



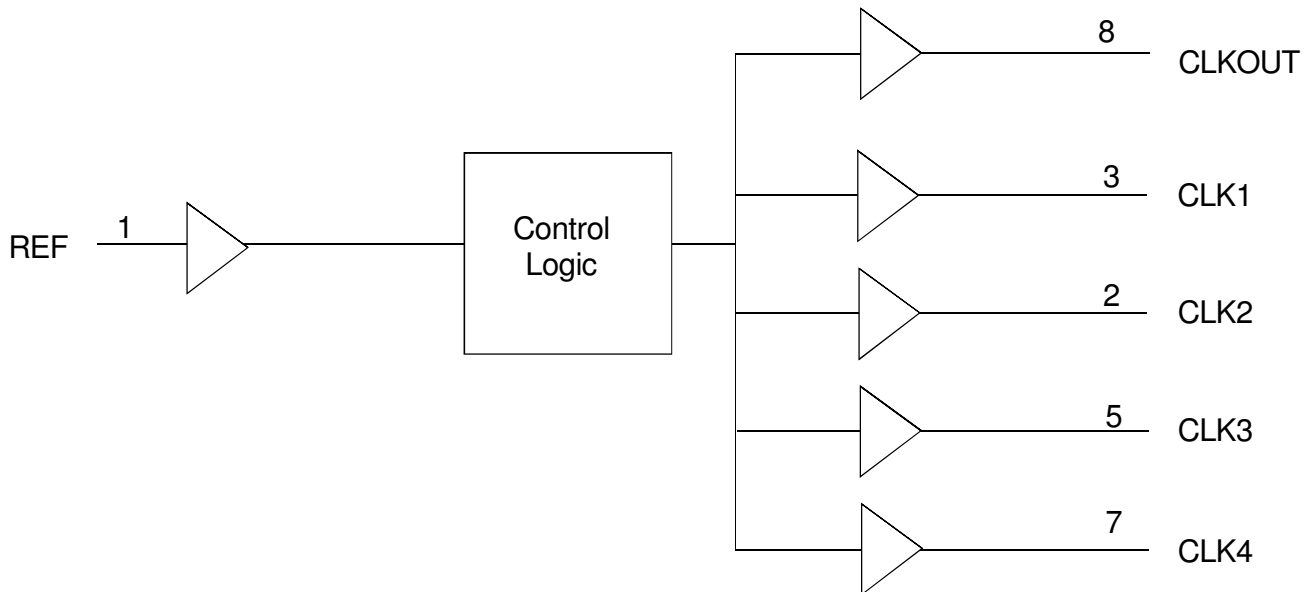
**FEATURES:**

- Clock Distribution
- 10MHz to 133MHz operating frequency
- Distributes one clock input to one bank of five outputs
- Output Skew < 250ps
- No external RC network required
- Operates at 2.5V VDD
- Available in SOIC package
- Available in commercial and industrial temperature range

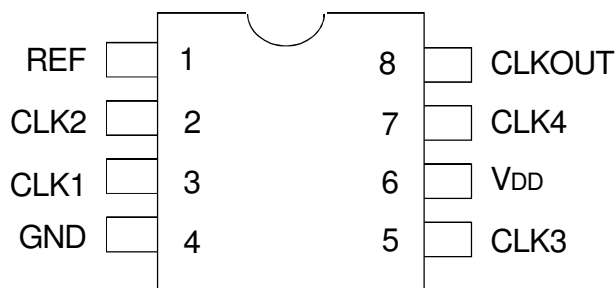
**DESCRIPTION:**

The IDT2305NZT is a high-speed clock buffer, designed to address high-speed clock distribution applications. IDT2305NZT accepts one reference input, and drives out five low skew clocks.

