



**THE DATASHEET OF  
ICS574MLFT**

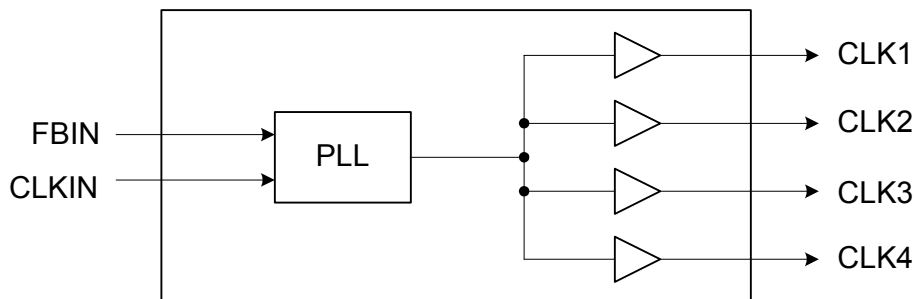


**ZERO DELAY, LOW SKEW BUFFER**
**ICS574**
**Description**

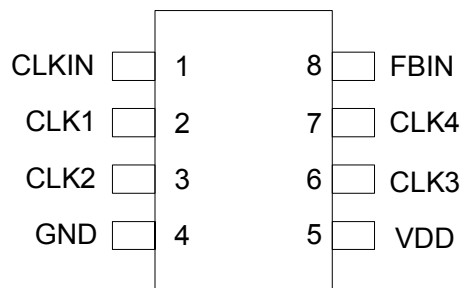
The ICS574 is a low jitter, low-skew, high performance PLL-based zero delay buffer for high speed applications. Based on IDT's proprietary low jitter Phase Locked Loop (PLL) techniques, the device provides four low skew outputs at speeds up to 160 MHz at 3.3 V. When one of the outputs is connected directly 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.

**Features**

- Packaged in 8 pin narrow SOIC, Pb (lead) free
- 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**


## Pin Assignment



## Pin Descriptions

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

## 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.

## Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the ICS574. These ratings, which are standard values for IDT commercially rated parts, 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.

| Item                                       | Rating              |
|--|---------------------|
| Supply Voltage, VDD (referenced to ground) | -0.5 V to 7 V       |
| All Inputs and Outputs                     | -0.5 V to VDD+0.5 V |
| Electrostatic Discharge (MIL-STD-883)      | 2000 V (minimum)    |
| Ambient Operating Temperature              | -40° C to +85° C    |
| Soldering Temperature (10 seconds max.)    | 260° C              |
| Junction Temperature                       | 150° C              |
| Storage Temperature                        | -65 to +150° C      |

## DC Electrical Characteristics

Unless stated otherwise, **VDD = 3.3 V**, Ambient Temperature -40 to +85° C

| Parameter                       | Symbol          | Conditions               | Min.    | Typ. | Max.    | Units |
|---------------------------------|-----------------|--------------------------|---------|------|---------|-------|
| Operating Supply Voltage        | VDD             |                          | 3       |      | 5.5     | V     |
| Input High Voltage              | V <sub>IH</sub> |                          | VDD/2+1 |      |         | V     |
| Input Low Voltage               | V <sub>IL</sub> |                          |         |      | VDD/2-1 | V     |
| Output High Voltage, CMOS level | V <sub>OH</sub> | I <sub>OH</sub> = -5 mA  | VDD-0.4 |      |         | V     |
| Output High Voltage             | V <sub>OH</sub> | I <sub>OH</sub> = -18 mA | 2.4     |      |         | V     |
| Output Low Voltage              | V <sub>OL</sub> | I <sub>OL</sub> = 18 mA  |         |      | 0.4     | V     |
| IDD Operating Supply Current    |                 | No load (Note 2)         |         | 36   |         | mA    |
| Short Circuit Current           | I <sub>OS</sub> | Each output              |         | ±65  |         | mA    |
| Input Capacitance               | C <sub>IN</sub> |                          |         | 7    |         | pF    |

## AC Electrical Characteristics

Unless stated otherwise, **VDD = 3.3 V**, Ambient Temperature -40 to +85° C

| Parameter                             | Symbol          | Conditions               | Min. | Typ. | Max. | Units |
|---------------------------------------|-----------------|--------------------------|------|------|------|-------|
| Input Frequency, clock                | f <sub>IN</sub> | FBIN from CLK4           | 20   |      | 160  | MHz   |
| Output Frequency, clock               |                 | FBIN from CLK4           | 20   |      | 160  | MHz   |
| Output Clock Rise Time                |                 | 0.8 to 2.0 V, 15 pF load |      |      | 1.5  | ns    |
| Output Clock Fall Time                |                 | 2.0 to 0.8 V, 15 pF load |      |      | 1.5  | ns    |
| Output Clock Duty Cycle, 3.3 V        |                 | At 1.4 V                 | 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, 15 pF loads    |                 | 66.67 MHz outputs        |      |      | 250  | ps    |

Notes:

1. Stresses beyond those listed in Absolute Maximum Ratings can permanently damage the device. Prolonged exposure to levels above the operating limits but below the Absolute Maximum Ratings may affect device reliability.
2. With CLKIN = 160 MHz, FBIN to CLK4.

