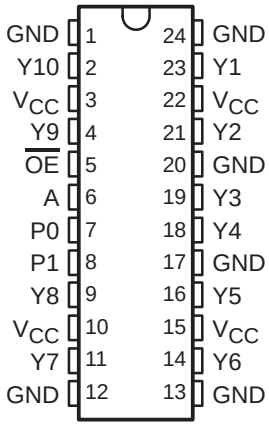
- **Low Output Skew, Low Pulse Skew for Clock-Distribution and Clock-Generation Applications**
- **Operates at 3.3-V V_{CC}**
- **LVTTL-Compatible Inputs and Outputs**
- **Supports Mixed-Mode Signal Operation (5-V Input and Output Voltages With 3.3-V V_{CC})**
- **Distributes One Clock Input to Ten Outputs**
- **Outputs Have Internal Series Damping Resistor to Reduce Transmission Line Effects**
- **Distributed V_{CC} and Ground Pins Reduce Switching Noise**
- **State-of-the-Art *EPIC*-II*B*™ BiCMOS Design Significantly Reduces Power Dissipation**
- **Package Options Include Plastic Small-Outline (DW) and Shrink Small-Outline (DB) Packages**

DB OR DW PACKAGE
(TOP VIEW)



description

The CDC2351 is a high-performance clock-driver circuit that distributes one input (A) to ten outputs (Y) with minimum skew for clock distribution. The output-enable ($\overline{OE}$) input disables the outputs to a high-impedance state. Each output has an internal series damping resistor to improve signal integrity at the load. The CDC2351 operates at nominal 3.3-V V_{CC}.

The propagation delays are adjusted at the factory using the P0 and P1 pins. The factory adjustments ensure that the part-to-part skew is minimized and is kept within a specified window. Pins P0 and P1 are not intended for customer use and should be connected to GND.

The CDC2351 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS		OUTPUTS
A	$\overline{OE}$	Yn
L	H	Z
H	H	Z
L	L	L
H	L	H



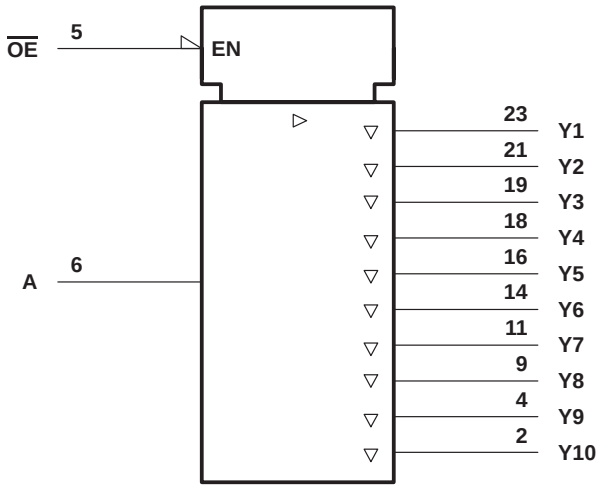
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

EPIC-IIB is a trademark of Texas Instruments Incorporated.

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.

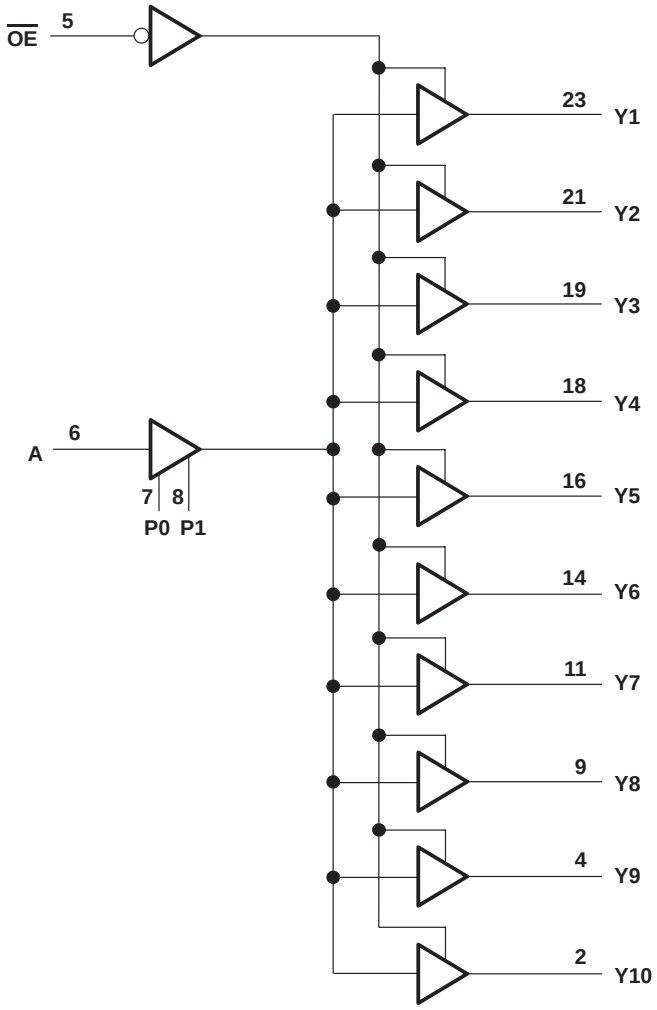
Copyright © 1995, Texas Instruments Incorporated

