

# 1:8 Clock Fanout Buffer

## Features

- Low-voltage operation  $V_{DD} = 3.3V$
- 1:8 fanout
- Single-input-configurable for LVDS, LVPECL, or LVTTTL
- 8 pair of LVPECL outputs
- Drives a 50-ohm load
- Low input capacitance
- Low output skew
- Low propagation delay Typical ( $t_{pd} < 4 ns$ )
- Industrial versions available
- Package available include: TSSOP
- Does not exceed Bellcore 802.3 standards
- Operation at  $\Rightarrow 350 MHz-700 Mbps$

## Description

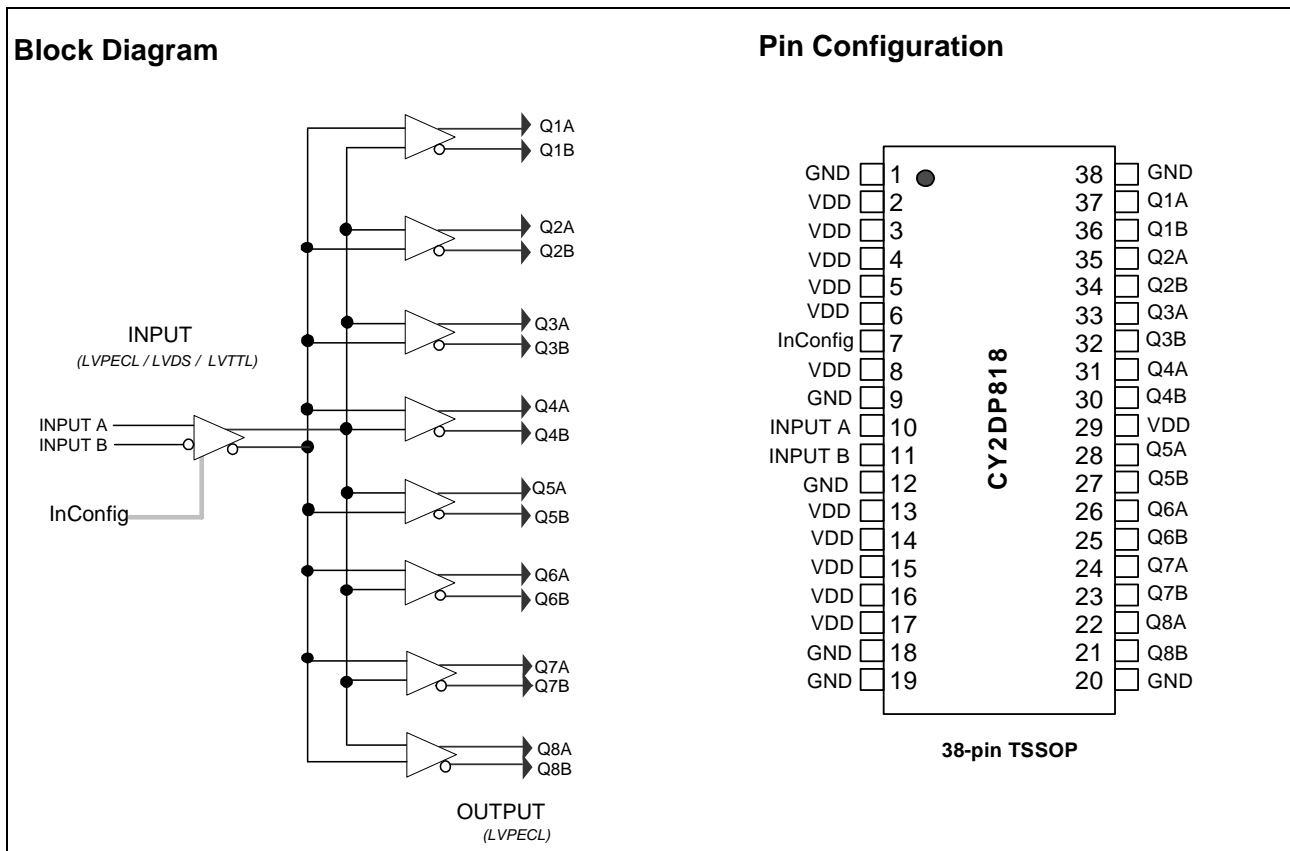
This Cypress series of network circuits are produced using advanced 0.35-micron CMOS technology, achieving the industry's fastest logic.

