tested.

**Switching Characteristics**

| Symbol       | Description                 | Test Conditions (1) | Max        | Unit       |
|--------------|-----------------------------|---------------------|------------|------------|
| <b>tPLH</b>  | Propagation Delay A, B to Y | CL = 15pF           | <b>1.5</b> | <b>ns</b>  |
| <b>tPHL</b>  | Propagation Delay A, B to Y | CL = 15pF           | <b>1.5</b> | <b>ns</b>  |
| <b>tr/tf</b> | Rise/Fall Time              | 0.8V – 2.0V         | <b>0.8</b> | <b>ns</b>  |
| <b>fmax</b>  | Input Frequency             | CL = 15pF           | <b>400</b> | <b>MHz</b> |
| <b>fmax</b>  | Input Frequency             | CL = 5pF            | <b>700</b> | <b>MHz</b> |
| <b>fmax</b>  | Input Frequency             | CL = 2pF            | <b>900</b> | <b>MHz</b> |

**Notes:**

1. See test circuits and waveforms.
2. tPLH, tPHL, tsk(p), and tsk(o) are production tested. All other parameters guaranteed but not production tested.
3. Airflow of 1m/s is recommended for frequencies above 133MHz

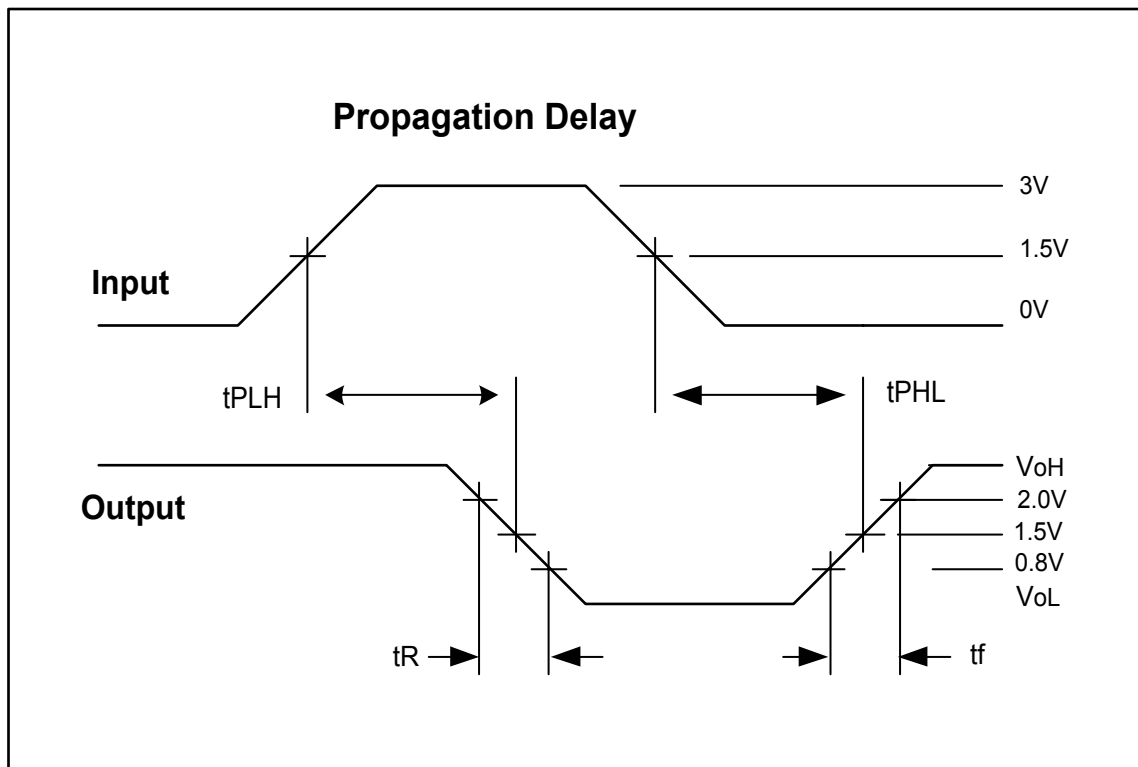


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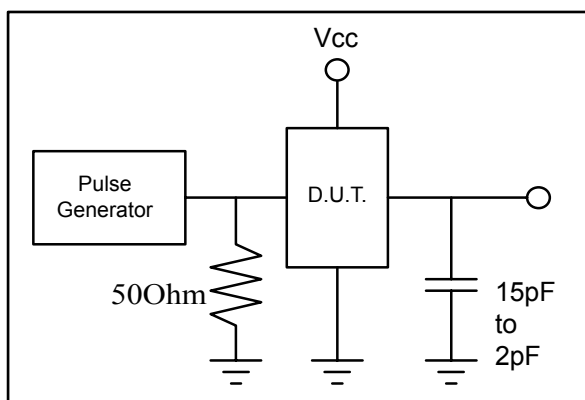
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### Test Waveforms



