- **Members of the Texas Instruments *Widebus*™ Family**
- **State-of-the-Art *EPIC*-II*B*™ BiCMOS Design Significantly Reduces Power Dissipation**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)**
- **Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17**
- **Typical V_{OLP} (Output Ground Bounce) < 0.8 V at V_{CC} = 5 V, T_A = 25°C**
- **Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise**
- **Flow-Through Architecture Optimizes PCB Layout**
- **High-Drive Outputs (–32-mA I_{OH}, 64-mA I_{OL})**
- **Packaged in Plastic 300-mil Shrink Small-Outline Packages and 380-mil Fine-Pitch Ceramic Flat Packages Using 25-mil Center-to-Center Spacings**

SN54ABT16377 . . . WD PACKAGE
SN74ABT16377 . . . DL PACKAGE
(TOP VIEW)

Signal	Pin	Pin	Signal
$1\overline{CLKEN}$	1	48	1CLK
1Q1	2	47	1D1
1Q2	3	46	1D2
GND	4	45	GND
1Q3	5	44	1D3
1Q4	6	43	1D4
V_{CC}	7	42	V_{CC}
1Q5	8	41	1D5
1Q6	9	40	1D6
GND	10	39	GND
1Q7	11	38	1D7
1Q8	12	37	1D8
2Q1	13	36	2D1
2Q2	14	35	2D2
GND	15	34	GND
2Q3	16	33	2D3
2Q4	17	32	2D4
V_{CC}	18	31	V_{CC}
2Q5	19	30	2D5
2Q6	20	29	2D6
GND	21	28	GND
2Q7	22	27	2D7
2Q8	23	26	2D8
$2\overline{CLKEN}$	24	25	2CLK

description

The ′ABT16377 is a 16-bit positive-edge-triggered D-type flip-flop with a clock (1CLK or 2CLK) input. It is particularly suitable for implementing buffer and storage registers, shift registers, and pattern generators.

The device can be used as two 8-bit flip-flops or one 16-bit flip-flop. On the positive transition of the clock input, the Q outputs of the flip-flop take on the logic levels set up at the data (D) inputs.

Data input information that meets the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock pulse if the common clock-enable ($1\overline{CLKEN}$ or $2\overline{CLKEN}$) input is low. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse. When the buffered clock input is at either the high or low level, the D input signal has no effect at the output. The circuits are designed to prevent false clocking by transitions at $\overline{CLKEN}$.

The SN74ABT16377 is available in TI’s shrink small-outline package (DL), which provides twice the I/O pin count and functionality of standard small-outline packages in the same printed-circuit-board area.

The SN54ABT16377 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74ABT16377 is characterized for operation from –40°C to 85°C.

PRODUCT PREVIEW

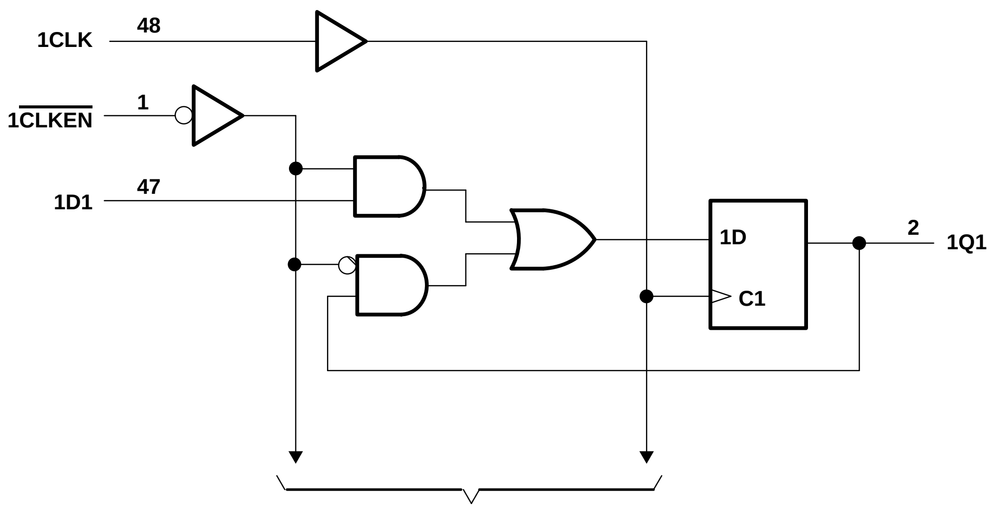
Widebus and EPIC-IIB are trademarks of Texas Instruments Incorporated.

