

**PI6C4931504-04**

**High Performance HCSL Fanout Buffer**

**Features**

- 4 HCSL outputs
- Up to 250MHz output frequency
- Ultra low additive phase jitter: < 0.1 ps (typ)
- Two selectable inputs
- Low delay from input to output (Tpd typ. 1.5ns)
- 2.5V / 3.3V power supply
- Industrial temperature support
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- TSSOP-20 package

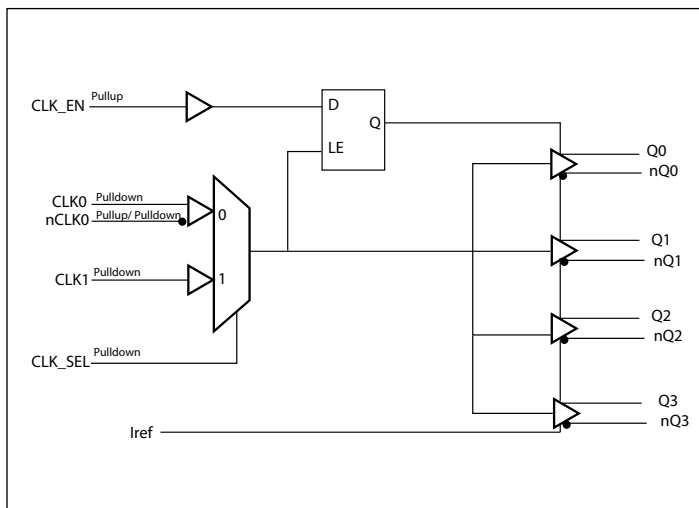
**Description**

The PI6C4931504-04 is a high performance fanout buffer device which supports up to 250MHz frequency. This device is ideal for systems that need to distribute low jitter clock signals to multiple destinations.

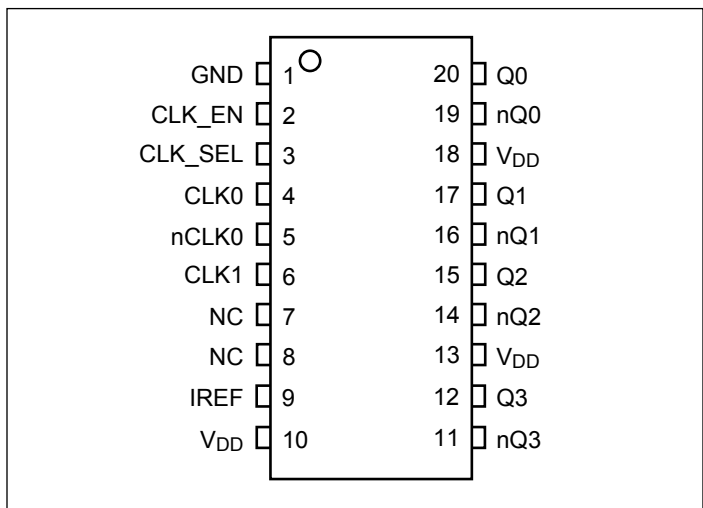
**Applications**

- Networking systems including switches and Routers
- High frequency backplane based computing and telecom platforms

**Block Diagram**



**Pin Configuration (20-Pin TSSOP)**



**Notes:**

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Pin Description

| Pin #      | Pin Name        | Type   | Description                                                     |
|------------|-----------------|--------|-----------------------------------------------------------------|
| 1          | GND             | Power  | Ground                                                          |
| 2          | CLK_EN          | Input  | Clock output enable/ disable                                    |
| 3          | CLK_SEL         | Input  | Clock input source selection pin                                |
| 4, 5       | CLK0<br>nCLK0   | Input  | Clock input                                                     |
| 6          | CLK1            | Input  | Clock input                                                     |
| 7, 8       | NC              | -      | No connect                                                      |
| 9          | IREF            | Power  | External resistor connection to set differential output current |
| 10, 13, 18 | V <sub>DD</sub> | Power  | Power supply                                                    |
| 11, 12     | nQ3<br>Q3       | Output | HCSL output clock                                               |
| 14, 15     | nQ2<br>Q2       | Output | HCSL output clock                                               |
| 16, 17     | nQ1<br>Q1       | Output | HCSL output clock                                               |
| 19, 20     | nQ0<br>Q0       | Output | HCSL output clock                                               |

## Function Table

Table 1: Input select function

| CLK_SEL | Function    |
|---------|-------------|
| 0       | CLK0, nCLK0 |
| 1       | CLK1        |

Table 2: Output Enable function

| CLK_EN | Outputs       |                |
|--------|---------------|----------------|
|        | Q0:Q4         | nQ0:nQ4        |
| 0      | Disabled; LOW | Disabled; HIGH |
| 1      | Enabled       | Enabled        |

**Maximum Ratings** (Above which the useful life may be impaired. For user guidelines, not tested)

|                                                      |                       |
|------------------------------------------------------|-----------------------|
| Storage temperature.....                             | -55 to +150°C         |
| Supply Voltage to Ground Potential ( $V_{DD}$ )..... | -0.5 to +4.6V         |
| Inputs (Referenced to GND) .....                     | -0.5 to $V_{DD}+0.5V$ |
| Clock Output (Referenced to GND).....                | -0.5 to $V_{DD}+0.5V$ |
| Soldering Temperature (Max of 10 seconds) .....      | +260°C                |

**Note:**

Stresses greater than those 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.

