# Chipsmall

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With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

## Contact us

# ⚡ PERICOM®

# PI6C490094

## 1:4 24MHz Clock Buffer

## Features

→ Support XTAL or Clock input at 24MHz

→ Four buffered outputs support $V_{DDO}$ operation

→ Very low phase jitter(RMS) : < 1.5ps (max)

→ Very low additive jitter: <300fs (typ)

→ 3.3V supply voltage for Core

→ 1.8V ~ 3.3V supply voltage for two output banks

→ Packaging: 16-pin TSSOP

→ Commercial & Industrial Temperature support

## Applications

→ Networking Systems

→ Femtocell BTS

→ Peripheral
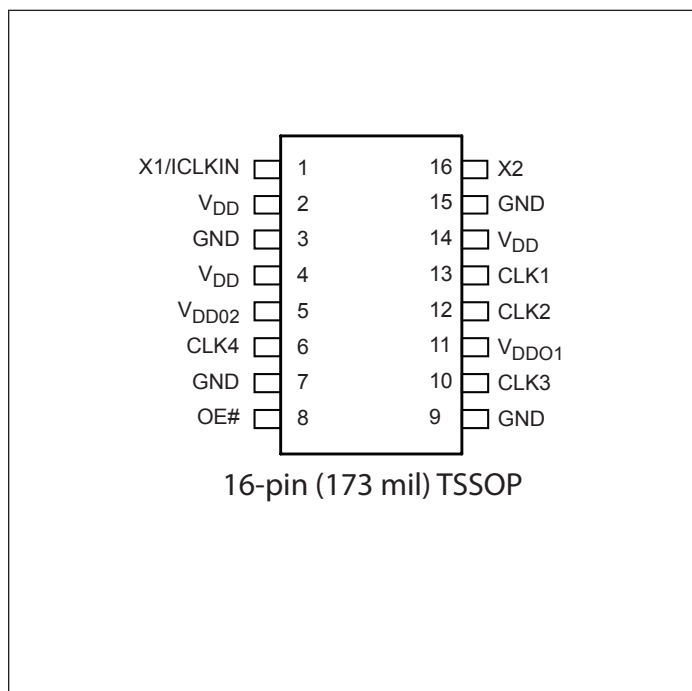
## Description

The PI6C490094 is a low jitter clock buffer supporting either XTAL or reference input. Two of its outputs can support wide operating voltage from 1.8V to 3.3V. It is a cost effective way to generate multiple outputs for all kinds of applications that need 24MHz with different power supplies.