The Cypress CY2DP818 fanout buffer features a single LVDS or a single-ended LVTTTL-compatible input and eight LVPECL output pairs.

Designed for data-communications clock-management applications, the large fanout from a single input reduces loading on the input clock.

The CY2DP818 is ideal for both level translations from single-ended to LVPECL and/or for the distribution of LVPECL-based clock signals.

The Cypress CY2DP818 has configurable input functions. The input is user configurable via the Inconfig pin for single ended or differential input.





**Pin Description**

Pin Number	Pin Name	Pin Standard Interface	Description
1, 9,12,18,19,20,38	GND	POWER	Ground
2,3,4,5,6,8, 13,14,15,16,17,29	VDD	POWER	Power Supply
10,11	Input A, Input B	Default: LVPECL/LDVS Optional: LVTTTL/LVCMOS single pin	Differential input pair or single line. LVPECL/LVDS default. See InConfig, below.
37, 36,35,34, 33,32,31, 30, 28,27,26,25, 24,23,22,21	Q1(A,B), Q2(A,B) Q3(A,B), Q4(A,B) Q5(A,B), Q6(A,B) Q7(A,B), Q8(A,B)	LVPECL	Differential Outputs
7	InConfig	LVTTTL/LVCMOS	Converts inputs from the default LVPECL/LVDS (logic = 0) To LVTTTL/LVCMOS (logic = 1) See <i>Figure 4</i> and <i>Figure 5</i> for additional Information

**Maximum Ratings<sup>[1]</sup>**

Storage Temperature: .....	-65°C to + 150°C	Supply Voltage to Ground Potential (Outputs only) .....	-0.3V to V <sub>DD</sub> + 0.3V
Ambient Temperature:.....	-40°C to +85°C	DC Input Voltage .....	-0.3V to V <sub>DD</sub> + 0.3V
Supply Voltage to Ground Potential (Inputs and V <sub>CC</sub> only).....	-0.3V to 4.6V	DC Output Voltage.....	-0.3V to V <sub>DD</sub> + 0.9V
		Power Dissipation.....	0.75W

**Table 1. Power Supply Characteristics**

Parameter	Description	Test Conditions	Min.	Typ.	Max.	Unit
ICCD	Dynamic Power Supply Current	V <sub>DD</sub> = Max. Input toggling 50% Duty Cycle, Outputs Open		1.5	2.0	mA/MHz
IC	Total Power Supply Current	V <sub>DD</sub> = Max. Input toggling 50% Duty Cycle, Outputs 50 ohms fL=100 MHz			350	mA
IC Core	Core current when output loads are disabled	V <sub>DD</sub> = Max. Input toggling 50% Duty Cycle, Outputs Disabled, not connected to VTT fL=100 MHz			50	mA

**Table 2. Input Receiver Configuration for Differential or LVTTTL/LVCMOS**

INCONFIG Pin 7 Binary Value	Input Receiver Family	Input Receiver Type
1	LVTTTL in LVCMOS	Single-ended, non-inverting, inverting, void of bias resistors
0	LVDS	Low-voltage differential signaling
	LVPECL	Low-voltage pseudo (positive) emitter coupled logic

**Notes:**

- Stresses greater than those listed under absolute maximum ratings may cause permanent damage to the device. This is intended to be a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

**Table 3. Function Control of the TTL Input Logic used to Accept or Invert the Input Signal**

LVTTTL/LVCMOS Input Logic			
Input Condition		Input Logic	Output Logic Q Pins, Q1A or Q1
Ground	Input B (-) Pin 11		
	Input A (+) Pin 10	Input	True
VCC	Input B (-) Pin 11		
	Input A (+) Pin 10	Input	Invert
Ground	Input A (+) Pin 10		
	Input B (-) Pin 11	Input	Invert
VCC	Input A (+) Pin 10		
	Input B (-) Pin 11	Input	True

