

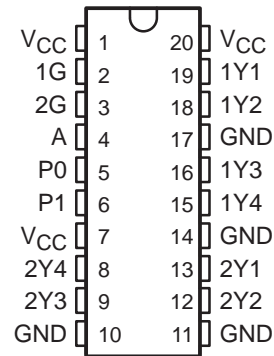
# CDC340

## 1-LINE TO 8-LINE CLOCK DRIVER

SCAS332B – DECEMBER 1992 – REVISED MAY 1997

- Low Output Skew, Low Pulse Skew for Clock-Distribution and Clock-Generation Applications
- TTL-Compatible Inputs and Outputs
- Distributes One Clock Input to Eight Outputs
- Distributed  $V_{CC}$  and Ground Pins Reduce Switching Noise
- High-Drive Outputs ( $-48\text{-mA } I_{OH}$ ,  $48\text{-mA } I_{OL}$ )
- State-of-the-Art *EPIC-II B*<sup>™</sup> BiCMOS Design Significantly Reduces Power Dissipation
- Package Options Include Plastic Small-Outline (DW) and Shrink

DW PACKAGE  
(TOP VIEW)



### description

The CDC340 is a high-performance clock-driver circuit that distributes one (A) input signal to eight (Y) outputs with minimum skew for clock distribution. Through the use of the control pins (1G and 2G), the outputs can be placed in a high state regardless of the A input.

The propagation delays are adjusted at the factory using the P0 and P1 pins. These pins are not intended for customer use and should be strapped to GND.

The CDC340 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS			OUTPUTS	
1G	2G	A	1Y1–1Y4	2Y1–2Y4
X	X	L	H	H
L	L	H	H	H
L	H	H	H	L
H	L	H	L	H
H	H	H	L	L



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**TEXAS  
INSTRUMENTS**

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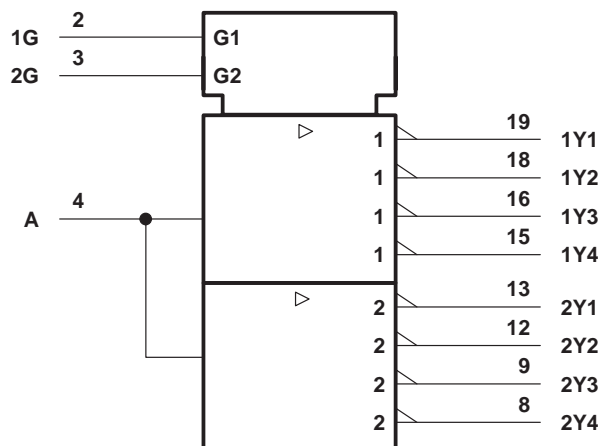
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# CDC340

## 1-LINE TO 8-LINE CLOCK DRIVER

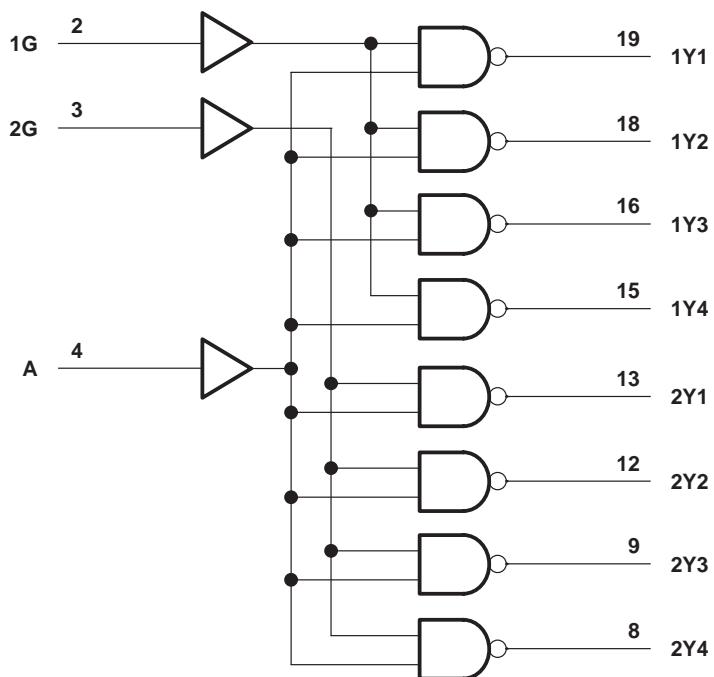
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### logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

### logic diagram (positive logic)



**absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†**

Supply voltage range, $V_{CC}$	–0.5 V to 7 V
Input voltage range, $V_I$ (see Note 1)	–0.5 V to 7 V
Voltage range applied to any output in the high state or power-off state, $V_O$ (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Current into any output in the low state, $I_O$	96 mA
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	–18 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2): DW package	1.6 W
Storage temperature range, $T_{stg}$	–65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.  
2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.  
For more information, refer to the *Package Thermal Considerations* Application Note in the *ABT Advanced BiCMOS Technology Data Book*, literature number SCBD002.