**FUNCTIONAL BLOCK DIAGRAM**



## PIN CONFIGURATION



## ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

| Symbol  | Rating                           | Max.                         | Unit |
|---|----------------------------------|------------------------------|------|
| V <sub>DD</sub>   | Supply Voltage Range             | -0.5 to +4.6                 | V    |
| V <sub>I</sub> <sup>(2)</sup>                           | Input Voltage Range (REF)        | -0.5 to +5.5                 | V    |
| V <sub>I</sub>  | Input Voltage Range (except REF) | -0.5 to V <sub>DD</sub> +0.5 | V    |
| I <sub>IK</sub> (V <sub>I</sub> < 0)                    | Input Clamp Current              | -50                          | mA   |
| I <sub>O</sub> (V <sub>O</sub> = 0 to V <sub>DD</sub> ) | Continuous Output Current        | ±50                          | mA   |
| V <sub>DD</sub> or GND                                  | Continuous Current               | ±100                         | mA   |
| T <sub>A</sub> = 55°C (in still air) <sup>(3)</sup>     | Maximum Power Dissipation        | 0.7                          | W    |
| T <sub>STG</sub>  | Storage Temperature Range        | -65 to +150                  | °C   |
| Operating Temperature                                   | Industrial Temperature Range     | -40 to +85                   | °C   |

### NOTES:

- Stresses greater than those listed under ABSOLUTE 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.
- The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.

## APPLICATIONS:

- SDRAM
- Telecom
- Datacom
- PC Motherboards/Workstations
- Critical Path Delay Designs

## PIN DESCRIPTION

| Pin Name              | Pin Number | Type | Functional Description                     |
|-----------------------|------------|------|--|
| REF <sup>(1)</sup>    | 1          | IN   | Input reference clock, 3.3V tolerant input |
| CLK2 <sup>(2)</sup>   | 2          | OUT  | Output clock                               |
| CLK1 <sup>(2)</sup>   | 3          | OUT  | Output clock                               |
| GND                   | 4          | GND  | Ground                                     |
| CLK3 <sup>(2)</sup>   | 5          | OUT  | Output clock                               |
| V <sub>DD</sub>       | 6          | PWR  | 2.5V Supply                                |
| CLK4 <sup>(2)</sup>   | 7          | OUT  | Output clock                               |
| CLKOUT <sup>(2)</sup> | 8          | OUT  | Output clock                               |

### NOTES:

- Weak pull down.
- Weak pull down on all outputs.

## OPERATING CONDITIONS

| Symbol          | Parameter                                   | Min. | Max. | Unit |
|-----------------|---|------|------|------|
| V <sub>DD</sub> | Supply Voltage                              | 2.3  | 2.7  | V    |
| T <sub>A</sub>  | Operating Temperature (Ambient Temperature) | -40  | +85  | °C   |
| C <sub>L</sub>  | Load Capacitance 10MHz - 133MHz             | —    | 15   | pF   |
| C <sub>IN</sub> | Input Capacitance                           | —    | 7    | pF   |

## DC ELECTRICAL CHARACTERISTICS

| Symbol             | Parameter                | Conditions                             | Min. | Max. | Unit |
|--------------------|--------------------------|--|------|------|------|
| V <sub>IL</sub>    | Input LOW Voltage Level  |  | —    | 0.7  | V    |
| V <sub>IH</sub>    | Input HIGH Voltage Level |  | 1.7  | —    | V    |
| I <sub>IL</sub>    | Input LOW Current        | V <sub>IN</sub> = 0V                   | —    | 50   | μA   |
| I <sub>IH</sub>    | Input HIGH Current       | V <sub>IN</sub> = V <sub>DD</sub>      | —    | 100  | μA   |
| V <sub>OL</sub>    | Output LOW Voltage       | Standard Drive, I <sub>OL</sub> = 8mA  | —    | 0.3  | V    |
| V <sub>OH</sub>    | Output HIGH Voltage      | Standard Drive, I <sub>OH</sub> = -8mA | 2    | —    | V    |
| I <sub>DD_PD</sub> | Power Down Current       | REF = 0MHz                             | —    | 12   | μA   |
| I <sub>DD</sub>    | Supply Current           | Unloaded Outputs at 66.66MHz           | —    | 32   | mA   |