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 4.6 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 3.6 V
Current into any output in the low state, I_O . . . . . 24 mA
Input clamp current, I_{IK} (V_I < 0) . . . . . –18 mA
Output clamp current, I_{OK} (V_I < 0) . . . . . –50 mA
Maximum power dissipation at T_A = 55°C (in still air) (see Note 2): DB package . . . . . 0.65 W
DW package . . . . . 1.7 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 1994 *ABT Advanced BiCMOS Technology Data Book*, literature number SCBD002B.

recommended operating conditions (see Note 3)

		MIN	MAX	UNIT
V_{CC}	Supply voltage	3	3.6	V
V_{IH}	High-level input voltage	2		V
V_{IL}	Low-level input voltage		0.8	V
V_I	Input voltage	0	5.5	V
I_{OH}	High-level output current		–12	mA
I_{OL}	Low-level output current		12	mA
f_{clock}	Input clock frequency		100	MHz
T_A	Operating free-air temperature	0	70	°C

NOTE 3: Unused pins (input or I/O) must be held high or low.

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

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
V_{IK}	V_{CC} = 3 V,	I_I = –18 mA				–1.2	V
V_{OH}	V_{CC} = 3 V,	I_{OH} = – 12 mA		2			V
V_{OL}	V_{CC} = 3 V,	I_{OL} = 12 mA				0.8	V
I_I	V_{CC} = 3.6 V,	V_I = V_{CC} or GND				±1	µA
I_O‡	V_{CC} = 3.6 V,	V_O = 2.5 V		–7		–70	mA
I_{OZ}	V_{CC} = 3.6 V,	V_{CC} = 3 V or 0				±10	µA
I_{CC}	V_{CC} = 3.6 V, V_I = V_{CC} or GND	I_O = 0,	Outputs high			0.3	mA
			Outputs low			15	
			Outputs disabled			0.3	
C_i	V_I = V_{CC} or GND,	V_{CC} = 3.3 V,	f = 10 MHz		4		pF
C_o	V_O = V_{CC} or GND,	V_{CC} = 3.3 V,	f = 10 MHz		6		pF

‡ Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

switching characteristics, C_L = 50 pF (see Figures 1 and 2)

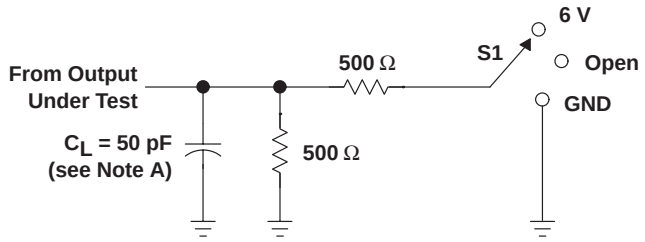
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 3.3 V, T_A = 25°C			V_{CC} = 3 V to 3.6 V, T_A = 0°C to 70°C		UNIT
			MIN	TYP	MAX	MIN	MAX	
t_{PLH}	A	Y	3.8	4.3	4.8			ns
t_{PHL}			3.6	4.1	4.6			
t_{PZH}	$\overline{OE}$	Y	2.4	4.9	6.0	1.8	6.9	ns
t_{PZL}			2.4	4.3	6.0	1.8	6.9	
t_{PHZ}	$\overline{OE}$	Y	2.2	4.4	6.3	2.1	7.1	ns
t_{PLZ}			2.2	4.6	6.3	2.1	7.3	
$t_{sk(o)}$	A	Y		0.3	0.5		0.5	ns
$t_{sk(p)}$	A	Y		0.2	0.8		0.8	ns
$t_{sk(pr)}$	A	Y			1		1	ns
t_r	A	Y					2.5	ns
t_f	A	Y					2.5	ns

switching characteristics temperature and V_{CC} coefficients over recommended operating free-air temperature and V_{CC} range (see Note 4)

