CY2CC910

1:10 Clock Fanout Buffer

Features

- Low voltage operation
- Full range support:
  - 3.3 V
  - 2.5 V
  - 1.8 V
- Over voltage tolerant input hot swappable
- 1:10 Fanout
- Drives either a 50-Ohm or 75-Ohm load
- Low input capacitance
- Low output skew
- Low propagation delay
- Typical (t_{pd} less than 4 ns)
- High speed operation:
  - 200 MHz at1.8 V
  - 650 MHz at 2.5 V and 3.3 V
- Industrial temperature range
- Available in SSOP package

Functional Description

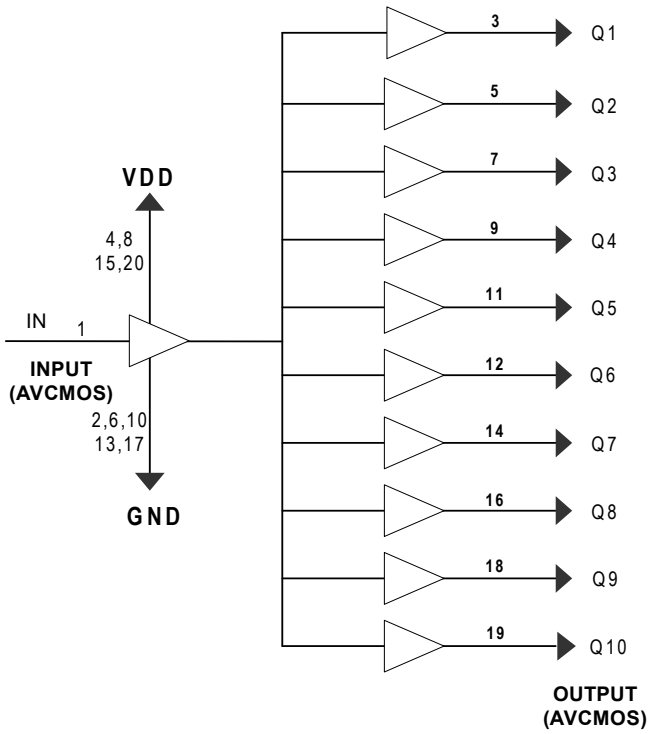
The Cypress series of network circuits are produced using advanced 0.35 micron CMOS technology, achieving the industry's fastest logic and buffers.

The Cypress CY2CC910 fanout buffer features one input and 10 outputs. It is ideal for conversion from and to 3.3 V, 2.5 V, and 1.8 V.

Designed for Data Communications clock management applications, the large fanout from a single input reduces loading on the input clock.

For a complete list of related documentation, click here.

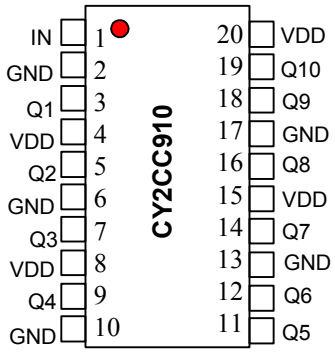
Logic Block Diagram



Contents

Pin Configuration

Figure 1. 20-pin SOIP/SSOP pinout



20 pin SOIC/SSOP

Pin Description

Pin Number	Pin Name	Description
1	IN	Input
2, 6, 10, 13, 17	GND	Ground
4, 8, 15, 20	V_{DD}	Power Supply
3, 5, 7, 9, 11, 12, 14, 16, 18, 19	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10	Output

Maximum Ratings

Exceeding maximum ratings[1] may shorten the useful life of the device. User guidelines are not tested.