### Test Circuit



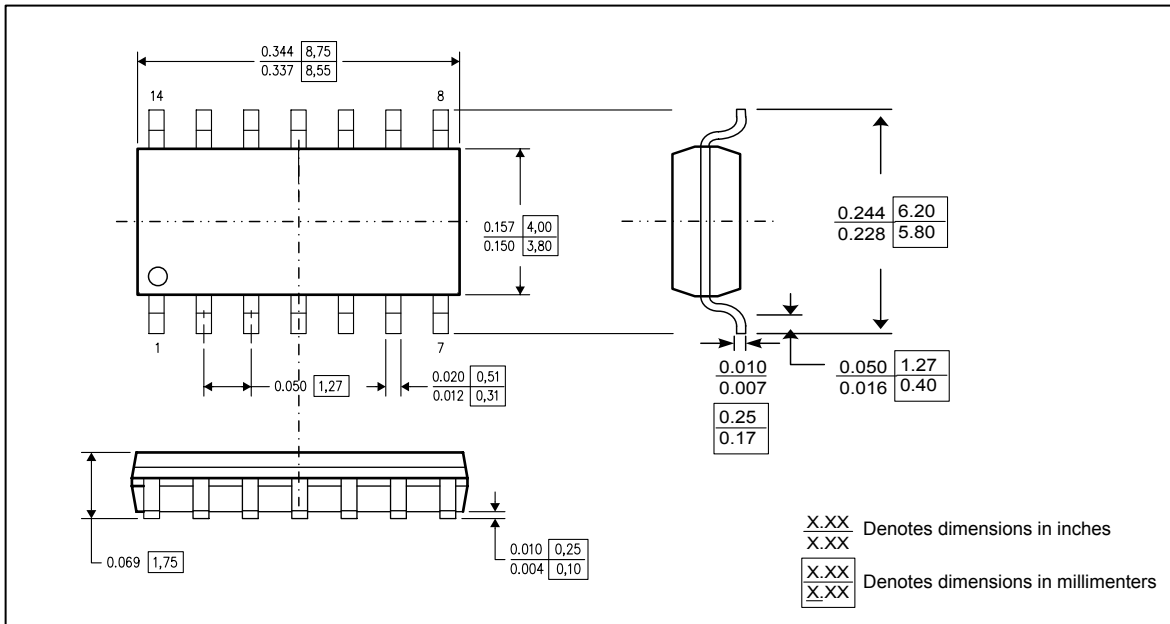


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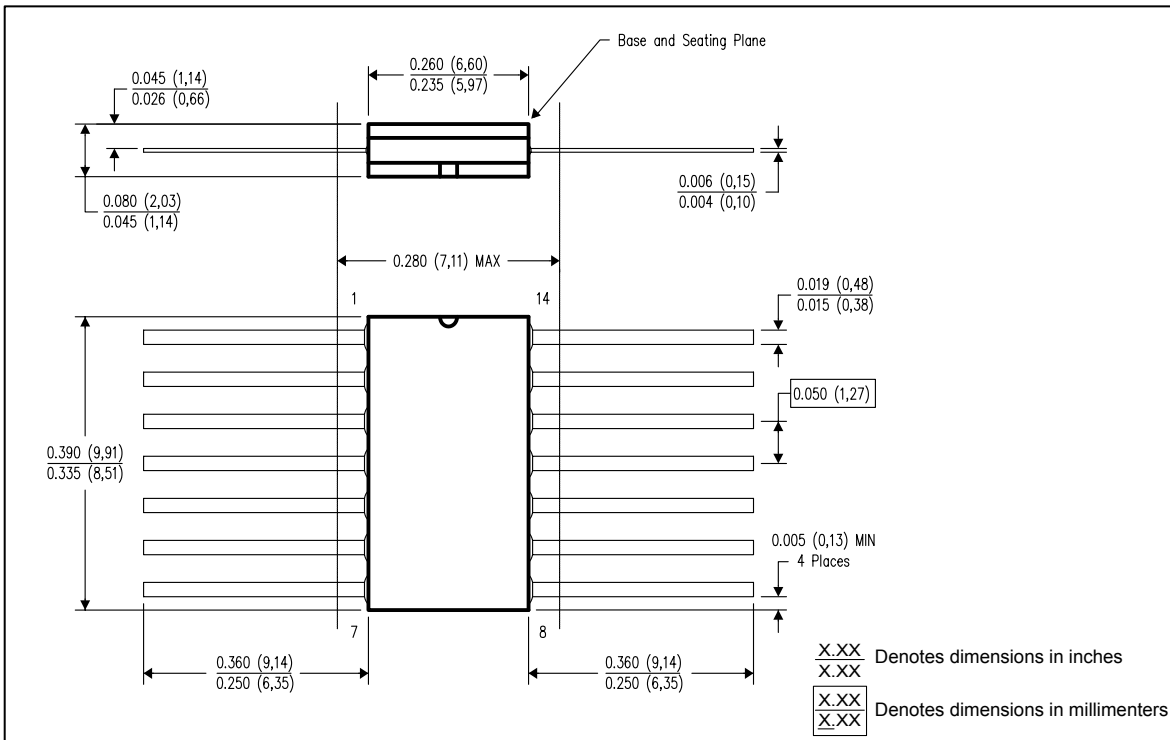
QUADRUPLE 2-INPUT POSITIVE-NOR GATES