## Block Diagram
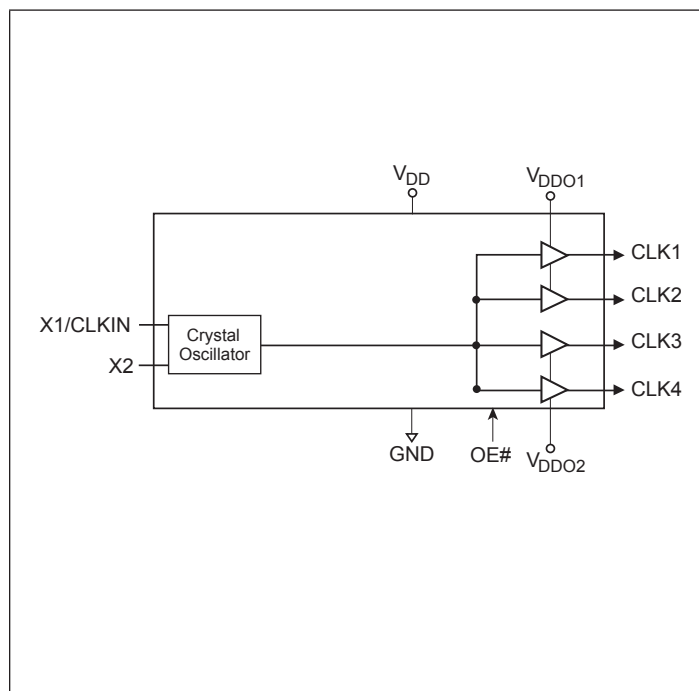


## Pin Configuration (16-Pin TSSOP)



16-pin (173 mil) TSSOP

| Pin number | Pin Name | Type | Description |
|---|---|---|---|
| 1 | X1/CLKIN | Input | Crystal connection or clock input |
| 2, 4, 14 | $V_{DD}$ | Power | Supply voltage 3.3V |
| 5 | $V_{DDO2}$ | Power | Supply voltage from 1.8V to 3.3V for CLK3 and CLK4 |
| 6 | CLK4 | Output | Clock Output 4 |
| 7, 9, 15 | GND | Power | Connect to Ground |
| 8 | OE# | Input | Global output enable when low. Internal pull-down resistor. |
| 10 | CLK3 | Output | Clock Output 3 |
| 11 | $V_{DDO1}$ | Power | Supply voltage from 1.8V to 3.3V for CLK1 and CLK2 |
| 12 | CLK2 | Output | Clock Output 2 |
| 13 | CLK1 | Output | Clock Output 1 |
| 16 | X2 | Output | Crystal connection |

## Function Table

| OE# | CLK1/CLK2/CLK3/CLK4 |
|---|---|
| 0 | Enabled |
| 1 | Hi-Z, weak pull down |

## Maximum Ratings

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

Storage Temperature.......................................................... −65°C to +150°C

Ambient Temperature with Power Applied ..................... -40°C to+85°C

Supply Voltage to Ground Potential, $V_{DD}$ ........................−0.5V to +4.6V

ESD Protection (HBM) ...................................................... 2000V

**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 Requirements (Over operating free-air temperature range)

| Symbol | Parameter | Min. | Typ. | Max. | Units |
|--------|-----------|------|------|------|-------|
| $V_{DD}$ | Power Supply Voltage | 3.135 | 3.3 | 3.465 | V |
| $V_{DDO}$ | Power Supply Voltage for outputs | 1.71 | | 3.465 | V |
| $I_{DD}$ | Power supply current, no load | | | 5 | mA |
| $T_A$ | Ambient Operating Temperature | 0 | | +70 | °C |
| | | -40 | | +85 | |
| $t_{UP}$ | Power Supply Ramp Time | | | 4 | ms |

## DC Electrical Characteristics

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Units |
|--------|-----------|-----------|------|------|------|-------|
| $V_{IH}$ | Input High Voltage | CLKIN, OE# | $V_{DD}/2+1$ | | | V |
| $V_{IL}$ | Input Low Voltage | CLKIN, OE# | | | $V_{DD}/2-1$ | V |
| $V_{OH}$ | Output High Voltage | $I_{OH}$ = -8mA | $V_{DDo} - 0.4$ | | | V |
| $V_{OL}$ | Output Low Voltage | $I_{OL}$ = 8mA | | | 0.4 | V |
| $Z_O$ | Nominal Output Impedance | | | 20 | | Ω |
| $R_{PD}$ | Internal Pull-down Resistor | OE# | | 170 | | kΩ |
| | | CLKIN | | 220 | | |
| $C_{IN}$ | Input Capacitance | OE# | | 4 | | pF |
| | | CLKIN | | 7.5 | | |

## AC Electrical Characteristics (Note 4)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $F_{IN}$ | Input Frequency | Fundamental Crystal | | 24 | | MHz |
| | | Input Clock | | 24 | | MHz |
| $t_R$ | Output Rise Time | 20% to 80% 24MHz, Note 1 | | 1 | | ns |
| $t_F$ | Output Fall Time | 80% to 20% 24MHz, Note 1 | | 1 | | ns |
| $t_{DC}$ | Duty Cycle | | 47 | | 53 | % |
| $J_{phase}$ | Clock Phase Jitter (RMS) | 24MHz, Note 2 | | | 1.5 | ps |
| $J_{add}$ | Additive Jitter | 24MHz, Note 3 | | 300 | | fs |

