

**SN54ALS576A, SN54ALS577A, SN54AS576, SN54AS577
SN74ALS576B, SN74ALS577A, SN74AS576, SN74AS577
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS**

D2661, DECEMBER 1982—REVISED JANUARY 1989

- 3-State Buffer-Type Inverting Outputs Drive Bus-Lines Directly
- Bus-Structured Pinout
- Buffered Control Inputs
- 'ALS577A and 'AS577 Have Synchronous Clear
- 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 registers feature three-state outputs designed specifically for bus driving. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

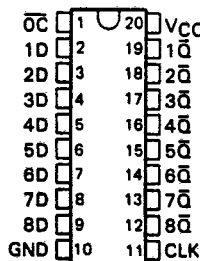
The eight-bit edge-triggered D-type flip-flops enter data on the low-to-high transition of the clock.

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 SN54ALS' and SN54AS' devices are characterized for operation over the full military temperature range of -55°C to 125°C. The SN74ALS' and SN74AS' devices are characterized for operation from 0°C to 70°C.

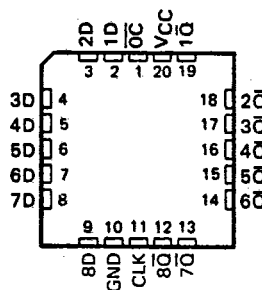
SN54ALS576A, SN54AS576 . . . J PACKAGE
SN74ALS576B, SN74AS576 . . . DW OR N PACKAGE

(TOP VIEW)



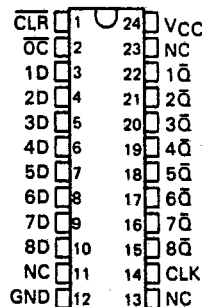
SN54ALS576A, SN54AS576 . . . FK PACKAGE

(TOP VIEW)



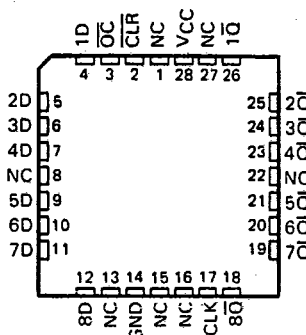
SN54ALS577A, SN54AS577 . . . JT PACKAGE
SN74ALS577A, SN74AS577 . . . DW OR NT PACKAGE

(TOP VIEW)



SN54ALS577A, SN54AS577 . . . FK PACKAGE
SN74ALS577A, SN74AS577 . . . FN PACKAGE

(TOP VIEW)



NOTICE
SEE ORDER OF DATA FOR ERRATA INFORMATION

NC No internal connection

3460

B-11

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.



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SN74ALS576B, SN74ALS577A, SN74AS576, SN74AS577
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS**

FUNCTION TABLES

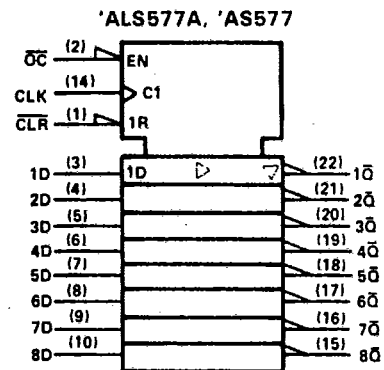
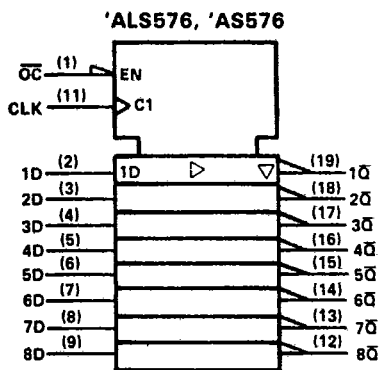
ALS576, AS576
(Each Flip-Flop)

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

ALS577A, AS577
(Each Flip-Flop)