**recommended operating conditions (see Note 3)**

		MIN	MAX	UNIT
$V_{CC}$	Supply voltage	4.75	5.25	V
$V_{IH}$	High-level input voltage	2		V
$V_{IL}$	Low-level input voltage		0.8	V
$V_I$	Input voltage	0	$V_{CC}$	V
$I_{OH}$	High-level output current		–48	mA
$I_{OL}$	Low-level output current		48	mA
$f_{clock}$	Input clock frequency	One output back loaded		80
		Both output banks loaded		40
$T_A$	Operating free-air temperature	0	70	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

PARAMETER	TEST CONDITIONS	$T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
		MIN	TYP‡	MAX			
$V_{IK}$	$V_{CC} = 4.75$ V, $I_I = -18$ mA			–1.2		–1.2	V
$V_{OH}$	$V_{CC} = 4.75$ V, $I_{OH} = -3$ mA	2.5			2.5		V
	$V_{CC} = 5$ V, $I_{OH} = -3$ mA	3			3		
	$V_{CC} = 4.75$ V, $I_{OH} = -48$ mA	2			2		
$V_{OL}$	$V_{CC} = 4.75$ V, $I_{OL} = 48$ mA					0.5	V
$I_I$	$V_{CC} = 5.25$ V, $V_I = V_{CC}$ or GND			$\pm 1$		$\pm 1$	$\mu\text{A}$
$I_O^{\S}$	$V_{CC} = 5.25$ V, $V_O = 2.5$ V	–50	–100	–200	–50	–200	mA
$I_{CC}$	$V_{CC} = 5.25$ V, $V_I = V_{CC}$ or GND, $I_O = 0$	Outputs high				3.5	mA
		Outputs low				33	
$C_i$	$V_I = 2.5$ V or 0.5 V		3				pF

‡ All typical values are at  $V_{CC} = 5$  V.

§ No more than one output should be tested at a time, and the duration of the test should not exceed one second.

# CDC340

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### switching characteristics, $C_L = 50$ pF (see Figure 1 and Figure 2)

PARAMETER		FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$			$V_{CC} = 4.75$ V to $5.25$ V, $T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$		UNIT
				MIN	TYP	MAX	MIN	MAX	
$t_{PLH}$	Propagation delay time, low-to-high level	A	Y	3.4		4.5	3	4.8	ns
$t_{PHL}$	Propagation delay time, high-to-low level			3.2		4.3	2.8	4.7	
$t_{PLH}$	Propagation delay time, low-to-high level	G	Y	2		3.8	2	4	ns
$t_{PHL}$	Propagation delay time, high-to-low level			2		3.8	2	4	
$t_{sk(o)}$	Skew time, output	A	Y		0.3	0.5		0.6	ns
$t_{sk(p)}$	Skew time, pulse				0.6	0.8		0.9	
$t_{sk(pr)}$	Skew time, process					1.1		1.1	
$t_r$	Rise time	A	Y					1.5	ns
$t_f$	Fall time	A	Y					1.5	ns

