

# Low Voltage 1:4 CMOS Clock Buffer

The MPC94551 is a CMOS 1:4 fanout buffer. The MPC94551 is ideal for applications requiring lower voltage.

## Features

- 1:4 CMOS fanout buffer
- 300 ps output to output skew
- I/O frequency up to 160 MHz operation
- Non-inverting output clock
- 3.3 V supply voltage
- Output Enable mode tri-states outputs
- -40°C to 85°C industrial temperature range
- Standard 8-lead SOIC package

## MPC94551

### 1:4 LVCMOS CLOCK BUFFER



**D SUFFIX**  
**8-LEAD SOIC PACKAGE**  
**CASE 751-06**



**EF SUFFIX**  
**8-LEAD SOIC PACKAGE**  
**Pb-FREE PACKAGE**  
**CASE 751-06**

## ORDERING INFORMATION

Device	Package
MPC94551D	SO-8
MPC94551DR2	SO-8
MPC94551EF	SO-8 (Pb-FREE)
MPC94551EFR2	SO-8 (Pb-FREE)

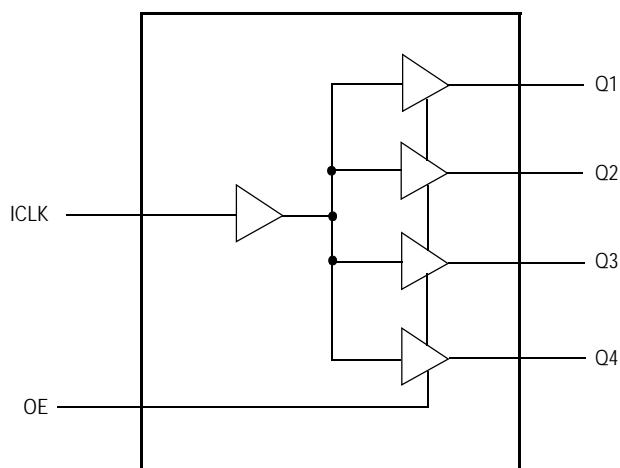


Figure 1. Logic Diagram

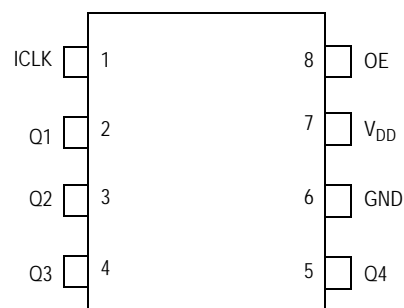


Figure 2. Pin Assignment

**Table 1. Pin Description**

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Pin Number	Pin Name	Pin Type	Pin Description
1	ICLK	Input	Clock input, internal pull-up resistor
2	Q1	Output	Clock output <sup>(1)</sup>
3	Q2	Output	Clock output <sup>(1)</sup>
4	Q3	Output	Clock output <sup>(1)</sup>
5	Q4	Output	Clock output <sup>(1)</sup>
6	GND	Power	Connect to ground <sup>(2)</sup>
7	V <sub>DD</sub>	Power	Connect to 3.3 V <sup>(2)</sup>
8	OE	Input	Output enable, tri-states outputs when low, internal pull-up resistor

1. A 33  $\Omega$  series terminating resistor may be used on each clock output if the trace is longer than 1 inch.
2. A decoupling capacitor of 0.01  $\mu$ F should be connected between V<sub>DD</sub> on pin 7 and GND on pin 6, as close to the device as possible.

**Table 2. Absolute Maximum Ratings<sup>(1)</sup>**

Parameter	Rating	Unit
Power Supply Voltage, V <sub>DD</sub>	3.9	V
All Inputs and Outputs	-0.5 to V <sub>DD</sub> +0.5	V
Ambient Operating Temperature	-40 to +85	°C
Storage Temperature	-65 to +150	°C
Junction Temperature	175	°C
Soldering Temperature	260	°C

1. Stresses above the ratings listed below can cause permanent damage to the device. These ratings are stress ratings only. Functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods can affect product reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.