Storage temperature: ..... –65° C to +150° C

Ambient temperature: ..... –40° C to +85° C

Supply voltage to ground potential

V_{CC} .....–0.5 V to 4.6 V

Input.....–0.5 V to 5.8 V

Supply voltage to ground potential

(Outputs only) ..... –0.5 V to V_{DD} + 1 V

DC output voltage ..... –0.5 V to V_{DD} + 1 V

Power dissipation ..... 0.75 W

DC Electrical Characteristics

At 3.3 V (See Figure 2)

Parameter	Description	Conditions		Min	Typ	Max	Unit
V_{OH}	Output high voltage	V_{DD} = Min, V_{IN} = V_{IH} or V_{IL}	I_{OH} = –12 mA	2.3	–	–	V
V_{OL}	Output low voltage	V_{DD} = Min, V_{IN} = V_{IH} or V_{IL}	I_{OL} = 12 mA	–	–	0.5	V
V_{IH}	Input high voltage	Guaranteed Logic High Level		2	–	5.8	V
V_{IL}	Input low voltage	Guaranteed Logic Low Level		–	–	0.8	V
I_{IH}	Input high current	V_{DD} = Max	V_{IN} = 2.7 V	–	–	1	µA
I_{IL}	Input low current	V_{DD} = Max	V_{IN} = 0.5 V	–	–	–1	µA
I_I	Input high current	V_{DD} = Max, V_{IN} = V_{DD}(Max)		–	–	20	µA
V_{IK}	Clamp diode voltage	V_{DD} = Min, I_{IN} = –18 mA		–	–0.7	–1.2	V
I_{OK}	Continuous clamp current	V_{DD} = Max, V_{OUT} = GND		–	–	–50	mA
O_{OFF}	Power-down disable	V_{DD} = GND, V_{OUT} = < 4.5 V		–	–	100	µA
V_H	Input hysteresis			–	80	–	mV

DC Electrical Characteristics

At 2.5 V (See Figure 2)

Parameter	Description	Conditions		Min	Typ	Max	Unit
V_{OH}	Output high voltage	V_{DD} = Min, V_{IN} = V_{IH} or V_{IL}	I_{OH} = –7 mA	1.8	–	–	V
			I_{OH} = 12 mA	1.6	–	–	V
V_{OL}	Output low voltage	V_{DD} = Min, V_{IN} = V_{IH} or V_{IL}	I_{OL} = 12 mA		–	0.65	V
V_{IH}	Input high voltage	Guaranteed Logic High Level		1.6	–	5.0	V
V_{IL}	Input low voltage	Guaranteed Logic Low Level		–	–	0.8	V
I_{IH}	Input high current	V_{DD} = Max	V_{IN} = 2.4 V	–	–	1	µA
I_{IL}	Input low current	V_{DD} = Max	V_{IN} = 0.5 V	–	–	–1	µA
I_I	Input high current	V_{DD} = Max, V_{IN} = V_{DD}(Max)		–	–	20	µA
V_{IK}	Clamp diode voltage	V_{DD} = Min, I_{IN} = –18 mA		–	–0.7	–1.2	V
I_{OK}	Continuous clamp current	V_{DD} = Max, V_{OUT} = GND		–		–50	mA
O_{OFF}	Power down disable	V_{DD} = GND, V_{OUT} = < 4.5 V		–		100	µA
V_H	Input hysteresis			–	80	–	mV

Note

1. 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.

DC Electrical Characteristics

At 1.8 V (See Figure 6)

Parameter	Description	Test Condition[2]	Min	Max	Unit
V_{DD}	Supply voltage		1.71	1.89	V
V_{IH}	Input high voltage		0.65 × V_{DD} [1.1]	4.3	V
V_{IL}	Input low voltage		–0.3	0.35 × V_{DD} [0.6]	V
V_{OH}	Output high voltage	I_{OH} = –2 mA	V_{DD} – 0.45 [1.2]	–	V
V_{OL}	Output low voltage	I_{OH} = 2 mA	–	0.45	V

Capacitance

Parameter [3]	Description	Test Conditions	Typ	Max	Unit
C_{IN}	Input capacitance	V_{IN} = 0 V	2.5	–	pF
C_{OUT}	Output capacitance	V_{OUT} = 0 V	6.5	–	pF

Thermal Resistance

Parameter [3]	Description	Test Conditions	20-pin SSOP	Unit
θ_{JA}	Thermal resistance (junction to ambient)	Test conditions follow standard test methods and procedures for measuring thermal impedance, in accordance with EIA/JESD51.	79	°C/W
θ_{JC}	Thermal resistance (junction to case)		35	°C/W

Power Supply Characteristics

(See Figure 2)

