



# ICS574

## Zero Delay, Low Skew Buffer

### Description

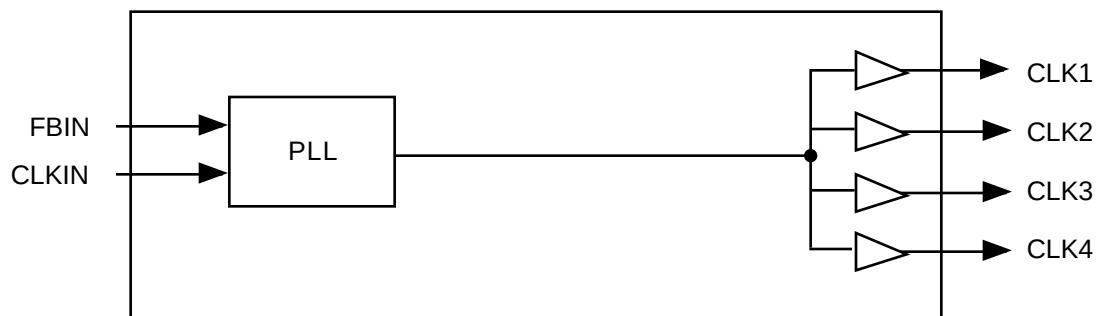
The ICS574 is a low jitter, low-skew, high performance PLL-based zero delay buffer for high speed applications. Based on ICS's proprietary low jitter Phase Locked Loop (PLL) techniques, the device provides four low skew outputs at speeds up to 160 MHz at 3.3 V. When one of the outputs is connected directly to FBIN, the rising edge of each output is aligned with the rising edge of the input clock. External delay elements connected in the feedback loops will cause the outputs to occur before the inputs by the amount of propagation delay of the external element.

ICS manufactures the largest variety of clock generators and buffers, and is the largest clock supplier in the world.

### Features

- Packaged in 8 pin narrow SOIC, Pb (lead) free available
- Zero input-to-output delay
- Four 1X outputs
- Output to output skew is less than 150 ps
- Output clocks up to 160 MHz at 3.3 V
- External feedback path for output edge placement
- Spread Smart™ technology works with spread spectrum clock generators
- Full CMOS outputs with 18 mA output drive capability at TTL levels at 3.3 V
- Advanced, low power, sub-micron CMOS process
- Operating voltage from 3.0 to 5.5 V
- Industrial temperature version available

### Block Diagram

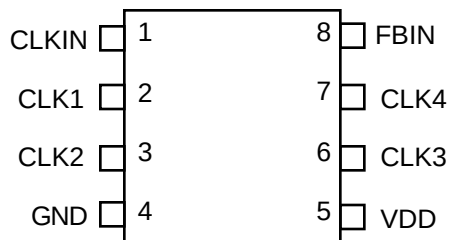




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### Pin Assignment



Standard 8 pin SOIC

### Pin Descriptions

| Number     | Name   | Type | Description                                                          |
|------------|--------|------|----------------------------------------------------------------------|
| 1          | CLKIN  | I    | Clock input. Connect to input clock source.                          |
| 2, 3, 6, 7 | CLK1:4 | O    | Four clock outputs.                                                  |
| 5          | VDD    | P    | Power supply. Connect both pins to same voltage (either 3.3V or 5V). |
| 4          | GND    | P    | Connect to ground.                                                   |
| 8          | FBIN   | I    | Feedback input.                                                      |

Key: I = Input; O = output; P = power supply connection.

### External Components

The ICS574 requires a minimum number of external components for proper operation. Decoupling capacitors of 0.1 $\mu$ F should be connected between VDD and GND on pins 4 and 5, as close to the device as possible. A series termination resistor of 33  $\Omega$  may be used close to the pin for each clock output to reduce reflections.



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### Electrical Specifications

| Parameter                                                          | Conditions            | Minimum | Typical | Maximum | Units |
|--------------------------------------------------------------------|-----------------------|---------|---------|---------|-------|
| <b>ABSOLUTE MAXIMUM RATINGS (note 1)</b>                           |                       |         |         |         |       |
| Supply voltage, VDD                                                | Referenced to GND     | -0.5    |         | 7       | V     |
| Inputs and Clock Outputs                                           | Referenced to GND     | -0.5    |         | VDD+0.5 | V     |
| Electrostatic Discharge                                            | MIL-STD-883           | 2000    |         |         | V     |
| Ambient Operating Temperature                                      |                       | -40     |         | 85      | °C    |
| Soldering Temperature                                              | Max of 10 seconds     |         |         | 260     | °C    |
| Junction temperature                                               |                       |         |         | 150     | °C    |
| Storage temperature                                                |                       | -65     |         | 150     | °C    |
| <b>DC CHARACTERISTICS (VDD = 3.3 V unless specified otherwise)</b> |                       |         |         |         |       |
| Operating Voltage, VDD                                             |                       | 3.00    |         | 5.50    | V     |
| Input High Voltage, VIH                                            |                       | VDD/2+1 |         |         | V     |
| Input Low Voltage, VIL                                             |                       |         |         | VDD/2-1 | V     |
| Output High Voltage, VOH                                           | IOH=-18 mA            | 2.4     |         |         | V     |
| Output Low Voltage, VOL                                            | IOL=18 mA             |         |         | 0.4     | V     |
| Output High Voltage, VOH, CMOS level                               | IOH=-5 mA             | VDD-0.4 |         |         | V     |
| Operating Supply Current, IDD (Note 2)                             | No Load               |         | 36      |         | mA    |
| Short Circuit Current                                              | Each output           |         | ±65     |         | mA    |
| Input Capacitance                                                  |                       |         | 7       |         | pF    |
| <b>AC CHARACTERISTICS (VDD = 3.3 V unless specified otherwise)</b> |                       |         |         |         |       |
| Input Clock Frequency                                              | FBIN to CLK1          | 20      |         | 160     | MHz   |
| Output Clock Frequency                                             | FBIN to CLK1          | 20      |         | 160     | MHz   |
| Output Clock Rise Time, CL=30pF                                    | 0.8 to 2.0V           |         |         | 1.5     | ns    |
| Output Clock Fall Time, CL=30pF                                    | 2.0 to 0.8V           |         |         | 1.5     | ns    |
| Output Clock Duty Cycle, VDD=3.3V                                  | At 1.4V               | 40      | 50      | 60      | %     |
| Device to Device Skew, equally loaded                              | rising edges at VDD/2 |         |         | 700     | ps    |
| Output to Output Skew, equally loaded                              | rising edges at VDD/2 |         |         | 150     | ps    |
| Maximum Absolute Jitter                                            |                       |         | 170     |         | ps    |
| Cycle to Cycle Jitter, 30pF loads                                  | 66.67 MHz outputs     |         |         | 250     | ps    |