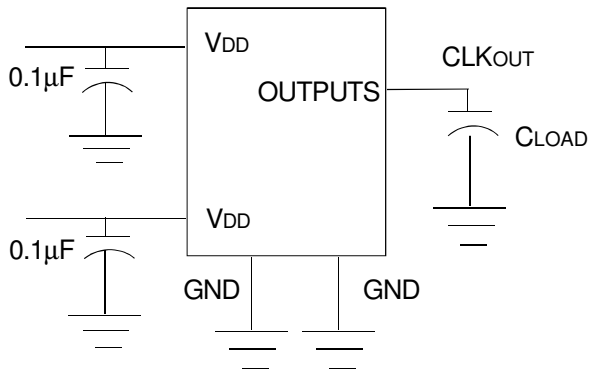
## SWITCHING CHARACTERISTICS<sup>(1,2)</sup>

| Symbol         | Parameter                                    | Conditions   | Min. | Typ. | Max. | Unit |
|----------------|--|--|------|------|------|------|
| t <sub>1</sub> | Output Frequency                             | 15pF Load  | 10   | —    | 133  | MHz  |
|                | Duty Cycle = t <sub>2</sub> ÷ t <sub>1</sub> | Measured at V <sub>DD</sub> /2, F <sub>OUT</sub> = 66.66MHz  | 40   | 50   | 60   | %    |
| t <sub>3</sub> | Rise Time                                    | Measured between 0.7V and 1.7V                               | —    | —    | 2.5  | ns   |
| t <sub>4</sub> | Fall Time                                    | Measured between 0.7V and 1.7V                               | —    | —    | 2.5  | ns   |
| t <sub>5</sub> | Output to Output Skew                        | All outputs equally loaded                                   | —    | —    | 250  | ps   |
| t <sub>6</sub> | Delay, REF Rising Edge to CLKOUT Rising Edge | Measured at V <sub>DD</sub> /2                               | —    | 0    | 8.7  | ns   |
| t <sub>7</sub> | Device-to-Device Skew                        | Measured at V <sub>DD</sub> /2 on the CLKOUT pins of devices | —    | 0    | 700  | ps   |

### NOTES:

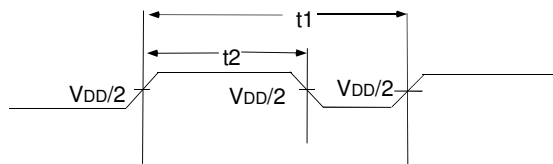
1. REF Input has a threshold voltage of V<sub>DD</sub>/2.
2. All parameters specified with loaded outputs.