Parameter	Description	Test Conditions	Min	Typ	Max	Unit
Δ_{ICC}	Delta I_{CC} Quiescent Power Supply Current	(I_{DD} @ V_{DD} = Max and V_{IN} = V_{DD}) – (I_{DD} @ V_{DD} = Max and V_{IN} = V_{DD} – 0.6 V6 V)	–	–	50	µA
I_{CCD}	Dynamic power supply current	V_{DD} = Max Input toggling 50% Duty Cycle, Outputs Open	–	–	0.63	mA/ MHz
I_C	Total power supply current	V_{DD} = Max Input toggling 50% Duty Cycle, Outputs Open, fL = 40 MHZ	–	–	25	mA

Notes
2. Test load conditions: 500-Ohm to ground with approximately 6-pF total loading and 200-MHz maximum frequency.
3. These parameters are guaranteed by design and are not tested.

High Frequency Parametrics

Parameter	Description	Test Conditions		Min	Typ	Max	Unit
D_J	Jitter, Deterministic	50% duty cycle t_W(50–50) The “point to point load circuit” | Output Jitter – Input Jitter |	See Figure 4	–	–	20	ps
F_{max} 3.3 V	Maximum frequency V_{DD} = 3.3 V	50% duty cycle t_W(50–50) Standard Load Circuit.	See Figure 2	–	–	160	MHz
		50% duty cycle t_W(50–50) The “point to point load circuit”	See Figure 4	–	–	650	
F_{max} 2.5 V	Maximum frequency V_{DD} = 2.5 V	The “point-to-point load circuit” V_{IN} = 2.4 V/0.0 V V_{OUT} = 1.7 V/0.7 V	See Figure 4	–	–	200	MHz
F_{max} 1.8 V	Maximum frequency V_{DD} = 1.8 V	The “6-pF load circuit” V_{IN} = 1.7 V/0.0 V V_{OUT} = 1.2 V/0.4 V	See Figure 6	–	–	200	MHz
$F_{max(20)}$	Maximum frequency V_{DD} = 3.3 V	20% duty cycle t_W(20–80) The “point to point load circuit” V_{IN} = 3.0 V/0.0 V V_{OUT} = 2.3 V/0.4 V	See Figure 5	–	–	250	MHz
t_W 3.3 V	Minimum pulse V_{DD} = 3.3 V	The “point-to-point load circuit” V_{IN} = 3.0 V/0.0 V F = 100 MHz V_{OUT} = 2.0 V/0.8 V	See Figure 4	1	–	–	ns
t_W 2.5 V	Minimum pulse V_{DD} = 2.5 V	The “point-to-point load circuit” V_{IN} = 2.4 V/0.0 V F = 100 MHz V_{OUT} = 1.7 V/0.7 V	See Figure 4	1	–	–	ns
t_W 1.8 V	Minimum pulse V_{DD} = 1.8 V	The “6-pF load circuit” V_{IN} = 1.7 V/0.0 V V_{OUT} = 1.2 V/0.4 V	See Figure 6	1	–	–	ns

AC Switching Characteristics

At 3.3 V (V_{DD} = 3.3 V ± 5%, Temperature = –40 °C to +85 °C)

Parameter	Description		Min	Typ	Max	Unit
t_{PLH}	Propagation delay – Low to High	See Figure 3	1.5	2.7	3.5	ns
t_{PHL}	Propagation delay – High to Low		1.5	2.7	3.5	ns
t_R	Output rise time		–	0.8	–	V/ns
t_F	Output fall time		–	0.8	–	V/ns
$t_{SK(0)}$	Output Skew: Skew between outputs of the same package (in phase).	See Figure 10	–	–	0.2	ns
$t_{SK(p)}$	Pulse Skew: Skew between opposite transitions of the same output ($t_{PHL} – t_{PLH}$).	See Figure 9	–	–	0.2	ns
$t_{SK(t)}$	Package Skew: Skew between outputs of different packages at the same power supply voltage, temperature and package type.	See Figure 11	–	–	0.4	ns

AC Switching Characteristics

At 2.5 V (V_{DD} = 2.5 V ± 5%, Temperature = –40 °C to +85 °C)