### $t_{pd}$ performance information relative to $V_{CC}$ and temperature variation (see Note 4)

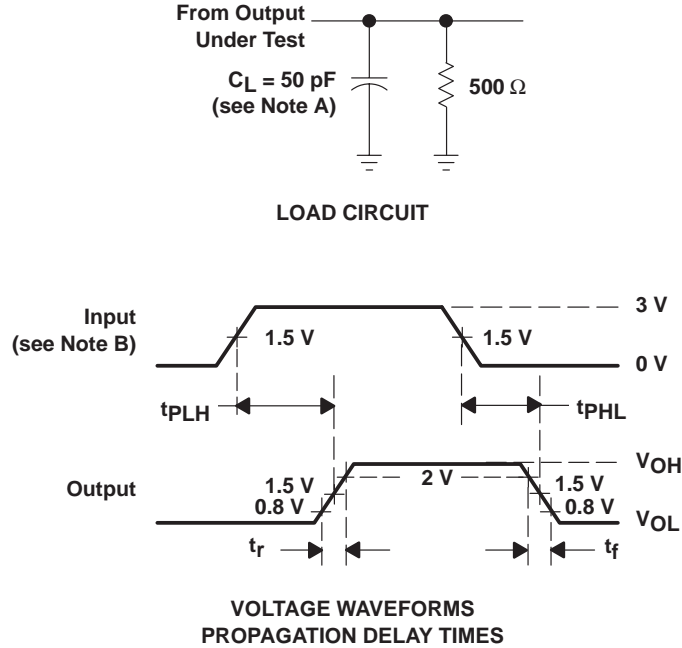
PARAMETER		$\Delta$ change
$\Delta t_{PLH(TA)}^\dagger$	Temperature drift of $t_{PLH}$ from $0^\circ\text{C}$ to $70^\circ\text{C}$	$-53$ ps/ $10^\circ\text{C}$
$\Delta t_{PHL(TA)}^\dagger$	Temperature drift of $t_{PHL}$ from $0^\circ\text{C}$ to $70^\circ\text{C}$	$-58$ ps/ $10^\circ\text{C}$
$\Delta t_{PLH(VCC)}^\ddagger$	$V_{CC}$ drift of $t_{PLH}$ from $4.75$ V to $5.25$ V	$43$ ps/ $100$ mV
$\Delta t_{PHL(VCC)}^\ddagger$	$V_{CC}$ drift of $t_{PHL}$ from $4.75$ V to $5.25$ V	$-33$ ps/ $100$ mV

$^\dagger$  Virtually independent of  $V_{CC}$

$^\ddagger$  Virtually independent of temperature

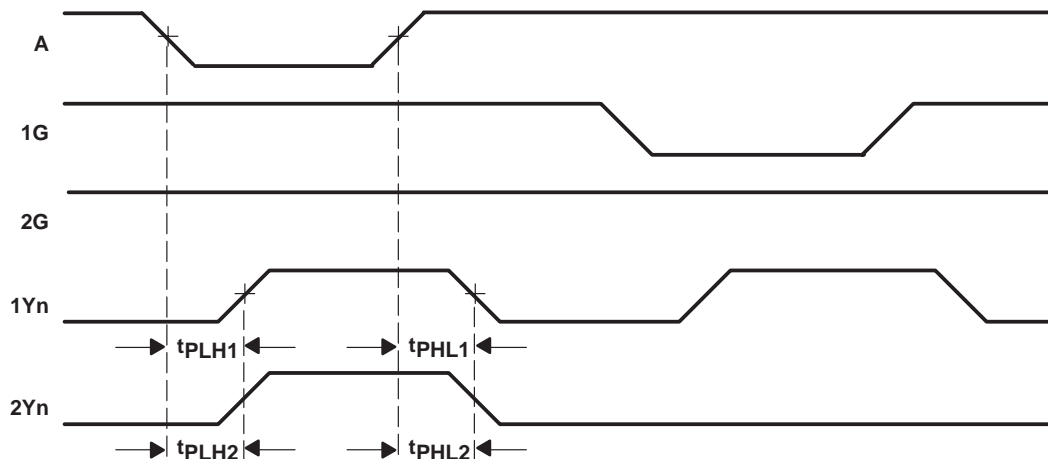
NOTE 4: The data extracted is from a wide range of characterization material.

## PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
B. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .

Figure 1. Load Circuit and Voltage Waveforms



- NOTES: A. Output skew,  $t_{sk(o)}$ , is calculated as the greater of:  
– The difference between the fastest and slowest of  $t_{PLHn}$  ( $n = 1, 2$ )  
– The difference between the fastest and slowest of  $t_{PHLn}$  ( $n = 1, 2$ )  
B. Pulse skew,  $t_{sk(p)}$ , is calculated as the greater of  $|t_{PLHn} - t_{PHLn}|$  ( $n = 1, 2$ ).  
C. Process skew,  $t_{sk(pr)}$ , is calculated as the greater of:  
– The difference between the fastest and slowest of  $t_{PLHn}$  ( $n = 1, 2$ ) across multiple devices under identical operating conditions  
– The difference between the fastest and slowest of  $t_{PHLn}$  ( $n = 1, 2$ ) across multiple devices under identical operating conditions

Figure 2. Waveforms for Calculation of  $t_{sk(o)}$ ,  $t_{sk(p)}$ ,  $t_{sk(pr)}$

## PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
<a href="#">CDC340DW</a>	Active	Production	SOIC (DW)   20	25   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	CDC340
CDC340DW.B	Active	Production	SOIC (DW)   20	25   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	CDC340

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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## TUBE



\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CDC340DW	DW	SOIC	20	25	507	12.83	5080	6.6
CDC340DW.B	DW	SOIC	20	25	507	12.83	5080	6.6

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