PRODUCT PREVIEW

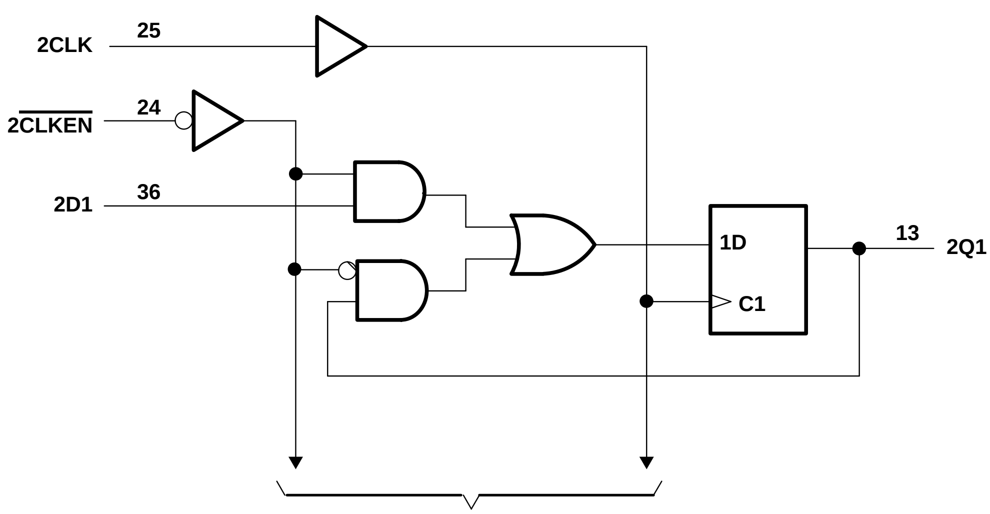
FUNCTION TABLE
(each flip-flop)

INPUTS			OUTPUT
$\overline{\text{CLKEN}}$	CLK	D	Q
H	X	X	Q_0
L	↑	H	H
L	↑	L	L
X	H or L	X	Q_0

logic diagram (positive logic)



To Seven Other Channels



To Seven Other Channels

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 . . . . –0.5 V to 5.5 V
Current into any output in the low state, I_O: SN54ABT16377 . . . . 96 mA
SN74ABT16377 . . . . 128 mA
Input clamp current, I_{IK} ($V_I < 0$) . . . . –18 mA
Output clamp current, I_{OK} ($V_O < 0$) . . . . –50 mA
Maximum power dissipation at T_A = 55°C (in still air) . . . . 0.85 W
Storage temperature range . . . . –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.

NOTE 1: The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

recommended operating conditions (see Note 2)

		SN54ABT16377		SN74ABT16377		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
V_I	Input voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		–24		–32	mA
I_{OL}	Low-level output current		48		64	mA
Δt/Δv	Input transition rise or fall rate		10		10	ns/V
T_A	Operating free-air temperature	–55	125	–40	85	°C

NOTE 2: Unused or floating inputs must be held high or low.

PRODUCT PREVIEW

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

PARAMETER	TEST CONDITIONS		T_A = 25°C			SN54ABT16377		SN74ABT16377		UNIT
			MIN	TYP†	MAX	MIN	MAX	MIN	MAX	
V_{IK}	V_{CC} = 4.5 V, I_I = –18 mA				–1.2		–1.2		–1.2	V
V_{OH}	V_{CC} = 4.5 V, I_{OH} = – 3 mA		2.5			2.5		2.5		V
	V_{CC} = 5 V, I_{OH} = – 3 mA		3			3		3		
	V_{CC} = 4.5 V, I_{OH} = –24 mA		2			2				
	V_{CC} = 4.5 V, I_{OH} = – 32 mA		2‡					2		
V_{OL}	V_{CC} = 4.5 V, I_{OL} = 48 mA				0.55		0.55			V
	V_{CC} = 4.5 V, I_{OL} = 64 mA				0.55‡				0.55	
I_I	V_{CC} = 5.5 V, V_I = V_{CC} or GND				±1		±1		±1	µA
I_{off}	V_{CC} = 0, V_I or V_O ≤ 4.5 V				±100				±100	µA
I_{CEX}	V_{CC} = 5.5 V, V_O = 5.5 V	Outputs high			50		50		50	µA
I_O§	V_{CC} = 5.5 V, V_O = 2.5 V		–50	–100	–180	–50	–180	–50	–180	mA
I_{CC}	V_{CC} = 5.5 V, I_O = 0, V_I = V_{CC} or GND	Outputs high			2		2		2	mA
		Outputs low			67		67		67	
		Outputs disabled			2		2		2	
ΔI_{CC}¶	V_{CC} = 5.5 V, One input at 3.4 V, Other inputs at V_{CC} or GND				1.5		1.5		1.5	mA
C_i	V_I = 2.5 V or 0.5 V									pF
C_o	V_O = 2.5 V or 0.5 V									pF

† All typical values are at V_{CC} = 5 V.
‡ On products compliant to MIL-STD-883, Class B, this parameter does not apply.
§ Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
¶ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND.

PRODUCT PREVIEW

IMPORTANT NOTICE

Texas Instruments (TI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

TI warrants performance of its semiconductor products and related software 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, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS.

Inclusion of TI products in such applications is understood to be fully at the risk of the customer. Use of TI products in such applications requires the written approval of an appropriate TI officer. Questions concerning potential risk applications should be directed to TI through a local SC sales office.

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

TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor does TI 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.