**Table 4. DC Electrical Characteristics: 3.3V–LVDS Input**

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
$V_{ID}$	Magnitude of Differential Input Voltage		100		600	mV
$V_{IC}$	Common-mode of Differential Input Voltage $V_{ID}/2$ (min. and max.)		$ V_{ID} /2$	$2.4 - ( V_{ID} /2)$		V
$V_{IH}$	Input High Voltage	Guaranteed Logic High Level	2			V
$V_{IL}$	Input Low Voltage	Guaranteed Logic Low Level			0.8	V
$I_{IH}$	Input High Current	$V_{DD} = \text{Max.}$ $V_{IN} = V_{DD}$		$\pm 10$	$\pm 20$	$\mu\text{A}$
$I_{IL}$	Input Low Current	$V_{DD} = \text{Max.}$ $V_{IN} = V_{SS}$		$\pm 10$	$\pm 20$	$\mu\text{A}$
$I_I$	Input High Current	$V_{DD} = \text{Max.}, V_{IN} = V_{DD}(\text{Max.})$			$\pm 20$	$\mu\text{A}$

**Table 5. DC Electrical Characteristics: 3.3V–LVPECL Input**

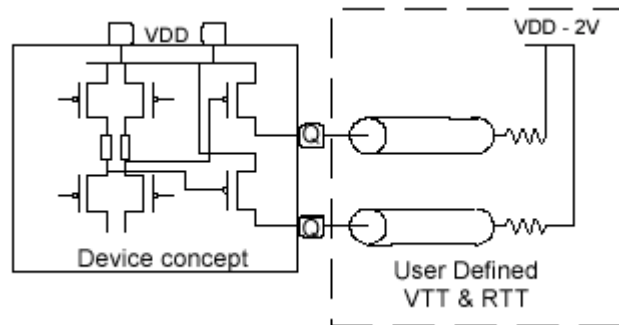
Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
$V_{ID}$	Differential Input Voltage p-p	Guaranteed Logic High Level	400		2600	mV
$V_{IH}$	Input High Voltage	Guaranteed Logic High Level	2.15		2.4	V
$V_{IL}$	Input Low Voltage	Guaranteed Logic Low Level	1.5		1.8	V
$I_{IH}$	Input High Current	$V_{DD} = \text{Max.}$ $V_{IN} = V_{DD}$		$\pm 10$	$\pm 20$	$\mu\text{A}$
$I_{IL}$	Input Low Current	$V_{DD} = \text{Max.}$ $V_{IN} = V_{SS}$		$\pm 10$	$\pm 20$	$\mu\text{A}$
$I_I$	Input High Current	$V_{DD} = \text{Max.}, V_{IN} = V_{DD}(\text{Max.})$			$\pm 20$	$\mu\text{A}$
$V_{CM}$	Common-mode Voltage				225	mV

**Table 6. DC Electrical Characteristics: 3.3V–LVTTTL/LVCMOS Input**

Parameter	Description	Conditions	Min.	Typ.	Max.	Units
$V_{IH}$	Input High Voltage	Guaranteed Logic High Level	2			V
$V_{IL}$	Input Low Voltage	Guaranteed Logic Low Level			0.8	V
$I_{IH}$	Input High Current	$V_{DD} = \text{Max}$ $V_{IN} = 2.7\text{V}$			1	$\mu\text{A}$
$I_{IL}$	Input Low Current	$V_{DD} = \text{Max}$ $V_{IN} = 0.5\text{V}$			-1	$\mu\text{A}$
$I_I$	Input High Current	$V_{DD} = \text{Max.}, V_{IN} = V_{DD}(\text{Max})$			20	$\mu\text{A}$
$V_{IK}$	Clamp Diode Voltage	$V_{DD} = \text{Min.}, I_{IN} = -18\text{mA}$		-0.7	-1.2	V
$V_H$	Input Hysteresis			80		mV