**Power Supply Characteristics and Operating Conditions**

| Symbol   | Parameter                     | Test Condition             | Min.  | Typ. | Max.  | Units |
|----------|-------------------------------|----------------------------|-------|------|-------|-------|
| $V_{DD}$ | Core Supply Voltage           |                            | 2.97  |      | 3.63  | V     |
|          |                               |                            | 2.375 |      | 2.625 | V     |
| $I_{DD}$ | Power Supply Current          | $V_{DD} = 3.3V$ , Unloaded |       |      | 90    | mA    |
|          |                               | $V_{DD} = 2.5V$ , Unloaded |       |      | 80    |       |
| $T_A$    | Ambient Operating Temperature |                            | -40   |      | 85    | °C    |

**DC Electrical Specifications - Differential Inputs**

| Symbol   | Parameter                          |                  | Min.      | Typ. | Max.          | Units |
|----------|------------------------------------|------------------|-----------|------|---------------|-------|
| $I_{IH}$ | Input High current: CLK0, nCLK0    | Input = $V_{DD}$ |           |      | 200           | uA    |
| $I_{IL}$ | Input Low current: nCLK0           |                  | -200      |      |               | uA    |
|          | Input Low current: CLK0            |                  | -10       |      |               | uA    |
| $C_{IN}$ | Input capacitance                  |                  |           | 4    |               | PF    |
| $V_{IH}$ | Input high voltage                 |                  |           |      | $V_{DD}+0.3$  | V     |
| $V_{IL}$ | Input low voltage                  |                  | -0.3      |      |               | V     |
| $V_{ID}$ | Input Differential Amplitude PK-PK |                  | 150       |      | 1300          | mV    |
| $V_{CM}$ | Common mode input voltage          |                  | GND + 0.5 |      | $V_{DD}-0.85$ | V     |

### DC Electrical Specifications - LVCMOS Inputs

| Symbol          | Parameter          |               | Conditions              | Min. | Typ. | Max.  | Units |
|-----------------|--------------------|---------------|-------------------------|------|------|-------|-------|
| I <sub>IH</sub> | Input High current | CLK1, CLK_SEL | Input = V <sub>DD</sub> |      |      | 200   | uA    |
|                 |                    | CLK_EN        |                         |      |      | 20    | uA    |
| I <sub>IL</sub> | Input Low current  | CLK1, CLK_SEL | Input = GND             | -10  |      |       | uA    |
|                 |                    | CLK_EN        |                         | -200 |      |       | uA    |
| V <sub>IH</sub> | Input high voltage |               | V <sub>DD</sub> =3.3V   | 2.0  |      | 3.765 | V     |
| V <sub>IL</sub> | Input low voltage  |               | V <sub>DD</sub> =3.3V   | -0.3 |      | 0.8   | V     |
| V <sub>IH</sub> | Input high voltage |               | V <sub>DD</sub> =2.5V   | 1.7  |      | 2.8   | V     |
| V <sub>IL</sub> | Input low voltage  |               | V <sub>DD</sub> =2.5V   | -0.3 |      | 0.7   | V     |

### DC Electrical Specifications – HCSL Outputs

| Parameter       | Description         | Conditions            | Min. | Typ. | Max. | Units |
|-----------------|---------------------|-----------------------|------|------|------|-------|
| V <sub>OH</sub> | Output High voltage | V <sub>DD</sub> =3.3V | 520  | 800  |      | mV    |
| V <sub>OL</sub> | Output Low voltage  | V <sub>DD</sub> =3.3V |      | 0    | 150  | mV    |