Parameter	Description		Min	Typ	Max	Unit
t_{PLH}	Propagation delay – Low to High	See Figure 3	1.5	2.7	3.5	ns
t_{PHL}	Propagation delay – High to Low		1.5	2.7	3.5	ns
t_R	Output rise time		–	0.8	–	V/ns
t_F	Output fall time		–	0.8	–	V/ns
$t_{SK(0)}$	Output Skew: Skew between outputs of the same package (in phase).	See Figure 10	–	–	0.2	ns
$t_{SK(p)}$	Pulse Skew: Skew between opposite transitions of the same output ($t_{PHL} – t_{PLH}$).	See Figure 9	–	–	0.2	ns
$t_{SK(t)}$	Package Skew: Skew between outputs of different packages at the same power supply voltage, temperature and package type.	See Figure 11	–	–	0.4	ns

AC Switching Characteristics

At 1.8 V (V_{DD} = 1.8 V ± 5%, Temperature = –40 °C to +85 °C)

Parameter	Description		Min	Typ	Max	Unit
t_{PLH}	Propagation delay – Low to High	See Figure 7	1.5	2.7	3.5	ns
t_{PHL}	Propagation delay – High to Low		1.5	2.7	3.5	ns
t_R	Output rise time 20%–80%		0.2	–	1.5	ns
t_F	Output fall time 20%–80%		0.2	–	1.5	ns
$t_{SK(0)}$	Output Skew: Skew between outputs of the same package (in phase).	See Figure 10	–	–	0.2	ns
$t_{SK(p)}$	Pulse Skew: Skew between opposite transitions of the same output ($t_{PHL} – t_{PLH}$).	See Figure 9	–	–	0.2	ns
$t_{SK(t)}$	Package Skew: Skew between outputs of different packages at the same power supply voltage, temperature and package type.	See Figure 11	–	–	0.4	ns

Parameter Measurement Information: V_{DD} at 3.3 V to 2.5 V

Figure 2. Load Circuit [4, 5, 6]

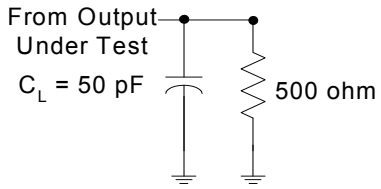


Figure 3. Voltage Waveforms Propagation Delay Times [7]

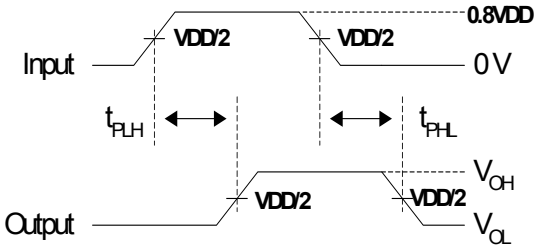


Figure 4. Point to Point Load Circuit [4, 5, 6]

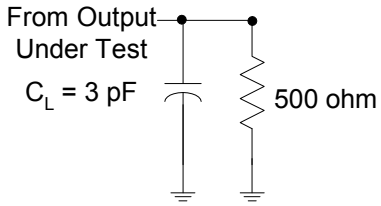
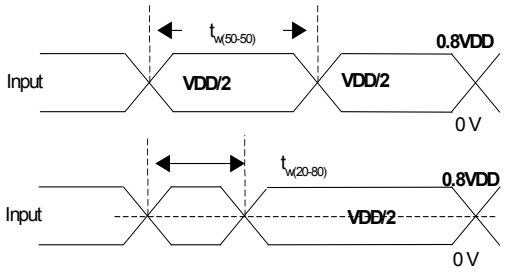


Figure 5. Voltage Waveforms – Pulse Duration [5]



Notes
4. C_L includes probe and jig capacitance.
5. All input pulses are supplied by generators having the following characteristics: PRR < 100 MHz, Z_0 = 50Ω, t_R < 2.5 ns, t_F < 2.5 ns.
6. The outputs are measured one at a time with one transition per measurement.
7. T_{PLH} and T_{PHL} are the same as t_{pd}.