1. Note 1: Measured with 7 pF lump load.

2. Note 2: 12 kHz to 20 MHz offset frequency using a crystal input.

3. Note 3: CLKIN input with X2 floating.

4. Note 4: Do not drive this device without a crystal or valid clock input
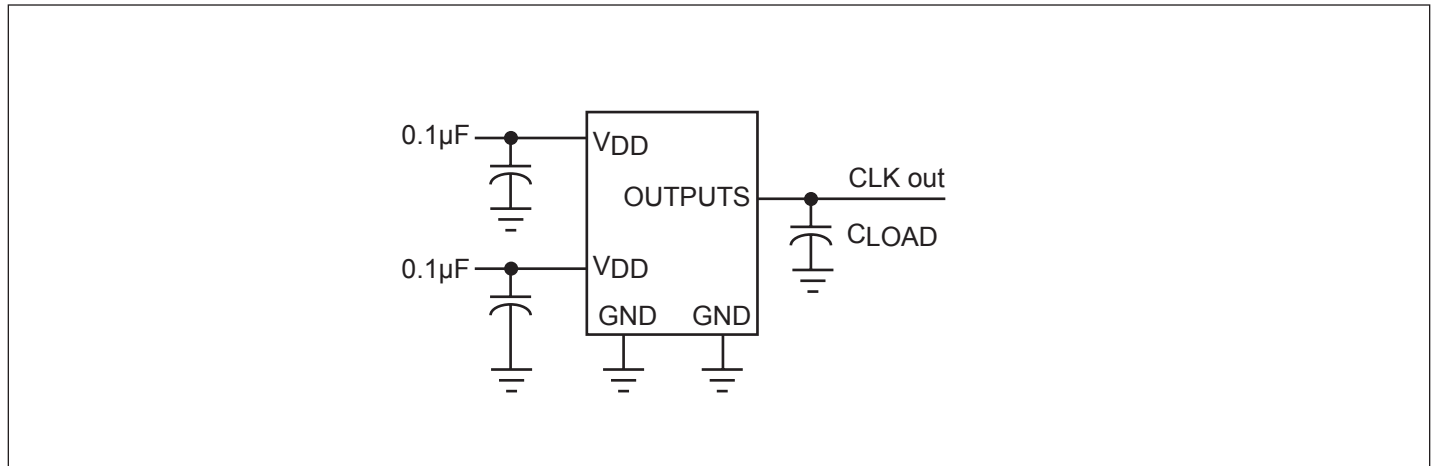


**CMOS Test Configuration**

## Crystal Oscillator Circuit
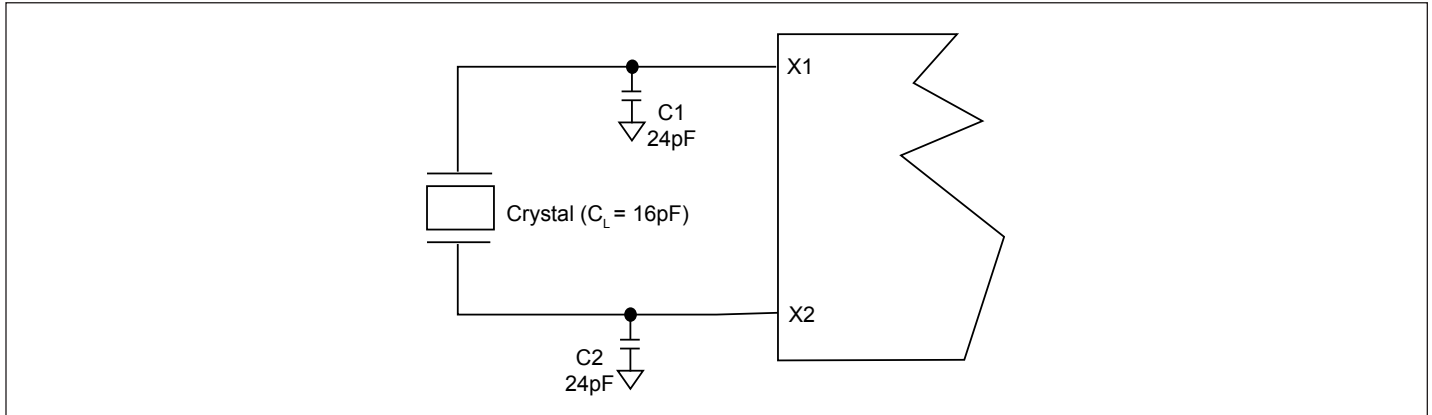


## Typical Crystal Requirement

| Parameter | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|
| Mode of Oscillation | | Fundamental | | |
| Frequency | | 24 | | MHz |
| Equivalent Series Resistance (ESR) | | | 50 | $\Omega$ |
| Shunt Capacitance | | | 7 | pF |
| Drive Level | | | 1 | mW |

## Recommended Crystal Specification

Pericom recommends:

a)  FL2400068, SMD 3.2x2.5(4P), 24MHz, CL=18pF, -20~70C, +/-20ppm, http://www.pericom.com/pdf/datasheets/se/FL.pdf

b)  FL2400075, SMD 3.2x2.5(4P), 24MHz, CL=18pF, -40~85C, +/-20ppm, http://www.pericom.com/pdf/datasheets/se/FL.pdf

b)  FY2400041, SMD 5x3.2(4P), 24MHz, CL=18pF, -20~70C, +/-30ppm, http://www.pericom.com/pdf/datasheets/se/FY_F9.pdf

For other crystal options, please contact Pericom sales.

## Thermal Information

| Symbol | Description | Condition | |
|---|---|---|---|
| $\Theta_{JA}$ | Junction-to-ambient thermal resistance | Still air | 84.0 $^{O}$C/W |
