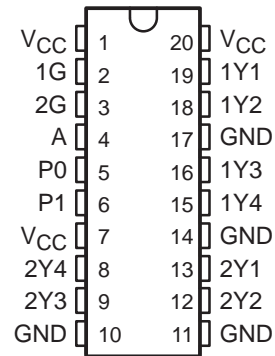


# CDC340 1-LINE TO 8-LINE CLOCK DRIVER

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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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

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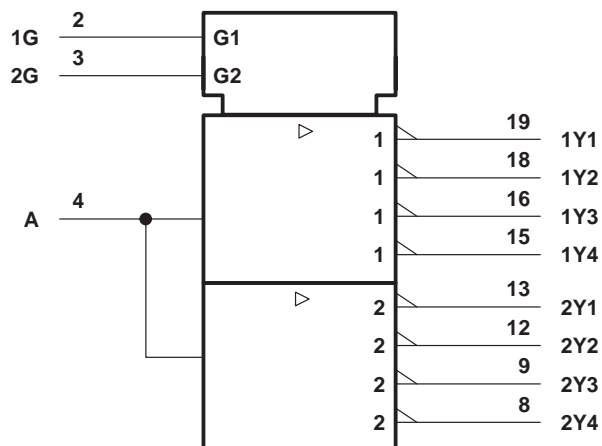
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# CDC340

## 1-LINE TO 8-LINE CLOCK DRIVER

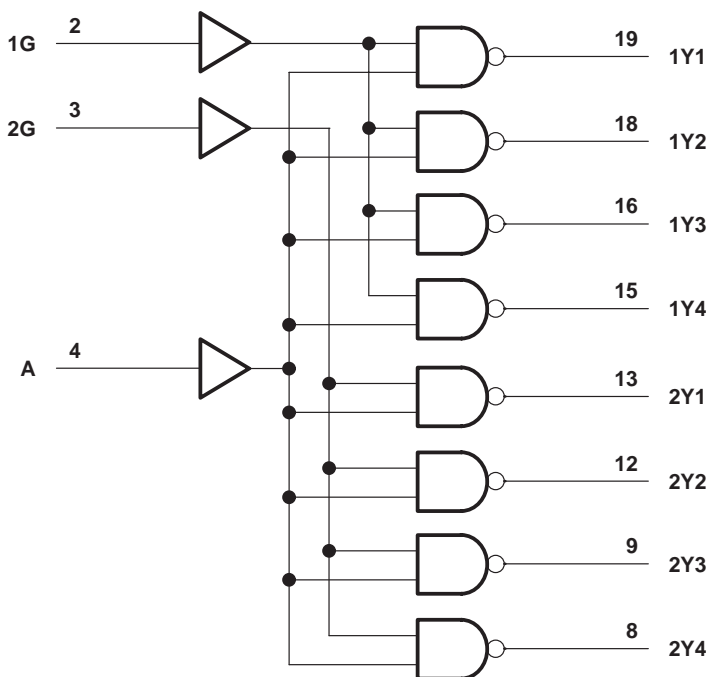
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### logic symbol†



† 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		MHz
		Both output banks loaded		
$T_A$	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	2		3.5		mA
		Outputs low	24		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

## 1-LINE TO 8-LINE CLOCK DRIVER

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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)

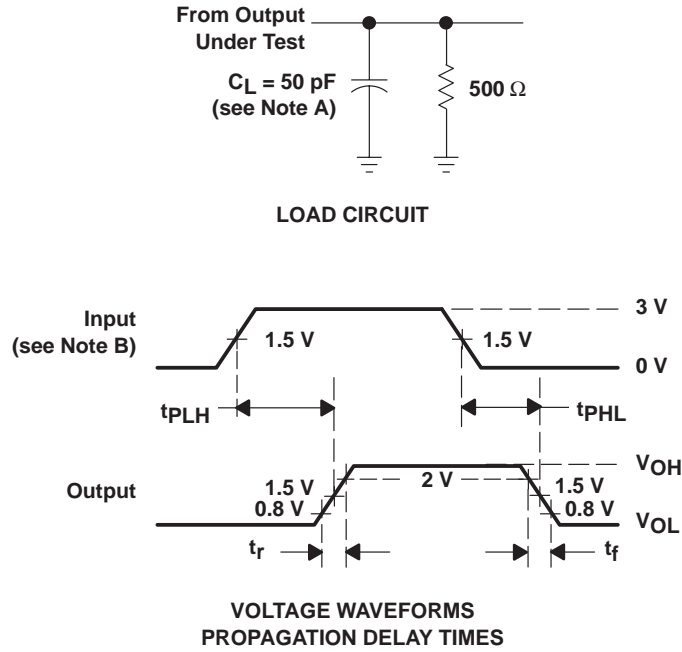
PARAMETER		$\Delta$ change
$\Delta t_{PLH(TA)}^\dagger$	Temperature drift of $t_{PLH}$ from $0^\circ\text{C}$ to $70^\circ\text{C}$	-53 ps/ $10^\circ\text{C}$
$\Delta t_{PHL(TA)}^\dagger$	Temperature drift of $t_{PHL}$ from $0^\circ\text{C}$ to $70^\circ\text{C}$	-58 ps/ $10^\circ\text{C}$
$\Delta t_{PLH(VCC)}^\ddagger$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