PARAMETER		FROM (INPUT)	TO (OUTPUT)	MIN	MAX	UNIT
$\propto t_{PLH}(T)$	Average temperature coefficient of low to high propagation delay	A	Y		85†	ps/10°C
$\propto t_{PHL}(T)$	Average temperature coefficient of high to low propagation delay	A	Y		50†	ps/10°C
$\propto t_{PLH}(V_{CC})$	Average V_{CC} coefficient of low to high propagation delay	A	Y		–145‡	ps/ 100 mV
$\propto t_{PHL}(V_{CC})$	Average V_{CC} coefficient of high to low propagation delay	A	Y		–100‡	ps/ 100 mV

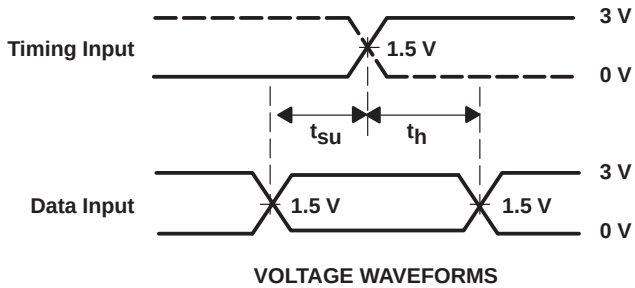
† $\propto t_{PLH}(T)$ and $\propto t_{PHL}(T)$ are virtually independent of V_{CC}.
‡ $\propto t_{PLH}(V_{CC})$ and $\propto t_{PHL}(V_{CC})$ are virtually independent of temperature.
NOTE 4: These data were extracted from characterization material and are not tested at the factory.

PARAMETER MEASUREMENT INFORMATION

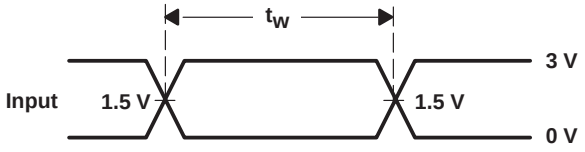


LOAD CIRCUIT

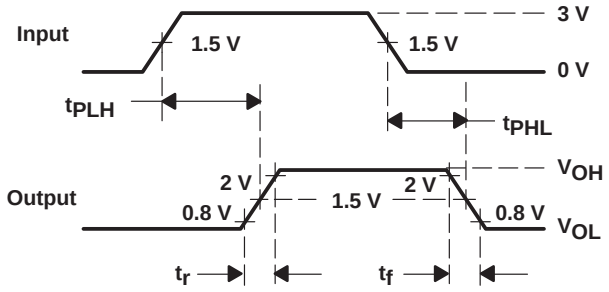
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	6 V
t_{PHZ}/t_{PZH}	GND