| $\Theta_{JC}$ | Junction-to-case thermal resistance | | 17.0 $^{O}$C/W |

## Packaging Mechanical: 16-Pin TSSOP (L)



VARIATIONS (ALL DIMENSIONS SHOWN IN MM)

| SYMBOLS | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | — | — | 1.20 |
| A1 | 0.05 | — | 0.15 |
| A2 | 0.80 | — | 1.05 |
| b | 0.19 | — | 0.30 |
| c | 0.09 | — | 0.20 |
| D | 4.90 | 5.00 | 5.10 |
| E1 | 4.30 | 4.40 | 4.50 |
| E | 6.40 BSC | | |
| e | 0.65 BSC | | |
| L1 | 1.00 REF | | |
| L | 0.45 | 0.60 | 0.75 |
| S | 0.20 | — | — |
| θ | 0° | — | 8° |

**Notes:**
1. Refer JEDEC MO-153F/AB
2. Controlling dimensions in millimeters
3. Package outline exclusive of mold flash and metal burr

| | |
|---|---|
| PERICOM® Enabling Serial Connectivity | **DATE: 05/03/12** |
| **DESCRIPTION: 16-Pin, 173mil Wide TSSOP** | |
| **PACKAGE CODE: L** | |
| **DOCUMENT CONTROL #: PD-1310** | **REVISION: F** |

12-0372

## Ordering Information

| Ordering Code | Package Code | Package Type | Operating Temperature |
|---|---|---|---|
| PI6C490094LE | L | Pb-free & Green, 16-pin TSSOP | Commercial |
| PI6C490094LIE | L | Pb-free & Green, 16-pin TSSOP | Industrial |

**Notes:**

• Thermal characteristics can be found on the company web site at www.pericom.com/packaging/

• E = Pb-free and Green

• X suffix = Tape/Reel