- **2-V to 6-V V_{CC} Operation**
- **Inputs Accept Voltages to 6 V**
- **Max t_{pd} of 11 ns at 5 V**
- **3-State Inverting Outputs Drive Bus Lines Directly**
- **Full Parallel Access for Loading**

description/ordering information

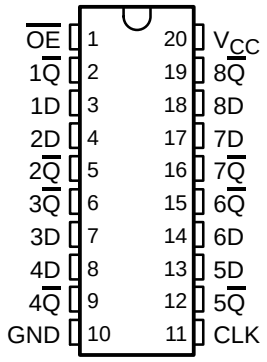
These octal edge-triggered D-type flip-flops feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. The devices are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

On the positive transition of the clock (CLK) input, the $\overline{Q}$ outputs are set to the complements of the logic levels set up at the data (D) inputs.

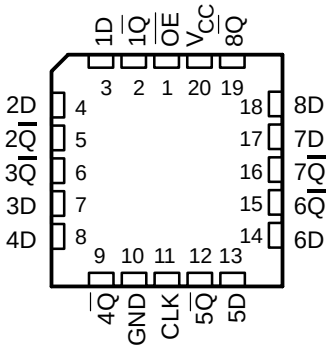
A buffered output-enable ($\overline{OE}$) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without need for interface or pullup components.

$\overline{OE}$ does not affect internal operations of the flip-flops. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

SN54AC534 . . . J OR W PACKAGE
SN74AC534 . . . DB, DW, N, NS, OR PW PACKAGE
(TOP VIEW)



SN54AC534 . . . FK PACKAGE
(TOP VIEW)



ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	PDIP – N	Tube	SN74AC534N	SN74AC534N
	SOIC – DW	Tube	SN74AC534DW	AC534
		Tape and reel	SN74AC534DWR	
	SOP – NS	Tape and reel	SN74AC534NSR	AC534
	SSOP – DB	Tape and reel	SN74AC534DBR	AC534
	TSSOP – PW	Tape and reel	SN74AC534PWR	AC534
–55°C to 125°C	CDIP – J	Tube	SNJ54AC534J	SNJ54AC534J
	CFP – W	Tube	SNJ54AC534W	SNJ54AC534W
	LCCC – FK	Tube	SNJ54AC534FK	SNJ54AC534FK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

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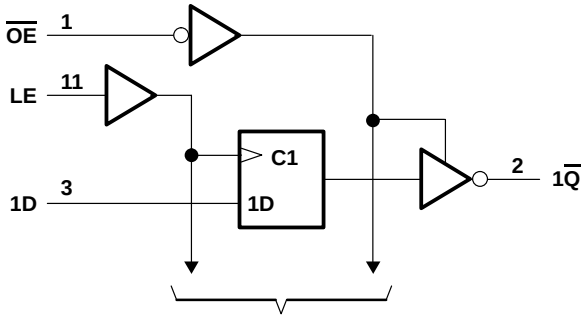
description/ordering information (continued)

To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

FUNCTION TABLE
(each flip-flop)

INPUTS			OUTPUT
$\overline{OE}$	CLK	D	$\overline{Q}$
L	↑	H	L
L	↑	L	H
L	H or L	X	$\overline{Q}_0$
H	X	X	Z

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 V_{CC} + 0.5 V
Output voltage range, V_O (see Note 1) . . . . . –0.5 V to V_{CC} + 0.5 V
Input clamp current, I_{IK} (V_I < 0 or V_I > V_{CC}) . . . . . ±20 mA
Output clamp current, I_{OK} (V_O < 0 or V_O > V_{CC}) . . . . . ±20 mA
Continuous output current, I_O (V_O = 0 to V_{CC}) . . . . . ±50 mA
Continuous current through V_{CC} or GND . . . . . ±200 mA
Package thermal impedance, θ_{JA} (see Note 2): DB package . . . . . 70°C/W
DW package . . . . . 58°C/W
N package . . . . . 69°C/W
NS package . . . . . 60°C/W
PW package . . . . . 83°C/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 voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 3)