**Table 7. DC Electrical Characteristics: 3.3V–LVPECL Output**

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
$V_{OD}$	Driver Differential Output voltage p-p	$V_{DD} = \text{Min.}, V_{IN} = V_{IH} \text{ or } V_{IL}$ $R_L = 50 \text{ ohm}$	1000		3600	mV
$V_{OC}$	Driver common-mode p-p	$V_{DD} = \text{Min.}, V_{IN} = V_{IH} \text{ or } V_{IL}$ $R_L = 50 \text{ ohm}$			300	mV
Rise Time	Differential 20% to 80%	CL–10 pF RL and CL to GND $R_L = 50 \text{ ohm}$	300		1200	ps
Fall Time						
$V_{OH}$	Output High Voltage	$V_{DD} = \text{Min.}, V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OH} = -12 \text{ mA}$	2.1		3.0	V
$V_{OL}$	Output Low Voltage	$V_{DD} = \text{Min.}, V_{IN} = V_{IH} \text{ or } V_{IL}$ User defined by VTT RTT.	0.8		1.3	V
$I_{OS}$	Short Circuit Current	$V_{DD} = \text{Max.}, V_{OUT} = \text{GND}$	-125		-150	mA



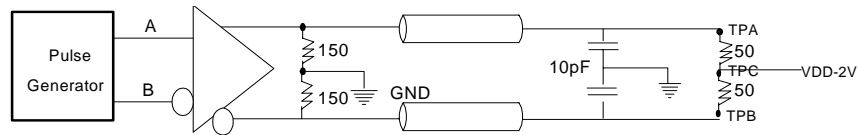
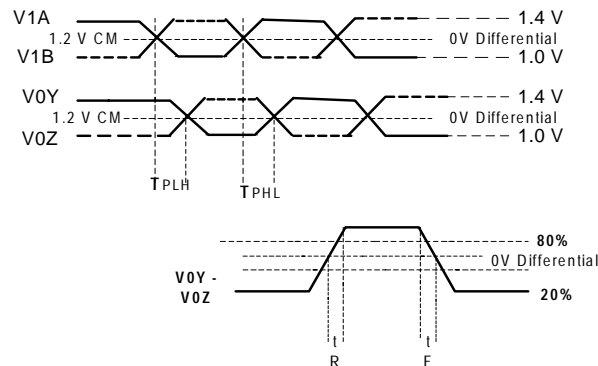
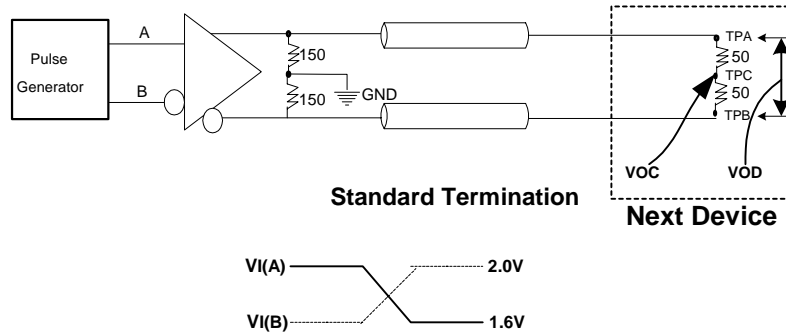
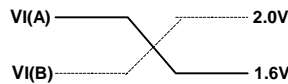
### Driver Design

**Table 8. AC Switching Characteristics @ 3.3 V ( $V_{DD} = 3.3\text{V} \pm 5\%$ , Temperature =  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$ )**