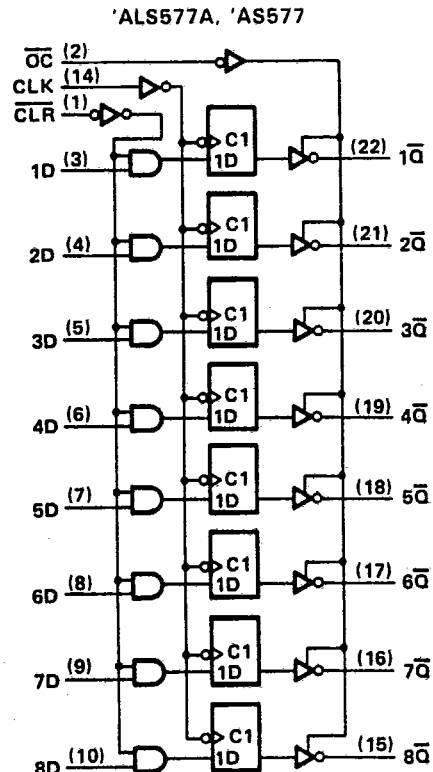
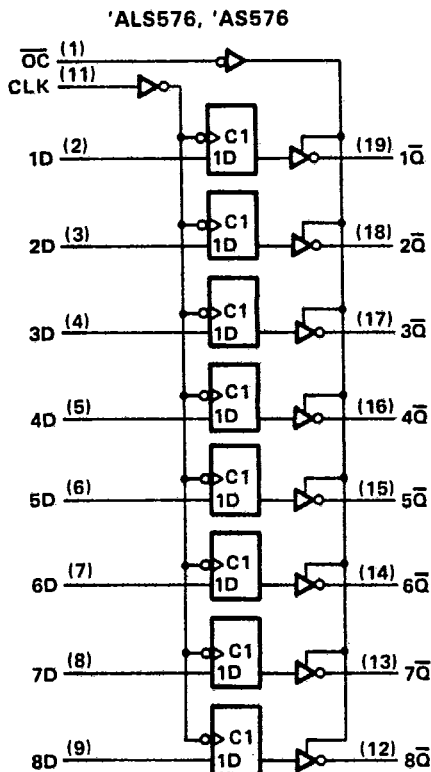
INPUTS				OUTPUT
\overline{OC}	\overline{CLR}	CLK	D	\overline{Q}
L	L	↑	X	H
L	H	↑	H	L
L	H	↑	L	H
L	H	L	X	\overline{Q}_0
H	X	X	X	Z

logic symbols†



†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagrams (positive logic)



Pin numbers shown are for DW, J, and N packages.

Pin numbers shown are for DW, JT, and NT packages.

SN54ALS576A, SN54ALS577A, SN74ALS576B, SN74ALS577A
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, VCC	7 V
Input voltage	7 V
Voltage applied to a disabled 3-state output	5.5 V
Operating free-air temperature range: SN54ALS', SN54AS'	-55°C to 125°C
SN74ALS', SN74AS'	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

		SN54ALS576A SN54ALS577A			SN74ALS576B SN74ALS577A			UNIT		
		MIN	NOM	MAX	MIN	NOM	MAX			
VCC	Supply voltage	4.5	5	5.5	4.5	5	5.5	V		
VIH	High-level input voltage	2			2			V		
VIL	Low-level input voltage			0.7			0.8	V		
IOH	High-level output current			-1			-2.6	mA		
IOL	Low-level output current			12			24	mA		
f _{clock}	Clock frequency	'ALS576B		0	25		0	30	MHz	
		'ALS577A		0	25		0	30		
t _w	Pulse duration	CLK high or low 'ALS576B		20			16.5		ns	
		CLK high or low 'ALS577A		20			16.5			
t _{su}	Setup time before CLK†	Data		15			15		ns	
		CLR ('ALS577A)		15			15			
t _h	Hold time after CLK†	Data		4			0		ns	
		CLR ('ALS577A)		4			0			
T _A	Operating free-air temperature			-55		125		0	70	°C

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

PARAMETER	TEST CONDITIONS	SN54ALS576A SN54ALS577A			SN74ALS576B SN74ALS577A			UNIT		
		MIN	TYP†	MAX	MIN	TYP†	MAX			
V _{IK}	VCC = 4.5 V, I _I = -18 mA			-1.2			-1.2	V		
V _{OH}	VCC = 4.5 V to 5.5 V, I _{OH} = -0.4 mA			VCC-2			VCC-2	V		
	VCC = 4.5 V, I _{OH} = -1 mA			2.4	3.3					
	VCC = 4.5 V, I _{OH} = -2.6 mA					2.4	3.2			
V _{OL}	VCC = 4.5 V, I _{OL} = 12 mA			0.25	0.4		0.25	0.4	V	
	VCC = 4.5 V, I _{OL} = 24 mA						0.35	0.5		
I _{OZH}	VCC = 5.5 V, V _O = 2.7 V					20		20	μA	
I _{OZL}	VCC = 5.5 V, V _O = 0.4 V					-20		-20	μA	
I _I	VCC = 5.5 V, V _I = 7 V					0.1		0.1	mA	
I _{IH}	VCC = 5.5 V, V _I = 2.7 V					20		20	μA	
I _{IL}	VCC = 5.5 V, V _I = 0.4 V					-0.2		-0.2	mA	
I _{O‡}	VCC = 5.5 V, V _O = 2.25 V			-30		-112		-30	-112	mA
I _{CC}	VCC = 5.5 V	Outputs high		10	18		10	18	mA	
		Outputs low		15	24		15	24		
		Outputs disabled		16	30		16	30		

† All typical values are at VCC = 5 V, T_A = 25°C.