- Notes: 1. Stresses beyond those listed under Absolute Maximum Ratings could cause permanent damage to the device. Prolonged exposure to levels above the operating limits but below the Absolute Maximums may affect device reliability.
2. With CLKIN = 160 MHz, FBIN to CLK4

### Using Spread Spectrum Input Clocks

The ICS574 uses ICS' Spread Smart technology, allowing it to accurately track (pass through) any clocks that implement spread spectrum techniques.



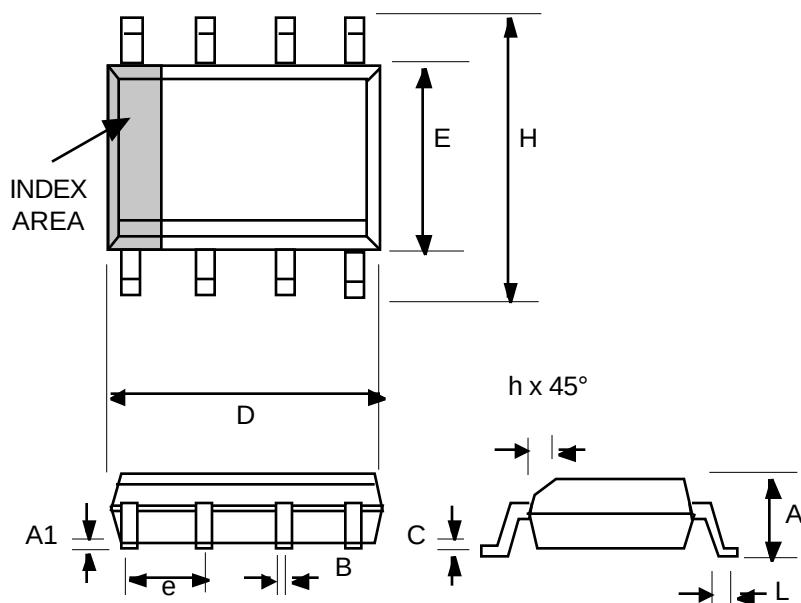
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### Package Outline and Package Dimensions

(For current dimensional specifications, see JEDEC Publication No. 95.)

#### 8 pin SOIC



| Symbol | Inches   |        | Millimeters |      |
|--------|----------|--------|-------------|------|
|        | Min      | Max    | Min         | Max  |
| A      | 0.0532   | 0.0688 | 1.35        | 1.75 |
| A1     | 0.0040   | 0.0098 | 0.10        | 0.24 |
| B      | 0.0130   | 0.0200 | 0.33        | 0.51 |
| C      | 0.0075   | 0.0098 | 0.19        | 0.24 |
| D      | 0.1890   | 0.1968 | 4.80        | 5.00 |
| E      | 0.1497   | 0.1574 | 3.80        | 4.00 |
| e      | .050 BSC |        | 1.27 BSC    |      |
| H      | 0.2284   | 0.2440 | 5.80        | 6.20 |
| h      | 0.0099   | 0.0195 | 0.25        | 0.50 |
| L      | 0.0160   | 0.0500 | 0.41        | 1.27 |

### Ordering Information

| Part/Order Number | Marking  | Shipping packaging | Package    | Temperature |
|-------------------|----------|--------------------|------------|-------------|
| ICS574M           | ICS574M  | tubes              | 8 pin SOIC | 0-70 °C     |
| ICS574MT          | ICS574M  | tape and reel      | 8 pin SOIC | 0-70 °C     |
| ICS574MI          | ICS574MI | tubes              | 8 pin SOIC | -40-85°C    |
| ICS574MIT         | ICS574MI | tape and reel      | 8 pin SOIC | -40-85°C    |
| ICS574MLF         | 574MLF   | tubes              | 8 pin SOIC | 0 to 70°C   |
| ICS574MLFT        | 574MLF   | tape and reel      | 8 pin SOIC | 0 to 70°C   |
| ICS574MILF        | 574MILF  | tubes              | 8 pin SOIC | -40 to 85°C |
| ICS574MILFT       | 574MILF  | tape and reel      | 8 pin SOIC | -40 to 85°C |

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