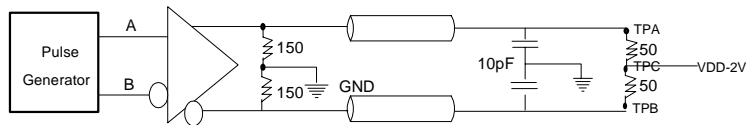
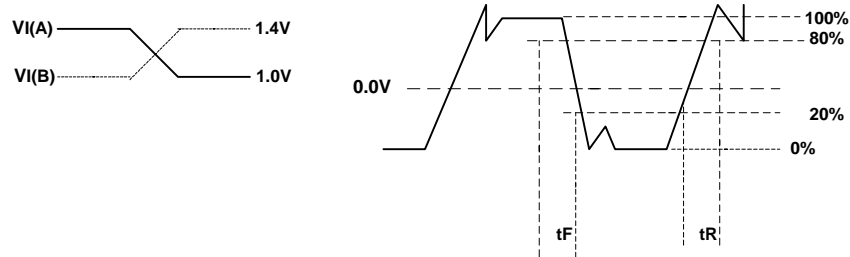
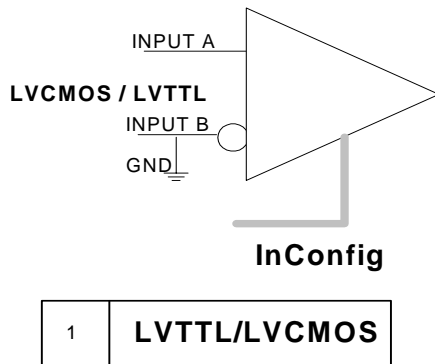
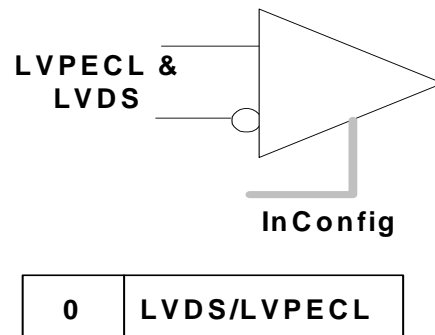
Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
$t_{PLH}$	Propagation Delay – Low to High	$V_{OD} = 100 \text{ mV}$	3	4	5	ns
$t_{PHL}$	Propagation Delay – High to Low		3	4	5	ns
$T_{PE}$	Enable (EN) to functional operation				6	ns
$T_{PD}$	Functional operation to Disable				5	ns
$t_{SK(0)}$	Output Skew: Skew between outputs of the same package (in phase)				0.2	ns
$t_{SK(p)}$	Pulse Skew: Skew between opposite transitions of the same output ( $t_{PHL} - t_{PLH}$ )			0.2		ns
$t_{SK(t)}$	Package Skew: Skew between outputs of different packages at the same power supply voltage, temperature and package type. Same input signal level and output load.	$V_{ID} = 100 \text{ mV}$			1	ns

**Table 9. High-frequency Parametrics**

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
Fmax	Maximum frequency $V_{DD} = 3.3\text{V}$	45%–55% duty cycle Standard load circuit			350	MHz


**Standard Termination**

**Figure 1. Differential Receiver to Driver Propagation Delay and Driver Transition Time**<sup>[2,3,4,5]</sup>

**Standard Termination**
**Next Device**

**Figure 2. Test Circuit and Voltage Definitions for the Driver Common-Mode Output Voltage**<sup>[2,3,4,5]</sup>
**Notes:**