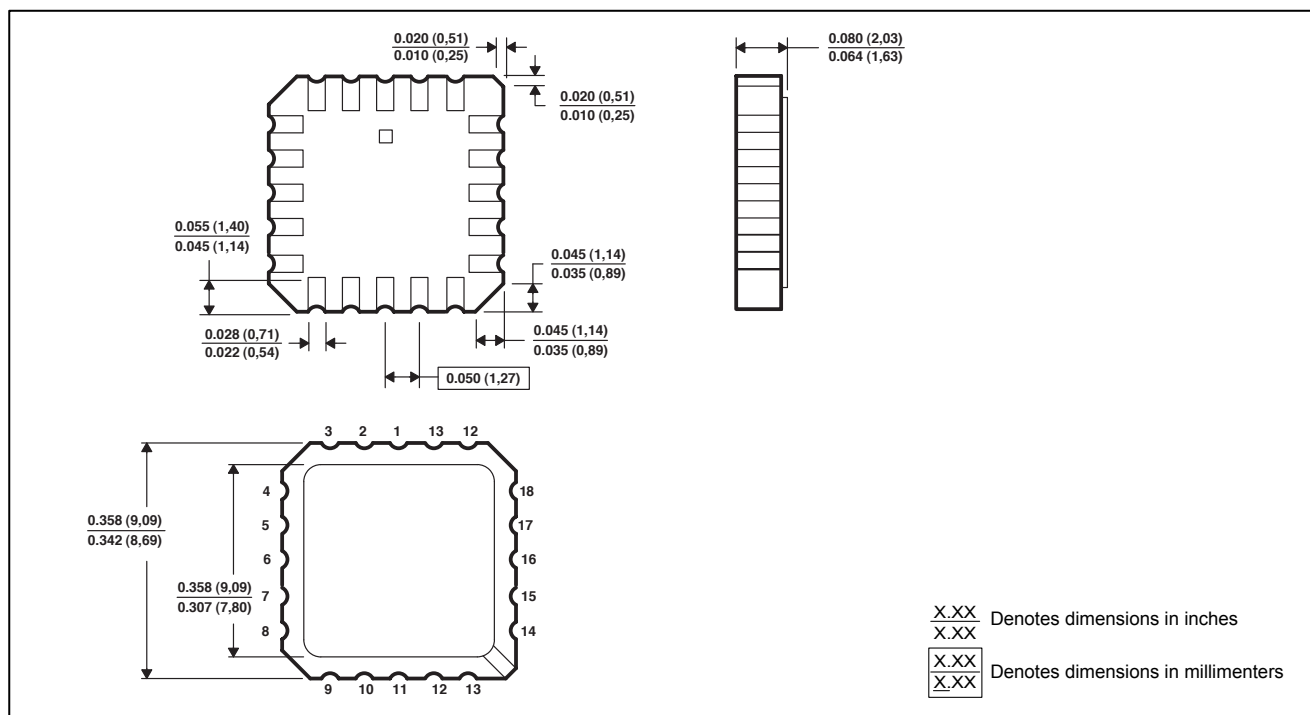
## 54, 74 Series Noise Cancellation GHz Logic

### Packaging Mechanical Drawing: 14 pin 150mil SOIC



### Packaging Mechanical Drawing: 14pin Leadless Ceramic Chip Carrier



**54, 74 Series Noise Cancellation GHz Logic****Packaging Mechanical Drawing: 20pin Ceramic Dual Flatpack****IC Ordering Information**

| Ordering Code              | Package                             |                 | Top-Marking   | T <sub>A</sub> |
|----------------------------|-------------------------------------|-----------------|---------------|----------------|
| PO74G02ASU for Tube        | 14pin SOIC                          | Pb-free & Green | POTATO74G02AS | -40°C to 125°C |
| PO74G02ASR for Tape & Reel | 14pin SOIC                          | Pb-free & Green | POTATO74G02AS | -40°C to 125°C |
| PO54G02ALU for Tube        | 14pin Leadless Ceramic Chip Carrier | Pb-free & Green | POTATO54G02AL | -55°C to 125°C |
| PO54G02AFU for Tube        | 20pin Ceramic Dual Flatpack         | Pb-free & Green | POTATO54G02AF | -55°C to 125°C |

**IC Package Information**

| PACKAGE CODE | PACKAGE TYPE | TAPE WIDTH (mm) | TAPE PITCH (mm) | PIN 1 LOCATION  | TAPE TRAILER LENGTH | QTY PER REEL | TAPE LEADER LENGTH | QTY PER TUBE |
|--------------|--------------|-----------------|-----------------|-----------------|---------------------|--------------|--------------------|--------------|
| S            | SOIC 14      | 16              | 8               | Top Left Corner | 39 (12")            | 3000         | 64 (20")           | 55           |
| L            | LCCC 20      | N/A             | N/A             | N/A             | N/A                 | N/A          | N/A                | 55           |
| F            | CFP 14       | N/A             | N/A             | N/A             | N/A                 | N/A          | N/A                | 150          |