Parameter Measurement Information: V_{DD} at 8 V

Figure 6. Load Circuit [8, 9, 10]

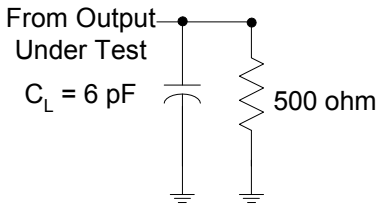


Figure 7. Voltage Waveforms Propagation

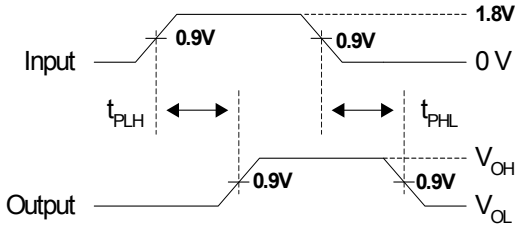


Figure 8. Voltage Waveforms – Pulse Duration [9]

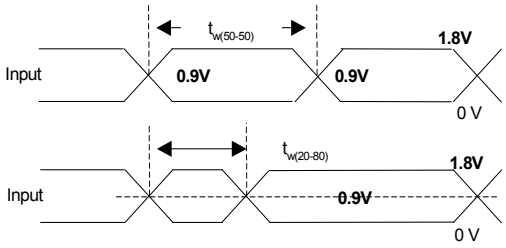
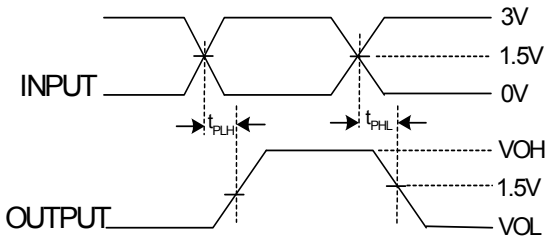
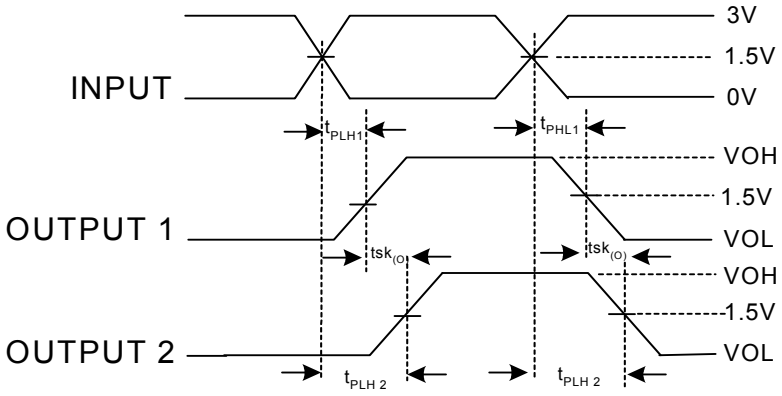


Figure 9. Pulse Skew - $tsk_{(p)}$



$$tsk_{(P)} = | t_{PHL} - t_{PLH} |$$

Figure 10. Output Skew - $tsk_{(0)}$



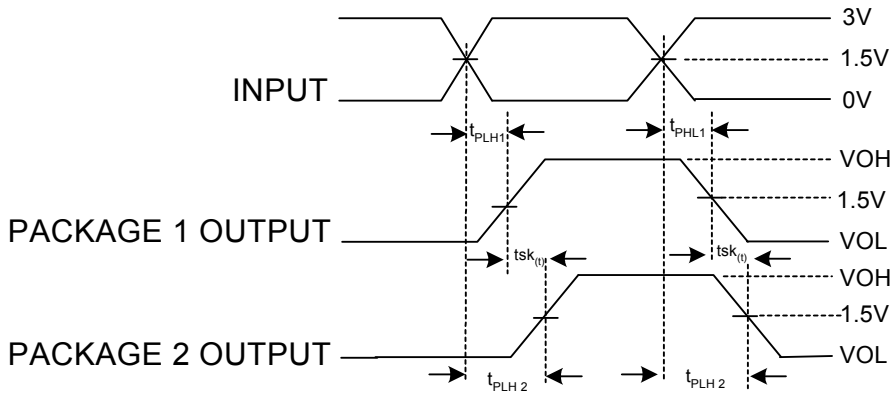
$$tsk_{(P)} = | t_{PLH2} - t_{PLH1} | \text{ or } | t_{PHL2} - t_{PHL1} |$$

Notes

8. C_L includes probe and jig capacitance.
9. All input pulses are supplied by generators having the following characteristics: PRR < 100 MHz, $Z_0 = 50\Omega$, t_R < 2.5 ns, t_F < 2.5 ns.
10. The outputs are measured one at a time with one transition per measurement.