## Using Spread Spectrum Input Clocks

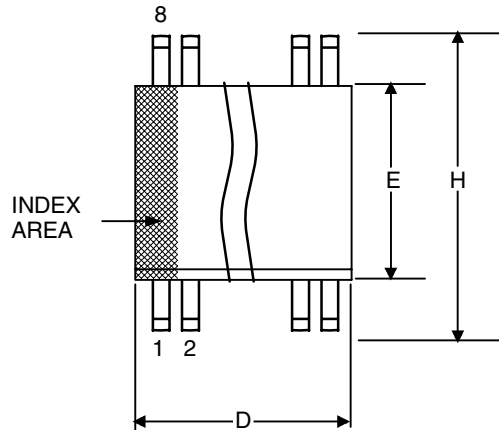
The ICS574 uses IDT's Spread Smart technology, allowing it to accurately track (pass through) any clocks that implement spread spectrum techniques.

## Thermal Characteristics

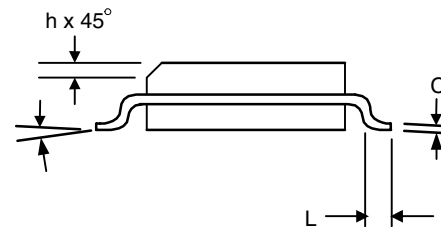
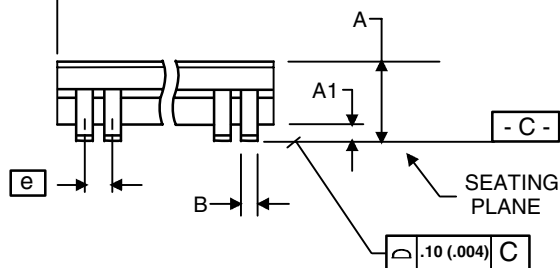
| Parameter                                  | Symbol        | Conditions     | Min. | Typ. | Max. | Units |
|--|---------------|----------------|------|------|------|-------|
| Thermal Resistance Junction to Ambient     | $\theta_{JA}$ | Still air      |      | 150  |      | °C/W  |
|  | $\theta_{JA}$ | 1 m/s air flow |      | 140  |      | °C/W  |
|  | $\theta_{JA}$ | 3 m/s air flow |      | 120  |      | °C/W  |
| Thermal Resistance Junction to Case        | $\theta_{JC}$ |                |      | 40   |      | °C/W  |
| Thermal Resistance Junction to Top of Case | $\Psi_{JT}$   | Still air      |      | 20   |      | °C/W  |

## Package Outline and Package Dimensions (8-pin SOIC, 150 Mil. Body)

Package dimensions are kept current with JEDEC Publication No. 95



| Symbol   | Millimeters |      | Inches      |       |
|----------|-------------|------|-------------|-------|
|          | Min         | Max  | Min         | Max   |
| A        | 1.35        | 1.75 | .0532       | .0688 |
| A1       | 0.10        | 0.25 | .0040       | .0098 |
| B        | 0.33        | 0.51 | .013        | .020  |
| C        | 0.19        | 0.25 | .0075       | .0098 |
| D        | 4.80        | 5.00 | .1890       | .1968 |
| E        | 3.80        | 4.00 | .1497       | .1574 |
| e        | 1.27 BASIC  |      | 0.050 BASIC |       |
| H        | 5.80        | 6.20 | .2284       | .2440 |
| h        | 0.25        | 0.50 | .010        | .020  |
| L        | 0.40        | 1.27 | .016        | .050  |
| $\alpha$ | 0°          | 8°   | 0°          | 8°    |



## Ordering Information

| Part / Order Number | Marking | Shipping Packaging | Package    | Temperature   |
|---------------------|---------|--------------------|------------|---------------|
| 574MLF              | 574MLF  | Tubes              | 8-pin SOIC | 0 to +70° C   |
| 574MLFT             |         | Tape and Reel      | 8-pin SOIC | 0 to +70° C   |
| 574MILF             | 574MILF | Tubes              | 8-pin SOIC | -40 to +85° C |
| 574MILFT            |         | Tape and Reel      | 8-pin SOIC | -40 to +85° C |

"LF" suffix to the part number are the Pb-Free configuration and are RoHS compliant.

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