



FAST CMOS BUFFER/CLOCK DRIVER

IDT74FCT810BT/CT

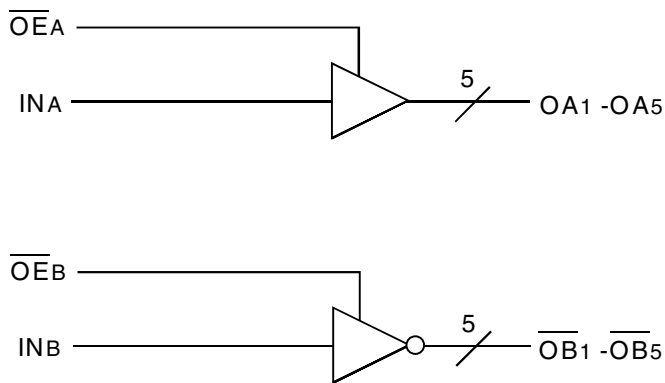
FEATURES:

- 0.5 MICRON CMOS Technology
- Guaranteed low skew < 600ps (max.)
- Very low duty cycle distortion < 700ps (max.)
- Low CMOS levels
- TTL compatible inputs and outputs
- TTL level output voltage swings
- High drive: -32mA I_{OH} , +48mA I_{OL}
- Two independent output banks with 3-state control:
 - One 1:5 inverting bank
 - One 1:5 non-inverting bank
- Available in QSOP, SSOP, and SOIC packages

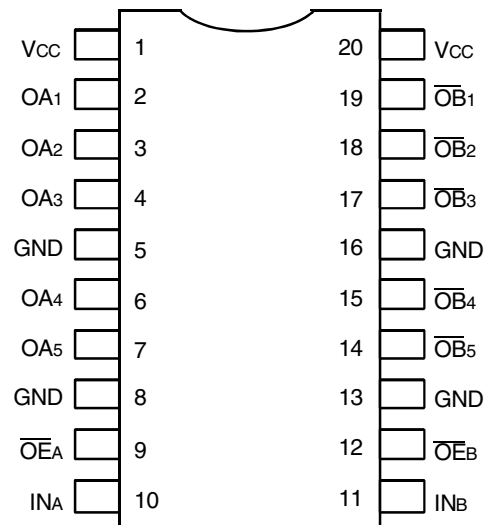
DESCRIPTION:

The 74FCT810T is a dual bank inverting/ non-inverting clock driver built using advanced dual metal CMOS technology. It consists of two banks of drivers, one inverting and one non-inverting. Each bank drives five output buffers from a standard TTL-compatible input. The FCT810T has low output skew, pulse skew and package skew. Inputs are designed with hysteresis circuitry for improved noise immunity. The outputs are designed with TTL output levels and controlled edge rates to reduce signal noise. The part has multiple grounds, minimizing the effects of ground inductance.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



QSOP/ SOIC/ SSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

| Symbol | Description | Max | Unit |
|-------------------|--------------------------------------|-------------|------|
| V _{TERM} | Terminal Voltage with Respect to GND | -0.5 to +7 | V |
| T _{STG} | Storage Temperature | -65 to +150 | °C |
| I _{OUT} | DC Output Current | -60 to +120 | mA |

NOTE:

- 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.

CAPACITANCE (T_A = +25°C, f = 1.0MHz)

| Symbol | Parameter ⁽¹⁾ | Conditions | Typ. | Max. | Unit |
|------------------|--------------------------|-----------------------|------|------|------|
| C _{IN} | Input Capacitance | V _{IN} = 0V | 4.5 | 6 | pF |
| C _{OUT} | Output Capacitance | V _{OUT} = 0V | 5.5 | 8 | pF |

NOTE:

- This parameter is measured at characterization but not tested.

PIN DESCRIPTION

| Pin Names | Description |
|-----------|---|
| OEA, OEB | 3-State Output-Enable Inputs (Active LOW) |
| INA, INB | Clock Inputs |
| OAX, OBX | Clock Outputs |

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Commercial: T_A = 0°C to +70°C, V_{CC} = 5V ± 5%