## TEST CIRCUIT

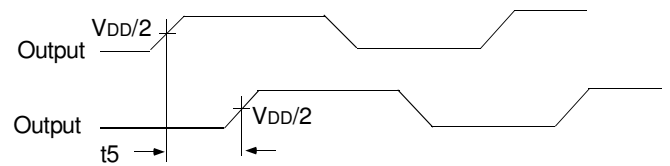


Test Circuit for All Parameters

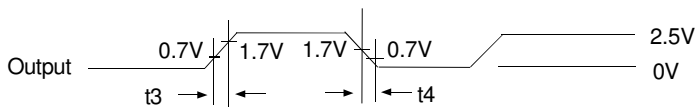
## SWITCHING WAVEFORMS



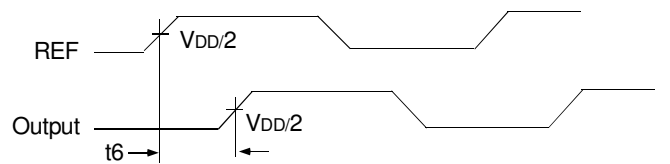
Duty Cycle Timing



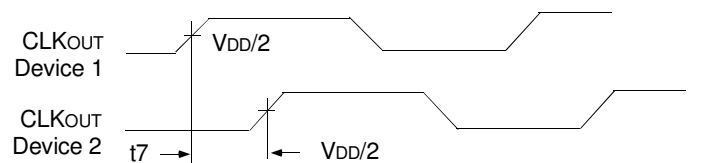
Output to Output Skew



All Outputs Rise/Fall Time

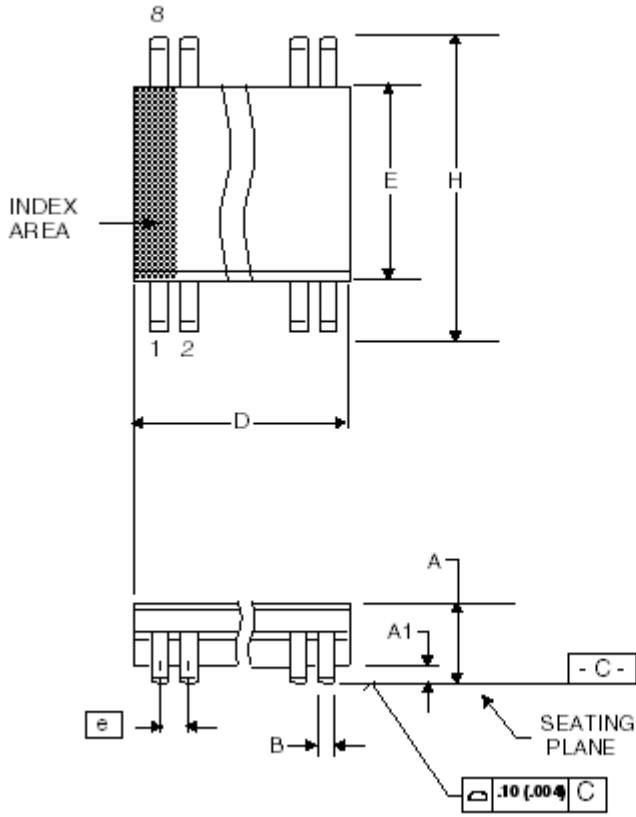


Input to Output Propagation Delay



Device to Device Skew

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



| Symbol | Millimeters |      | Inches      |        |
|--------|-------------|------|-------------|--------|
|        | Min         | Max  | Min         | Max    |
| A      | 1.35        | 1.75 | 0.0532      | 0.0688 |
| A1     | 0.1         | 0.25 | 0.004       | 0.0098 |
| B      | 0.33        | 0.51 | 0.013       | 0.02   |
| C      | 0.19        | 0.25 | 0.0075      | 0.0098 |
| D      | 4.8         | 5    | 0.189       | 0.1968 |
| E      | 3.8         | 4    | 0.1497      | 0.1574 |
| e      | 1.27 BASIC  |      | 0.050 BASIC |        |
| H      | 5.8         | 6.2  | 0.2284      | 0.244  |
| h      | 0.25        | 0.5  | 0.01        | 0.02   |
| L      | 0.4         | 1.27 | 0.016       | 0.05   |
| a      | 0°          | 8°   | 0°          | 8°     |

## Ordering Information

| Part / Order Number | Shipping Packaging | Package    | Temperature   |
|---------------------|--------------------|------------|---------------|
| 2305NZT-1DCG        | Tubes              | 8-pin SOIC | 0 to +70° C   |
| 2305NZT-1DCG8       | Tape and Reel      | 8-pin SOIC | 0 to +70° C   |
| 2305NZT-1DCGI       | Tubes              | 8-pin SOIC | -40 to +85° C |
| 2305NZT-1DCGI8      | Tape and Reel      | 8-pin SOIC | -40 to +85° C |

"G" after the two-letter package code denotes Pb free configuration, RoHS complaint.



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