**Table 3. DC Characteristics** (V<sub>DD</sub> = 3.3 V  $\pm$  5%; Ambient Temperature = -40°C to 85°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating Voltage	V <sub>DD</sub>		3.15		3.45	V
Input High Voltage <sup>(1)</sup> , ICLK	V <sub>IH</sub>		V <sub>DD</sub> /2 + 0.7		3.8	V
Input Low Voltage <sup>(1)</sup> , ICLK	V <sub>IL</sub>				V <sub>DD</sub> /2 - 0.7	V
Input High Voltage, OE	V <sub>IH</sub>		2		V <sub>DD</sub>	V
Input Low Voltage, OE	V <sub>IL</sub>				0.8	V
Output Low Voltage	V <sub>OL</sub>	I <sub>OL</sub> = 12 mA			0.4	V
Output High Voltage	V <sub>OH</sub>	I <sub>OH</sub> = -12 mA	2.4			V
Operating Supply Current	I <sub>DD</sub>	No load, 135 MHz		30		mA
Nominal Output Impedance	Z <sub>O</sub>			27		$\Omega$
Internal Pull-up Resistor	R <sub>PU</sub>	ICLK		31		k $\Omega$
Input Capacitance	C <sub>IN</sub>	OE pin		5		pF
	C <sub>IN</sub>	ICLK		1		pF
Short Circuit Current	I <sub>OS</sub>			$\pm$ 50		mA

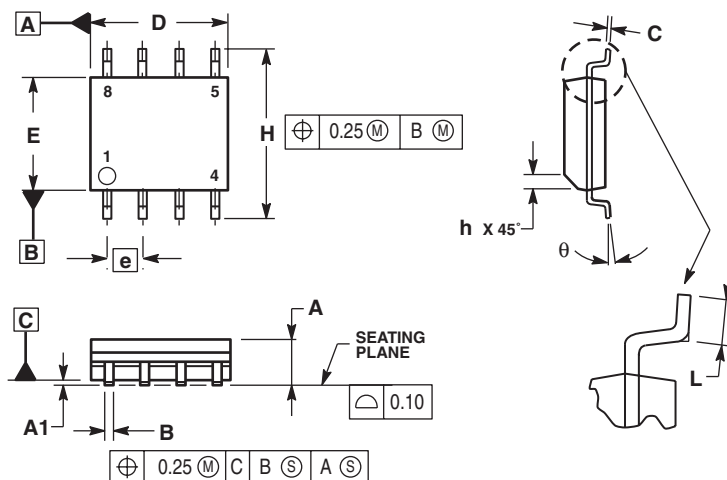
1. Nominal switching threshold is V<sub>DD</sub>/2.

**Table 4. AC Characteristics** ( $V_{DD} = 3.3 \text{ V} \pm 5\%$ ; Ambient Temperature =  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ )

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input Frequency			0		160	MHz
Output Frequency <sup>(1)</sup>		15 pF load			160	MHz
Output Clock Rise Time	$t_{OR}$	0.8 V to 2.0 V			1.5	ns
Output Clock Fall Time	$t_{OF}$	2.0 V to 0.8 V			1.5	ns
Propagation Delay <sup>(2)</sup>		135 MHz	1.5	4	5	ns
Output to Output Skew <sup>(3)</sup>		Rising edges at $V_{DD}/2$			300	ps

1. Measured with an external series resistor of  $33\Omega$  positioned close to each output pin
2. Measured with rail to rail input clock
3. Measured between any 2 outputs with equal loading

## PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. DIMENSIONS ARE IN MILLIMETER.
  3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
  5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.35	0.49
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.25
θ	0°	7°

**D/EF SUFFIX  
SOIC PACKAGE  
CASE 751-06  
ISSUE T**

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