			SN54AC534		SN74AC534		UNIT
			MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage		2	6	2	6	V
V_{IH}	High-level input voltage	V_{CC} = 3 V	2.1		2.1		V
		V_{CC} = 4.5 V	3.15		3.15		
		V_{CC} = 5.5 V	3.85		3.85		
V_{IL}	Low-level input voltage	V_{CC} = 3 V		0.9		0.9	V
		V_{CC} = 4.5 V		1.35		1.35	
		V_{CC} = 5.5 V		1.65		1.65	
V_I	Input voltage		0	V_{CC}	0	V_{CC}	V
V_O	Output voltage		0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 3 V		–12		–12	mA
		V_{CC} = 4.5 V		–24		–24	
		V_{CC} = 5.5 V		–24		–24	
I_{OL}	Low-level output current	V_{CC} = 3 V		12		12	mA
		V_{CC} = 4.5 V		24		24	
		V_{CC} = 5.5 V		24		24	
$\Delta t/\Delta v$	Input transition rise or fall rate			8		8	ns/V
T_A	Operating free-air temperature		–55	125	–40	85	°C

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER	TEST CONDITIONS	V_{CC}	T_A = 25°C			SN54AC534		SN74AC534		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	I_{OH} = –50 μA	3 V	2.9			2.9		2.9		V
		4.5 V	4.4			4.4		4.4		
		5.5 V	5.4			5.4		5.4		
	I_{OH} = –12 mA	3 V	2.56			2.4		2.46		
	I_{OH} = –24 mA	4.5 V	3.86			3.7		3.76		
		5.5 V	4.86			4.7		4.76		
V_{OL}	I_{OL} = 50 μA	3 V			0.1		0.1		0.1	V
		4.5 V			0.1		0.1		0.1	
		5.5 V			0.1		0.1		0.1	
	I_{OL} = 12 mA	3 V			0.36		0.5		0.44	
	I_{OL} = 24 mA	4.5 V			0.36		0.5		0.44	
		5.5 V			0.36		0.5		0.44	
I_{OZ}	V_O = V_{CC} or GND	5.5 V			±0.5		±5		±2.5	μA
I_I	V_I = V_{CC} or GND	5.5 V			±0.1		±1		±1	μA
I_{CC}	V_I = V_{CC} or GND, I_O = 0	5.5 V			4		80		40	μA
C_i	V_I = V_{CC} or GND	5 V		4.5						pF

timing requirements over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

		T_A = 25°C		SN54AC534		SN74AC534		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration, CLK high or low	5		8		6.5		ns
t_{su}	Setup time, data before CLK↑	5		8		6.5		ns
t_h	Hold time, data after CLK↑	1		3		1.5		ns

timing requirements over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

		T_A = 25°C		SN54AC534		SN74AC534		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration, CLK high or low	3.5		5.5		4		ns
t_{su}	Setup time, data before CLK↑	3.5		5.5		4		ns
t_h	Hold time, data after CLK↑	1		3		1.5		ns

switching characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C		SN54AC534		SN74AC534		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
f_{max}			70		60		70		MHz
t_{PLH}	CLK	$\overline{Q}$	3	14	2	17.5	2.5	16	ns
t_{PHL}			3	13	2	16.5	2.5	15	
t_{PZH}	$\overline{OE}$	$\overline{Q}$	3	12.5	2	15.5	2.5	14	ns
t_{PZL}			3	12.5	2	15.5	2.5	14	
t_{PHZ}	$\overline{OE}$	$\overline{Q}$	2	13.5	1	16.5	1.5	15	ns
t_{PLZ}			2	12	1	15	1.5	13.5	