### AC Electrical Specifications – Differential Outputs

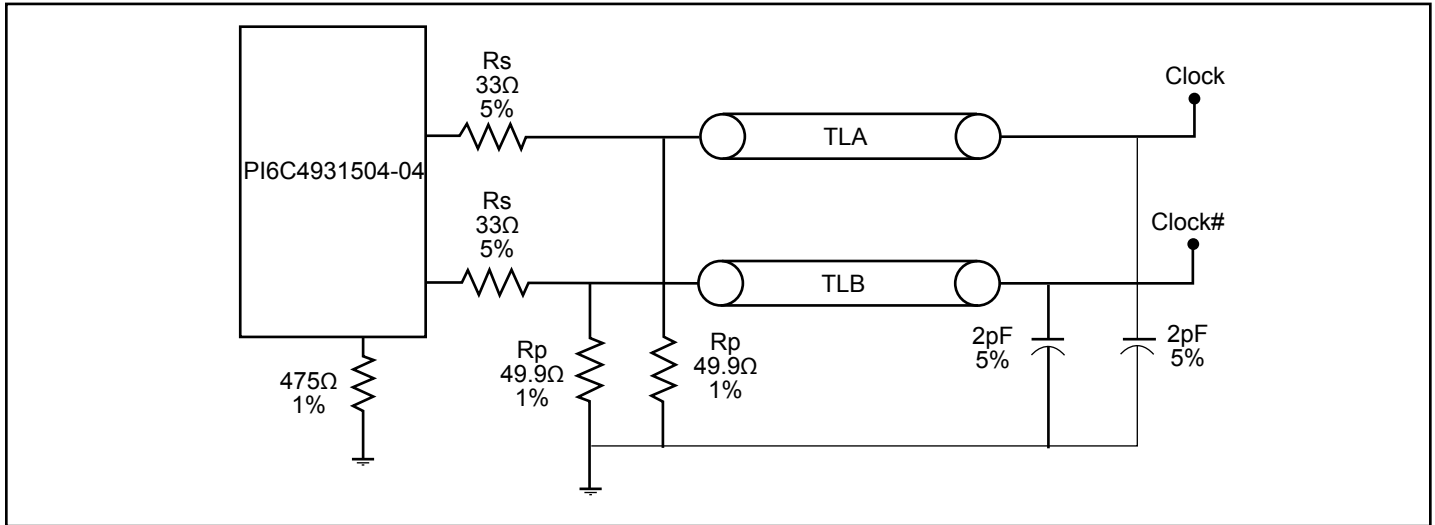
| Parameter             | Description                         | Conditions      | Min. | Typ. | Max. | Units |
|-----------------------|-------------------------------------|-----------------|------|------|------|-------|
| f <sub>OUT</sub>      | Output frequency                    |                 |      |      | 250  | MHz   |
| T <sub>r</sub>        | Output rise time                    | From 20% to 80% | 175  |      | 700  | ps    |
| T <sub>f</sub>        | Output fall time                    | From 80% to 20% | 175  |      | 700  | ps    |
| T <sub>ODC</sub>      | Output duty cycle                   |                 | 48   |      | 52   | %     |
| T <sub>j</sub>        | Buffer additive jitter RMS          |                 |      | 0.1  |      | ps    |
| V <sub>MAX</sub>      | Absolute Maximum Output Voltage     |                 |      |      | 1150 | mV    |
| V <sub>MIN</sub>      | Absolute Minimum Output Voltage     |                 | -300 |      |      | mV    |
| V <sub>CROSS</sub>    | Absolute crossing voltage           | HCSL            | 250  |      | 550  | mV    |
| DV <sub>CROSS</sub>   | Total variation of crossing voltage | HCSL            |      |      | 140  | mV    |
| T <sub>SK</sub>       | Output Skew                         |                 |      | 40   | 100  | ps    |
| T <sub>PD</sub>       | Propagation Delay                   |                 |      | 1500 |      | ps    |
| T <sub>P2P Skew</sub> | Part to Part Skew <sup>1</sup>      |                 |      |      | 600  | ps    |

**Notes:**

1. This parameter is guaranteed by design

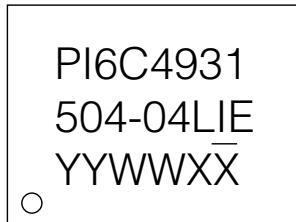
PI6C4931504-04

**Configuration test load board termination for HCSL Outputs**



**Part Marking**

L Package



YY: Year

WW: Workweek

1st X: Assembly Code

2nd X: Fab Code

**Packaging Mechanical: 20-TSSOP (L)**

| SYMBOLS  | MIN.     | NOM. | MAX. |
|----------|----------|------|------|
| A        | –        | –    | 1.20 |
| A1       | 0.05     | –    | 0.15 |
| A2       | 0.80     | 1.00 | 1.05 |
| b        | 0.19     | –    | 0.30 |
| C        | 0.09     | –    | 0.20 |
| D        | 6.40     | 6.50 | 6.60 |
| E1       | 4.30     | 4.40 | 4.50 |
| E        | 6.20     | 6.40 | 6.60 |
| e        | 0.65 BSC |      |      |
| L1       | 1.00 REF |      |      |
| L        | 0.45     | 0.60 | 0.75 |
| S        | 0.20     | –    | –    |
| $\theta$ | 0°       | –    | 8°   |

**NOTES:**  
 1. ALL DIMENSIONS IN MILLIMETERS. ANGLES IN DEGREES.  
 2. JEDEC MO-153F  
 3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

16-0074

|                                        |             |                |
|----------------------------------------|-------------|----------------|
|                                        |             | DATE: 03/31/16 |
| DESCRIPTION: 20-Pin, 173mil Wide TSSOP |             |                |
| PACKAGE CODE: L (L20)                  |             |                |
| DOCUMENT CONTROL #: PD-1311            | REVISION: G |                |

For latest package info.

please check: <http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/>

**Ordering Information**<sup>(1-3)</sup>

| Ordering Code      | Package Code | Package Description         |
|--------------------|--------------|-----------------------------|
| PI6C4931504-04LIEX | L            | 20-pin, 173mil Wide (TSSOP) |

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. E = Pb-free and Green
5. X suffix = Tape/Reel

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