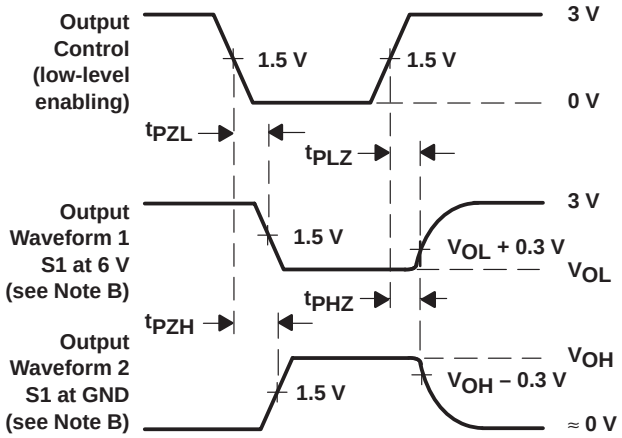
VOLTAGE WAVEFORMS



VOLTAGE WAVEFORMS



VOLTAGE WAVEFORMS

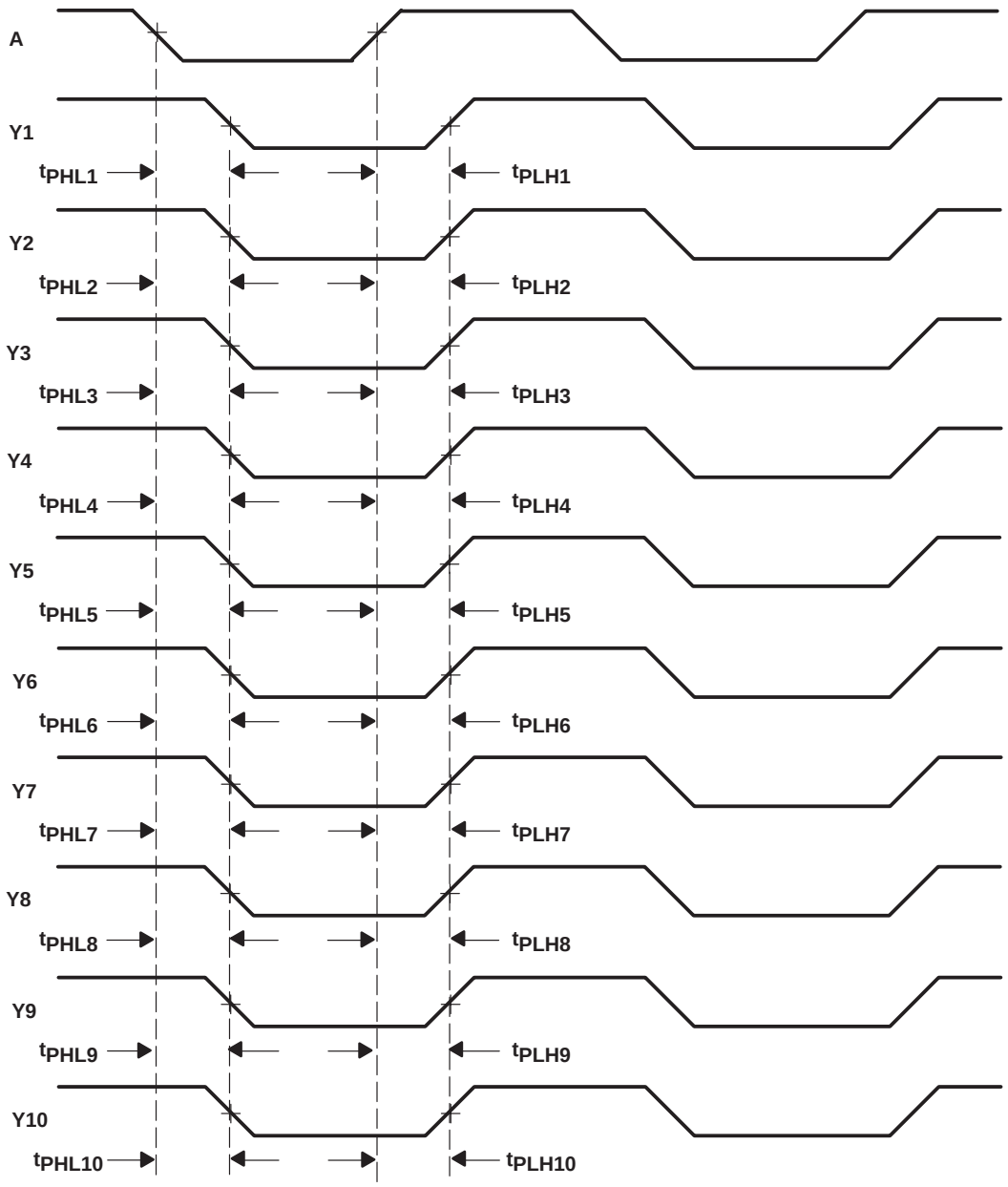


VOLTAGE WAVEFORMS

NOTES: A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.
D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

PARAMETER MEASUREMENT INFORMATION



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, 3, 4, 5, 6, 7, 8, 9, 10)
- The difference between the fastest and slowest of t_{PHLn} (n = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10)

B. Pulse skew, $t_{sk(p)}$, is calculated as the greater of $| t_{PLHn} - t_{PHLn} |$ (n = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10).

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, 3, 4, 5, 6, 7, 8, 9, 10) across multiple devices under identical operating conditions
- The difference between the fastest and slowest of t_{PHLn} (n = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10) across multiple devices under identical operating conditions

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

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.

Copyright © 1998, Texas Instruments Incorporated

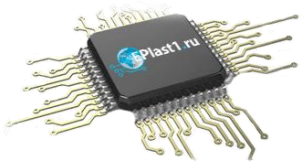
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)
Факс: 8 (812) 320-02-42
Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.