| Symbol | Parameter | Test Conditions ⁽¹⁾ | Min. | Typ. ⁽²⁾ | Max. | Unit | |
|--|---|--|--|---------------------|------|------|---|
| V _{IH} | Input HIGH Level (Input pins) | Guaranteed Logic HIGH Level | 2 | — | — | V | |
| V _{IL} | Input LOW Level | Guaranteed Logic LOW Level | — | — | 0.8 | V | |
| I _{IH} | Input HIGH Current (Input pins) | V _{CC} = Max., V _I = 2.7V | — | — | ±1 | μA | |
| I _{IL} | Input LOW Current (Input pins) | V _{CC} = Max., V _I = 0.5V | — | — | ±1 | μA | |
| I _{OZH} | High Impedance Output Current (3-State Output pins) | V _{CC} = Max., V _O = 2.7V | — | — | ±1 | μA | |
| I _{OZL} | | | — | — | ±1 | | |
| I _I | Input HIGH Current | V _{CC} = Max., V _I = V _{CC} (Max.) | — | — | ±1 | μA | |
| V _{IK} | Clamp Diode Voltage | V _{CC} = Min., I _{IN} = -18mA | — | -0.7 | -1.2 | V | |
| I _{OS} | Short Circuit Current | V _{CC} = Max., V _O = GND ⁽³⁾ | -60 | -120 | -225 | mA | |
| V _{OH} | Output HIGH Voltage | V _{CC} = Min., V _{IN} = V _{IH} or V _{IL} | I _{OH} = -15mA | 2.4 | 3.3 | — | V |
| | | | I _{OH} = -32mA ⁽⁴⁾ | 2 | 3 | | |
| V _{OL} | Output LOW Voltage | V _{CC} = Min., V _{IN} = V _{IH} or V _{IL} | — | 0.3 | 0.55 | V | |
| I _{OFF} | Input/Output Power Off Leakage | V _{CC} = 0V, V _{IN} or V _O ≤ 4.5V | — | — | ±1 | μA | |
| V _H | Input Hysteresis for all inputs | — | — | 150 | — | mV | |
| I _{CC1} I _{CC2} I _{CC3} | Quiescent Power Supply Current | V _{CC} = Max., V _{IN} = GND or V _{CC} | — | 5 | 500 | μA | |

NOTES:

- For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V_{CC} = 5V, +25°C ambient.
- Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
- Duration of the condition should not exceed one second.

POWER SUPPLY CHARACTERISTICS

| Symbol | Parameter | Test Conditions ⁽¹⁾ | | Min. | Typ. ⁽²⁾ | Max. | Unit |
|------------------|---|--|--|------|---------------------|---------------------|--------|
| ΔI_{CC} | Quiescent Power Supply Current TTL Inputs HIGH | V _{CC} = Max. V _{IN} = 3.4V ⁽³⁾ | | — | 0.5 | 2 | mA |
| I _{CCD} | Dynamic Power Supply Current ⁽⁴⁾ | V _{CC} = Max. Outputs Open O _{EA} = O _{EB} = GND 50% Duty Cycle | V _{IN} = V _{CC} V _{IN} = GND | — | 60 | 100 | μA/MHz |
| I _C | Total Power Supply Current ⁽⁶⁾ | V _{CC} = Max. Outputs Open f _o = 25MHz 50% Duty Cycle O _{EA} = GND, O _{EB} = V _{CC} | V _{IN} = V _{CC} V _{IN} = GND | — | 7.5 | 13 | mA |
| | | | V _{IN} = 3.4V V _{IN} = GND | — | 7.8 | 14 | |
| | | V _{CC} = Max. Outputs Open f _o = 50MHz 50% Duty Cycle O _{EA} = O _{EB} = GND | V _{IN} = V _{CC} V _{IN} = GND | — | 30 | 50.5 ⁽⁵⁾ | |
| | | | V _{IN} = 3.4V V _{IN} = GND | — | 30.5 | 52.5 ⁽⁵⁾ | |

NOTES:

- For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V_{CC} = 5V, +25°C ambient.
- Per TTL driven input (V_{IN} = 3.4V); all other inputs at V_{CC} or GND.
- This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
- Values for these conditions are examples of the I_C formula. These limits are guaranteed but not tested.
- I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_o N_o)$
 I_{CC} = Quiescent Current (I_{CC1}, I_{CC2} and I_{CC3})
 ΔI_{CC} = Power Supply Current for a TTL High Input (V_{IN} = 3.4V)
 D_H = Duty Cycle for TTL Inputs High
 N_T = Number of TTL Inputs at D_H
 I_{CCD} = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)
 f_o = Output Frequency
 N_o = Number of Outputs at f_o
 All currents are in milliamps and all frequencies are in megahertz.