Parameter Measurement Information: V_{DD} at 8 V(continued)

Figure 11. Package Skew - $tsk_{(t)}$

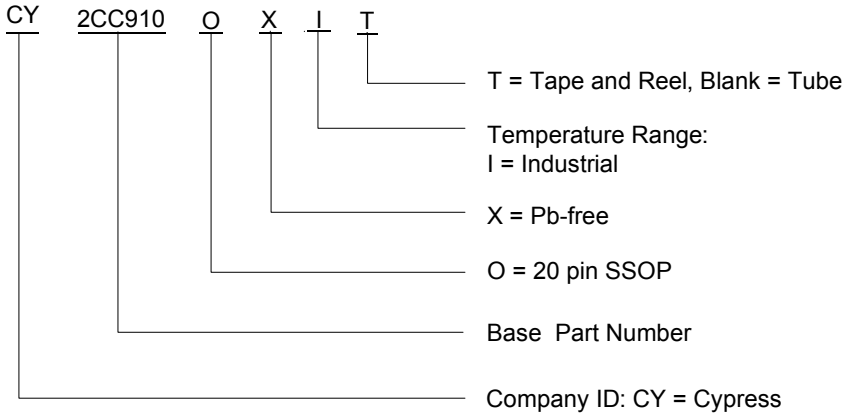


$$tsk_{(t)} = | t_{PLH2} - t_{PLH1} | \text{ or } | t_{PHL2} - t_{PHL1} |$$

Ordering Information

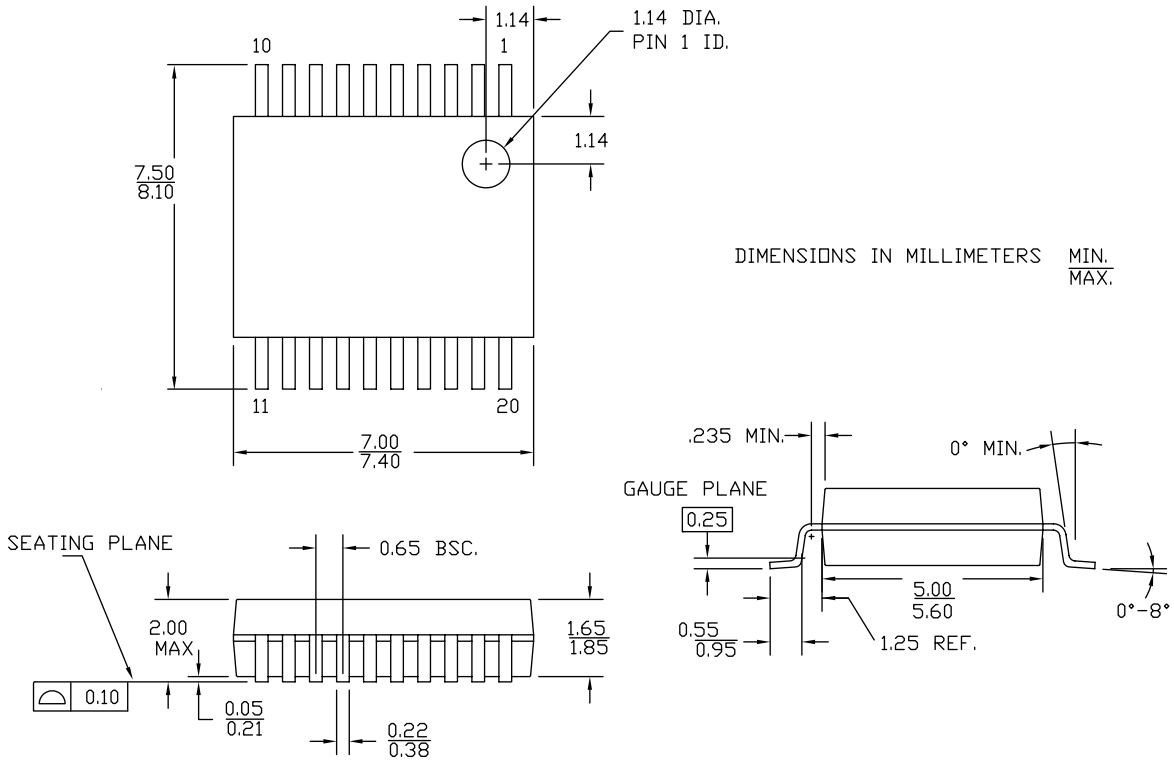
Part Number	Package Type	Product Flow
Pb-free		
CY2CC910OXI	20-pin SSOP	Industrial, –40° C to 85° C
CY2CC910OXIT	20-pin SSOP – Tape and Reel	Industrial, –40° C to 85° C