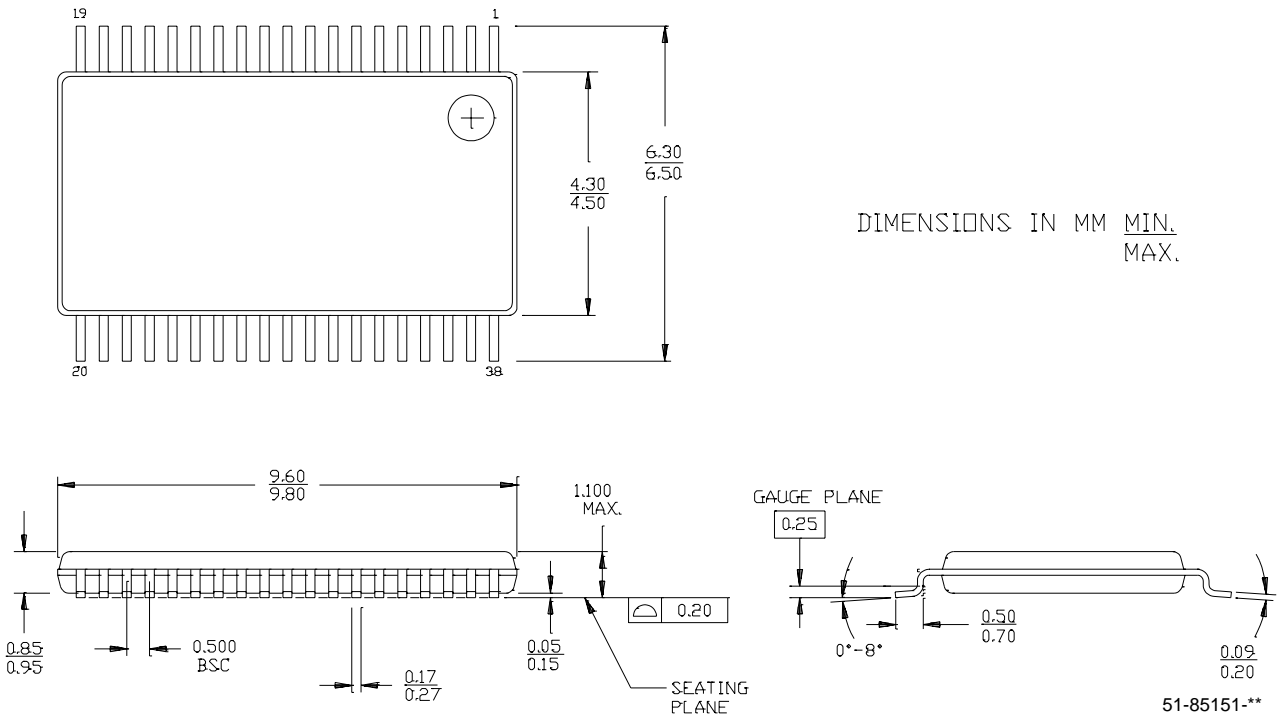
2. All input pulses are supplied by a frequency generator with the following characteristics:  $t_R$  and  $t_F \leq 1$  ns; pulse rate = 50 Mpps; pulse width =  $10 \pm 0.2$  ns.
3.  $R_L = 50 \text{ ohm} \pm 1\%$ ;  $Z_{line} = 50 \text{ ohm}$ .
4. CL includes instrumentation and fixture capacitance within 6 mm of the UT.
5. TPA and B are used for prop delay and Rise/Fall measurements. TPC is used for VOC measurements only and is otherwise connected to  $V_{DD} - 2$ .


**Standard Termination**

**Figure 3. Test Circuit and Voltage Definitions for the Differential Output Signal<sup>[2,3,4,5]</sup>**

**Figure 4. <sup>[6]</sup>**

**Figure 5. <sup>[7]</sup>**
**Notes:**

- 6. See *Table 3*.
- 7. LVPECL or LVDS differential input value.

**Ordering Information**

Part Number	Package Type	Product Flow
CY2DP818ZI	38-pin TSSOP	Industrial, -40° to 85°C
CY2DP818ZIT	38-pin TSSOP-Tape and Reel	Industrial, -40° to 85°C
CY2DP818ZC	38-pin TSSOP	Commercial, 0°C to 70°C
CY2DP818ZCT	38-pin TSSOP-Tape and Reel	Commercial, 0°C to 70°C

**Package Drawing and Dimensions**
**38-lead TSSOP (4.40 mm Body) Z38**


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**Document Title: CY2DP818 1:8 Clock Fanout Buffer**  
**Document Number: 38-07061**

<b>REV.</b>	<b>ECN NO.</b>	<b>Issue Date</b>	<b>Orig. of Change</b>	<b>Description of Change</b>
**	107086	06/07/01	IKA	New Data Sheet
*A	115913	07/11/02	CTK	IC, VCM, VOC, Rise/Fall Time Fmax (20)



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