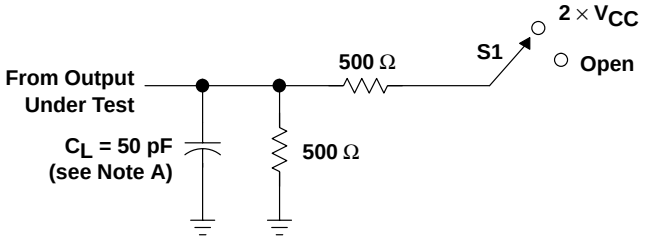
switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C		SN54AC534		SN74AC534		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
f_{max}			150		75		140		MHz
t_{PLH}	CLK	$\overline{Q}$	2.5	10.5	1.5	13.5	2	12	ns
t_{PHL}			2.5	9.5	1.5	12.5	2	11	
t_{PZH}	$\overline{OE}$	$\overline{Q}$	2.5	10	1.5	13	2	11.5	ns
t_{PZL}			2.5	10	1.5	13	2	11.5	
t_{PHZ}	$\overline{OE}$	$\overline{Q}$	1.5	11.5	1	14	1	12.5	ns
t_{PLZ}			1.5	10	1	12.5	1	11	

operating characteristics, V_{CC} = 5 V, T_A = 25°C

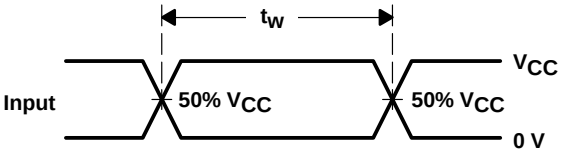
PARAMETER		TEST CONDITIONS		TYP	UNIT
C_{pd}	Power dissipation capacitance	C_L = 50 pF,	f = 1 MHz	40	pF

PARAMETER MEASUREMENT INFORMATION

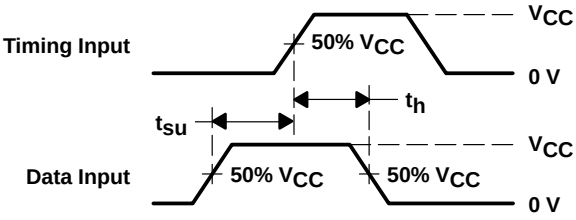


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	$2 \times V_{CC}$
t_{PHZ}/t_{PZH}	Open

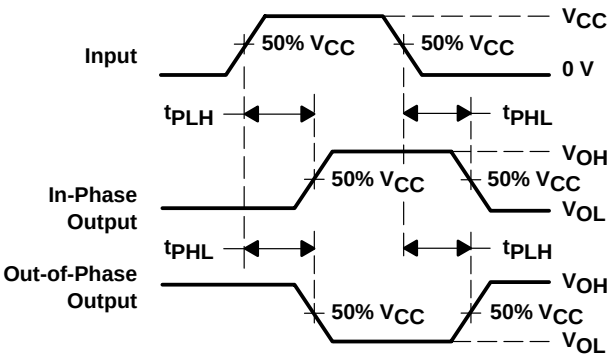
LOAD CIRCUIT



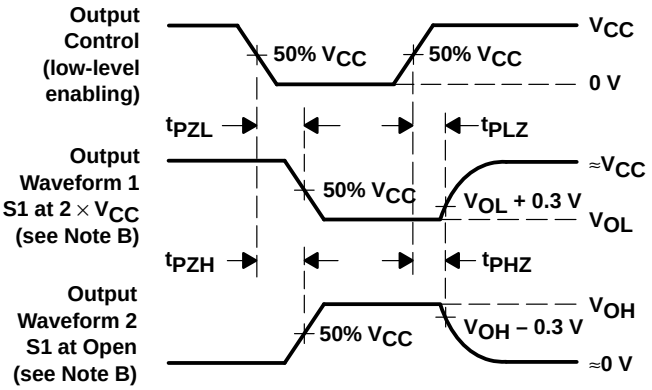
VOLTAGE WAVEFORMS



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 ≤ 1 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 input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265