

SN54F534, SN74F534 OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

D2932, MARCH 1987—REVISED JANUARY 1989

- 3-State Bus-Driving Inverting Outputs
- Buffered Control Inputs
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

description

These 8-bit flip-flops feature three-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. They are particularly attractive for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight flip-flops of the 'F534 are edge-triggered D-type flip-flops. On the positive transition of the clock, the Q outputs will be set to the complement of the logic states that were set up at the D inputs. The 'F534 is equivalent to the 'F374 except for having inverted outputs.

A buffered output-control input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or a high-impedance state. In the high-impedance state the outputs neither load nor drive the bus lines significantly. The high-impedance third state provide the capability to drive the bus lines in a bus-organized system without need for interface or pull-up components.

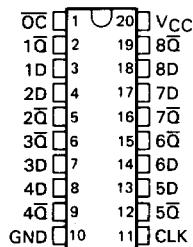
The output control does not affect the internal operation of the flip-flops. Old data can be retained or new data can be entered while the outputs are off.

The SN54F534 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74F534 is characterized for operation from 0°C to 70°C .

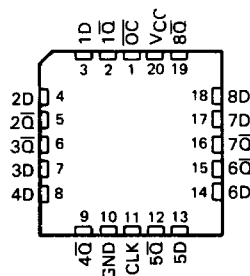
FUNCTION TABLE
(EACH FLIP-FLOP)

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

SN54F534 . . . J PACKAGE
SN74F534 . . . DW OR N PACKAGE
(TOP VIEW)



SN54F534 . . . FK PACKAGE
(TOP VIEW)



PRODUCTION DATA documents contain information 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**

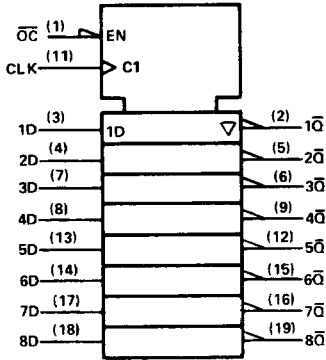
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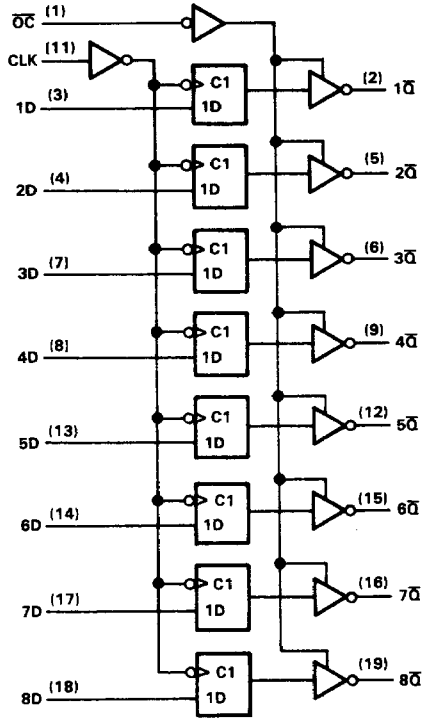
2-249

SN54F534, SN74F534
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

logic symbol†



logic diagram (positive logic)



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

SN54F534, SN74F534

OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

absolute maximum ratings over operating free-air temperature range

Supply voltage, V_{CC}	-0.5 V to 7 V
Input voltage†	-1.2 V to 7 V
Input current	-30 mA to 5 mA
Voltage applied to any output in the disabled or power-off state	-0.5 V to 5.5 V
Voltage applied to any output in the high state	-0.5 V to V_{CC}
Current into any output in the low state: SN54F534	40 mA
SN74F534	48 mA
Operating free-air temperature range: SN54F534	-55°C to 125°C
SN74F534	0°C to 70°C
Storage temperature range	-65°C to 150°C

† The input voltage ratings may be exceeded provided the input current ratings are observed.

recommended operating conditions

		SN54F534			SN74F534			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage				0.8			V
I_{IK}	Input clamp current				-18			mA
I_{OH}	High-level output current				-3			mA
I_{OL}	Low-level output current				24			mA
T_A	Operating free-air temperature	-55			125			°C

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

PARAMETER	TEST CONDITIONS		SN54F534			SN74F534			UNIT
			MIN	TYP [‡]	MAX	MIN	TYP [‡]	MAX	
V_{IK}	$V_{CC} = 4.5$ V,	$I_I = -18$ mA	-1.2			-1.2			V
V_{OH}	$V_{CC} = 4.5$ V,	$I_{OH} = -1$ mA	2.5	3.4		2.5	3.4		V
	$V_{CC} = 4.5$ V,	$I_{OH} = -3$ mA	2.4	3.3		2.4	3.3		
	$V_{CC} = 4.75$ V,	$I_{OH} = -1$ mA to -3 mA				2.7			
V_{OL}	$V_{CC} = 4.5$ V,	$I_{OL} = 20$ mA	0.3			0.5			V
	$V_{CC} = 4.5$ V,	$I_{OL} = 24$ mA				0.35			
I_{OZH}	$V_{CC} = 5.5$ V,	$V_O = 2.7$ V				50			μ A
I_{OZL}	$V_{CC} = 5.5$ V,	$V_O = 0.5$ V				-50			μ A
I_I	$V_{CC} = 5.5$ V,	$V_I = 7$ V				0.1			mA
I_{IH}	$V_{CC} = 5.5$ V,	$V_I = 2.7$ V				20			μ A
I_{IL}	$V_{CC} = 5.5$ V,	$V_I = 0.5$ V				-0.6			mA
I_{OS}^{\S}	$V_{CC} = 5.5$ V,	$V_O = 0$	-60			-150			mA
I_{CCZ}	$V_{CC} = 5.5$ V,	See Note 1	55			86			mA

[‡] All typical values are at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$.

^{\S} Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

NOTE 1: I_{CC} is measured with \overline{OC} at 4.5 V, all other inputs grounded.

2
Data Sheets



timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Note 2)

			V _{CC} = 5 V, T _A = 25°C		V _{CC} = 4.5 V to 5.5 V, T _A = MIN to MAX†				UNIT
			'F534		SN54F534		SN74F534		
			MIN	MAX	MIN	MAX	MIN	MAX	
f _{clock}	Clock frequency		0	100	0	60	0	70	MHz
t _{su}	Setup time before CLK†	Data high	2		2.5		2		ns
		Data low	2		2		2		
t _h	Hold time after CLK†	Data high	2		2		2		ns
		Data low	2		2.5		2		
t _w	Pulse duration	CLK high	7		7		7		ns
		CLK low	6		6		6		

switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = 25°C			V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = MIN to MAX†				UNIT
			'F534			SN54F534		SN74F534		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f _{max}			100			60		70		MHz
t _{PLH}	CLK	Q	3.2	6.1	8.5	3.2	10.5	3.2	10	ns
t _{PHL}			3.2	6.1	8.5	3.2	11	3.2	10	
t _{PZH}	OC	Q	1.2	8.6	11.5	1.2	14	1.2	12.5	ns
t _{PZL}			1.2	5.4	7.5	1.2	10	1.2	8.5	
t _{PHZ}	OC	Q	1.2	4.9	7	1.2	8	1.2	8	ns
t _{PLZ}			1.2	3.9	5.5	1.2	7.5	1.2	6.5	

† For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

NOTE 2: Load circuits and waveforms are shown in Section 1.