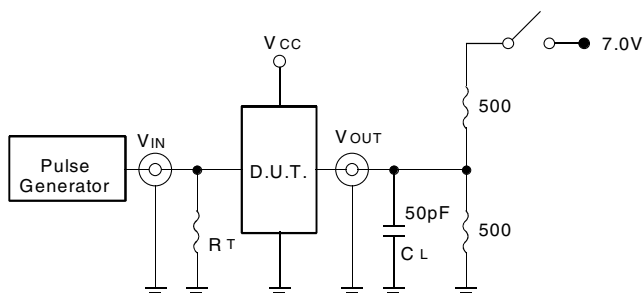
SWITCHING CHARACTERISTICS OVER OPERATING RANGE^(3,4)

| Symbol | Parameter | Conditions ⁽¹⁾ | FCT810BT | | FCT810CT | | Unit |
|------------------|--|---------------------------|---------------------|------|---------------------|------|------|
| | | | Min. ⁽²⁾ | Max. | Min. ⁽²⁾ | Max. | |
| t _{PLH} | Propagation Delay | CL = 50pF RL = 500Ω | 1.5 | 4.5 | 1.5 | 4.3 | ns |
| t _{PHL} | INA to OAx, INA to OBx | | — | 1.5 | — | 1.5 | ns |
| t _R | Output Rise Time | | — | 1.5 | — | 1.5 | ns |
| t _F | Output Fall Time | | — | 1.5 | — | 1.5 | ns |
| tsk1(O) | Output skew (same bank): skew between outputs of same bank and same package (same transition) | | — | 0.5 | — | 0.3 | ns |
| tsk2(O) | Output skew (all banks): skew between outputs of all banks of same package (inputs tied together) | | — | 0.7 | — | 0.6 | ns |
| tsk(P) | Pulse skew: skew between opposite transitions of same output (t _{PHL} - t _{PLH}) | | — | 0.7 | — | 0.7 | ns |
| tsk(T) | Package skew: skew between outputs of different packages at same power supply voltage, temperature, package type and speed grade | | — | 1.2 | — | 1 | ns |
| t _{PZL} | Output Enable Time | | 1.5 | 6 | 1.5 | 5 | ns |
| t _{PZH} | OEA to OAx, OEB to OBx | | 1.5 | 6 | 1.5 | 5 | ns |
| t _{PLZ} | Output Disable Time | 1.5 | 6 | 1.5 | 5 | ns | |
| t _{PHZ} | OEA to OAx, OEB to OBx | 1.5 | 6 | 1.5 | 5 | ns | |

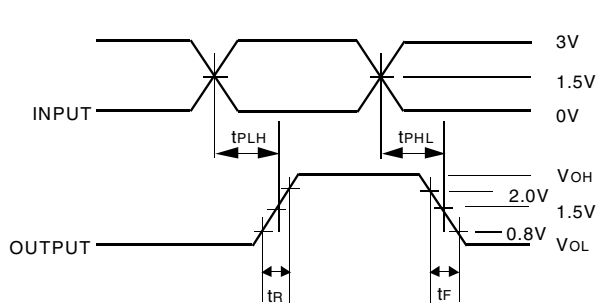
NOTES:

1. See test circuits and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. t_{PLH}, t_{PHL}, tsk(t) are production tested. All other parameters guaranteed but not production tested.
4. Propagation delay range indicated by Min. and Max. limit is due to V_{cc}, operating temperature and process parameters. These propagation delay limits do not imply skew.

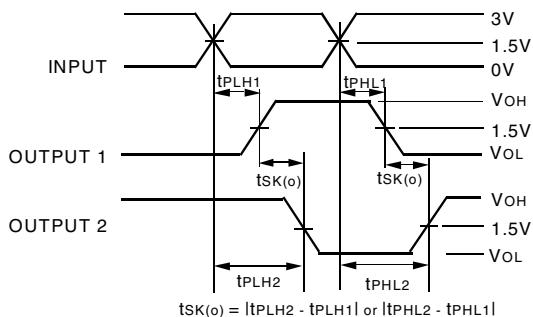
TEST CIRCUITS AND WAVEFORMS



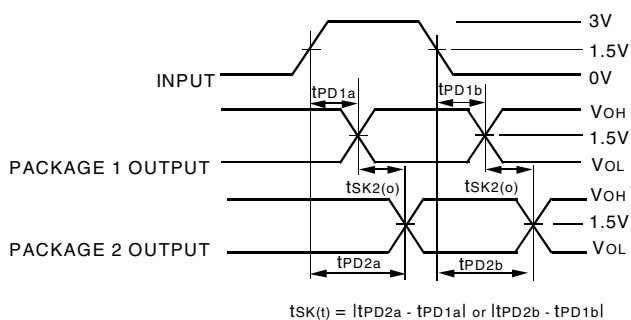
Test Circuit for All Outputs



Package Delay



Output Skew (All Banks) - tSK2(O)



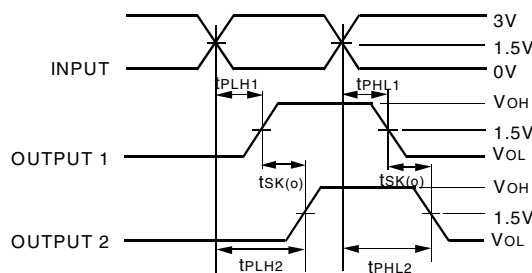
Package Skew - tSK(T)