Ordering Code Definitions



Package Diagram

Figure 12. 20-pin SSOP (210 Mils) O20.21 Package Outline, 51-85077



51-85077 *F

Acronyms

Acronym	Description
CMOS	complementary metal oxide semiconductor
DJ	deterministic jitter
SSOP	shrunk small outline package

Document Conventions

Units of Measure

Symbol	Unit of Measure
°C	degree Celsius
MHZ	megahertz
uA	microamperes
mA	milliamperes
ms	milliseconds
ns	nanoseconds
%	percent
pF	picofarads
ps	picoseconds
V	volt

Document History Page

Document Title: CY2CC910, 1:10 Clock Fanout Buffer Document No: 38-07348				
Rev.	**ECN No.**	**Orig. of Change**	**Submission Date**	**Description of Change**
**	114318	TSM	05/10/02	New data sheet
*A	119148	RGL	10/07/02	Added 5.8 as the Max value for V_{IH} in the DC Electrical Characteristics @3.3 V table. Changed the Max value of V_{IH} from 5.8 to 5.0 in the DC Electrical Characteristics @2.5 V table. Changed the value of V_{IH} from V_{DD}+0.3 [2.25] to 4.3 in the DC Electrical Characteristics @1.8 V table.
*B	404287	RGL	See ECN	Added Lead-free devices for SSOP
*C	2595534	CXQ / PYRS	10/23/08	Added “Status” column to Ordering Information table Updated Package Diagram 51-85024 Updated to new template.
*D	2896073	CXQ	03/19/10	Removed SOIC packages related information in all instances across the document. Updated Ordering Information: Removed obsolete parts from ordering information table and added CY2CC910OXI-1, CY2CC910OXI-1T. Updated Package Diagram.
*E	3056154	CXQ	10/08/2010	Updated Ordering Information: Removed CY2CC910OXI-1, CY2CC910OXI-1T, CY2CC910OXC, and CY2CC910OXCT parts. Removed the Note “Devices with part numbers ending with -1 are identical to devices without the -1 suffix. There are no differences in specification.” and its reference.
*F	3411742	PURU	10/18/2011	Added Contents. Updated Functional Description: Removed “Cypress employs the unique AVCMOS type outputs VOI (Variable Output Impedance) that dynamically adjust for variable impedance matching, eliminate the need for series damping resistors, and reduce overall noise.” Removed “Variable Output Impedance Control (VOI)”. Updated Ordering Information Updated Package Diagram. Added Acronyms and Units of Measure.
*G	4575136	TAVA	11/20/2014	Updated Functional Description: Added “For a complete list of related resources, click here.” at the end. Updated to new template. Completing Sunset Review.
*H	4586288	TAVA	12/03/2014	Updated Functional Description: Replaced “resources” with “documentation”.
*I	5272946	PSR	05/16/2016	Added Thermal Resistance. Updated Package Diagram: spec 51-85077 – Changed revision from *E to *F. Updated to new template.
*J	5726314	PSR	05/11/2017	Updated DC Electrical Characteristics (At 3.3 V): Removed typical values of V_{OH} and V_{OL} parameters. Updated to new template.

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