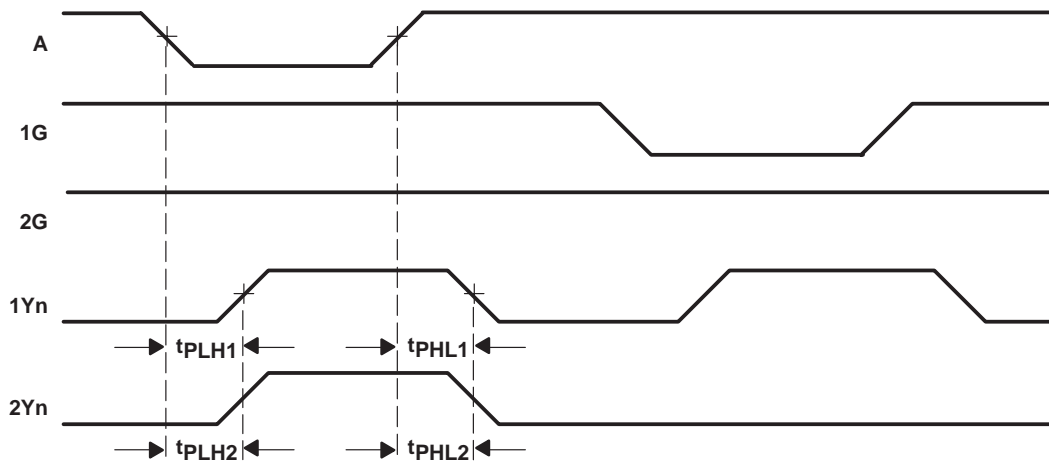
NOTE 4: The data extracted is from a wide range of characterization material.

PARAMETER MEASUREMENT INFORMATION



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

# CDC340 1-LINE TO 8-LINE CLOCK DRIVER

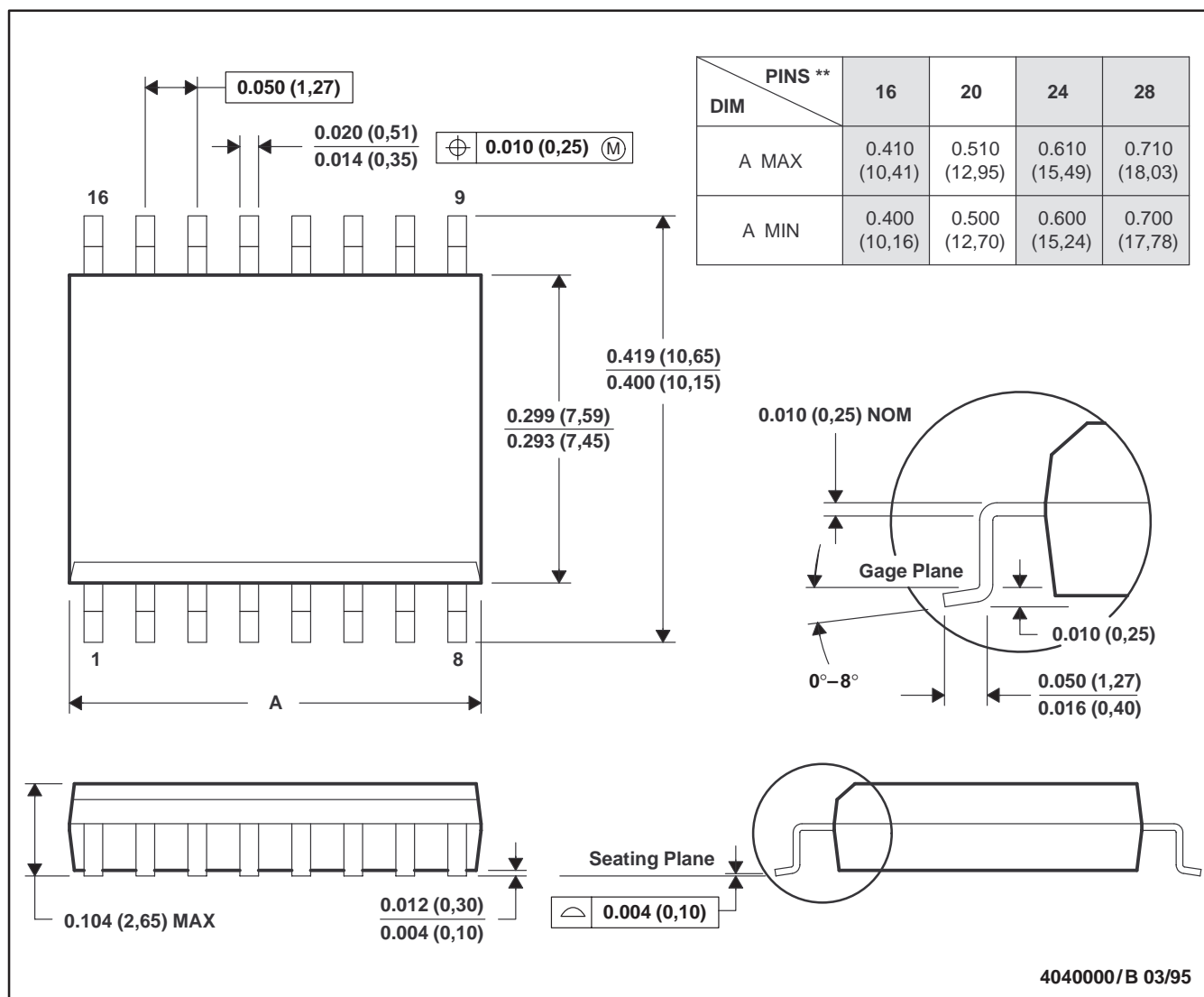
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## MECHANICAL INFORMATION

DW (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

16 PIN SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).  
 D. Falls within JEDEC MS-013

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
CDC340DBLE	OBSOLETE	SSOP	DB	20		TBD	Call TI	Call TI
CDC340DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CDC340DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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