SWITCH POSITION

| Test | Switch |
|-----------------------------|--------|
| Disable LOW Enable LOW | Closed |
| Disable HIGH Enable HIGH | GND |

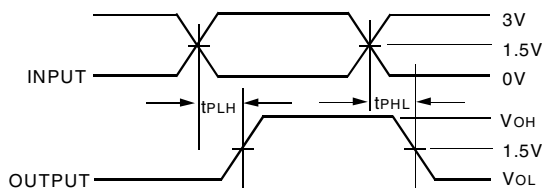
DEFINITIONS:

CL = Load capacitance: includes jig and probe capacitance.
RT = Termination resistance: should be equal to ZOUT of the Pulse Generator.



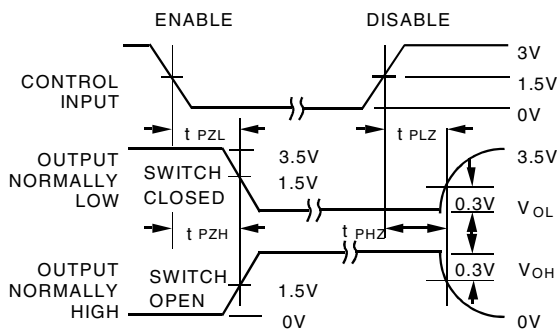
$$tSK(o) = |tPLH2 - tPLH1| \text{ or } |tPHL2 - tPHL1|$$

Output Skew (Same Bank) - tSK1(O)



$$tSK(p) = |tPHL - tPLH|$$

Pulse Skew - tSK(P)



Enable and Disable Times

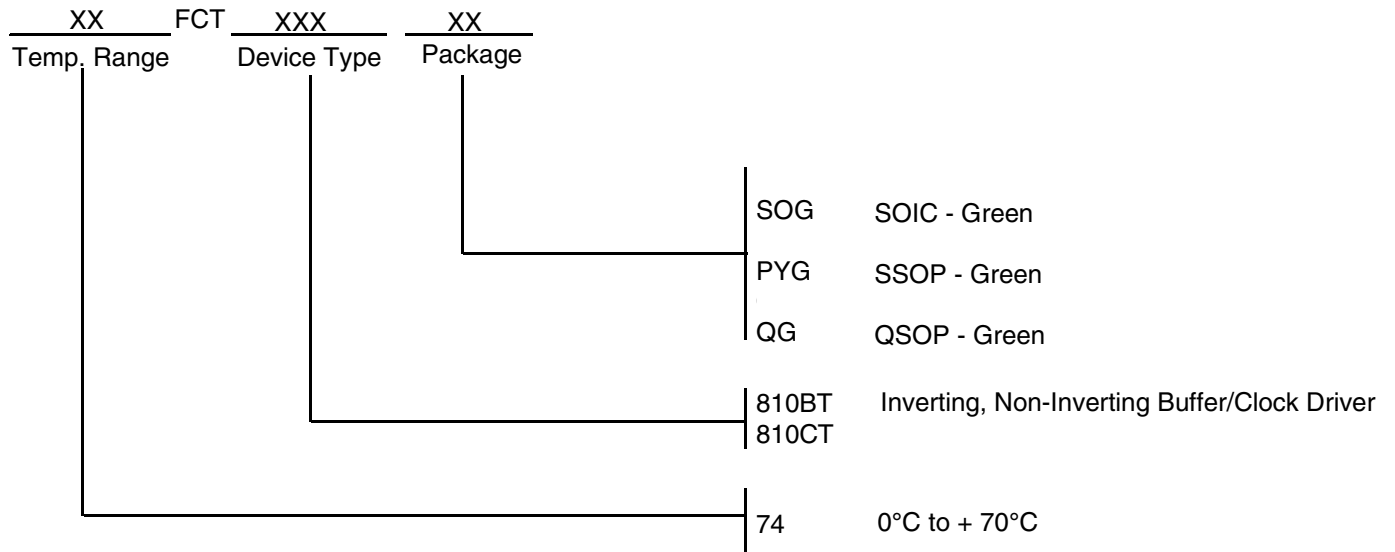
NOTES:

- Diagram shown for input Control Enable-LOW and input Control Disable-HIGH
- Pulse Generator for All Pulses: Rate $\leq 1.0\text{MHz}$; $t_r \leq 2.5\text{ns}$; $t_f \leq 2.5\text{ns}$

NOTE:

- Package 1 and Package 2 are same device type and speed grade.

ORDERING INFORMATION



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