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

SN54ALS576A, SN54ALS577A, SN74ALS576B, SN74ALS577A
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS
'ALS576 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = 25°C		V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX		UNIT		
			'ALS576		SN54ALS576A			SN74ALS576B	
			TYP		MIN	MAX		MIN	MAX
f _{max}			50		25		30	MHz	
t _{PLH}	CLK	Any \bar{Q}	9		4	15	3	14	ns
t _{PHL}			9		4	15	4	14	
t _{PZH}	\bar{OC}	Any \bar{Q}	11		4	21	3	18	ns
t _{PZL}			11		4	21	4	18	
t _{PHZ}	\bar{OC}	Any \bar{Q} 'ALS576	6		2	12	1	10	ns
t _{PLZ}		Any \bar{Q}	8		3	17	2	15	

'ALS577A switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = 25°C			V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX			UNIT	
			'ALS577A			SN54ALS577A		SN74ALS577A		
			MIN	TYP	MAX	MIN	MAX	MIN		MAX
f _{max}			40	50		25		30	MHz	
t _{PLH}	CLK	Any \bar{Q}	9	11		4	15	4	14	ns
t _{PHL}			9	11.5		4	15	4	14	
t _{PZH}	\bar{OC}	Any \bar{Q}	11	15		4	21	4	18	ns
t _{PZL}			11	15		4	21	4	18	
t _{PHZ}	\bar{OC}	Any \bar{Q} 'ALS577	6	8		2	12	2	10	ns
t _{PLZ}		Any \bar{Q}	8	12		3	17	3	15	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of the *ALS/AS Logic Data Book*, 1986.

SN54AS576, SN54AS577, SN74AS576, SN74AS577
OCTAL D-TYPE EDGE-TRIGGERED FLOP-FLOPS WITH 3-STATE OUTPUTS

recommended operating conditions

		SN54AS576 SN54AS577			SN74AS576 SN74AS577			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			0.8	V		
I _{OH}	High-level output current			-12			-15	mA		
I _{OL}	Low-level output current			32			48	mA		
f _{clock}	Clock frequency	0		100	0		125	MHz		
t _w	Pulse duration	CLK high		5			4	ns		
		CLK low		4			2			
t _{su}	Setup time before CLK1	Data		3			2	ns		
		CLR ('AS577)		6.5			5.5			
t _h	Hold time after CLK1	Data		3			2	ns		
		CLR ('AS577)		0			0			
T _A	Operating free-air temperature			-55		125		0	70	°C

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

PARAMETER	TEST CONDITIONS	SN54AS576 SN54AS577			SN74AS576 SN74AS577			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 to 5.5 V, I _{OH} = -2 mA	V _{CC} - 2			V _{CC} - 2			V
	V _{CC} = 4.5 V, I _{OH} = -12 mA	2.4	3.2					
	V _{CC} = 4.5 V, I _{OH} = -15 mA				2.4	3.3		
V _{OL}	V _{CC} = 4.5 V, I _{OL} = 32 mA		0.29	0.5				V
	V _{CC} = 4.5 V, I _{OL} = 48 mA				0.33	0.5		
I _{OZH}	V _{CC} = 5.5 V, V _O = 2.7 V			50			50	μA
I _{OZL}	V _{CC} = 5.5 V, V _O = 0.4 V			-50			-50	μA
I _I	V _{CC} = 5.5 V, V _I = 7 V			0.1			0.1	mA
I _{IH}	V _{CC} = 5.5 V, V _I = 2.7 V			20			20	μA
I _{IL}	D			-3			-2	mA
	All other			-0.5			-0.5	
I _O ‡	V _{CC} = 5.5 V, V _O = 2.25 V	-30		-112	-30		-112	mA
I _{CC}	'AS576	V _{CC} = 5.5 V	Outputs high	77	125	77	125	mA
			Outputs low	84	135	84	135	
			Outputs disabled	84	135	84	135	
			Outputs high	78	126	78	126	
			Outputs low	76	123	76	123	
			Outputs disabled	88	142	88	142	
I _{CC}	'AS577	V _{CC} = 5.5 V	Outputs high	77	125	77	125	mA
			Outputs low	84	135	84	135	
			Outputs disabled	84	135	84	135	
			Outputs high	78	126	78	126	
			Outputs low	76	123	76	123	
			Outputs disabled	88	142	88	142	

† All typical values are at V_{CC} = 5 V, T_A = 25 °C.

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

SN54AS576, SN54AS577, SN74AS576, SN74AS577
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX				UNIT
			SN54AS576 SN54AS577		SN74AS576 SN74AS577		
			MIN	MAX	MIN	MAX	
f _{max}			100		125		MHz
t _{PLH}	CLK	Any \bar{Q}	3	11	3	8	ns
t _{PHL}			4	11	4	9	
t _{PZH}	\overline{OC}	Any \bar{Q}	2	7	2	6	ns
t _{PZL}			3	11	3	10	
t _{PHZ}	\overline{OC}	Any \bar{Q}	2	7	2	6	ns
t _{PLZ}			2	7	2	6	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of the *ALS/AS Logic Data Book, 1986*.