- 'LS377 and 'LS378 Contain Eight and Six Flip-Flops, Respectively, with Single-Rail Outputs
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- Individual Data Input to Each Flip-Flop
- Applications Include:
  Buffer/Storage Registers
  Shift Registers
  Pattern Generators

description

These monolithic, positive-edge-triggered flip-flops utilize TTL circuitry to implement D-type flip-flop logic with an enable input. The 'LS377, 'LS378, and 'LS379 devices are similar to 'LS273, 'LS174, and 'LS175, respectively, but feature a common enable instead of a common clear.

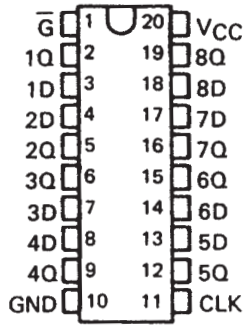
Information at the D inputs meeting the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock pulse if the enable input $\overline{G}$ is low. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse. When the 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 the $\overline{G}$ input.

These flip-flops are guaranteed to respond to clock frequencies ranging from 0 to 30 MHz while maximum clock frequency is typically 40 megahertz. Typical power dissipation is 10 milliwatts per flip-flop.

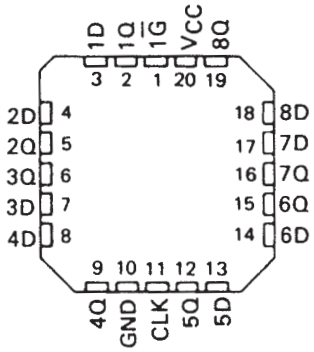
FUNCTION TABLE
(EACH FLIP-FLOP)

INPUTS			OUTPUTS	
$\overline{G}$	CLOCK	DATA	Q	$\overline{Q}$
H	X	X	Q_0	$\overline{Q}_0$
L	↑	H	H	L
L	↑	L	L	H
X	L	X	Q_0	$\overline{Q}_0$

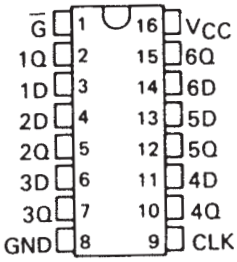
SN54LS377 . . . J PACKAGE
SN74LS377 . . . DW OR N PACKAGE
(TOP VIEW)



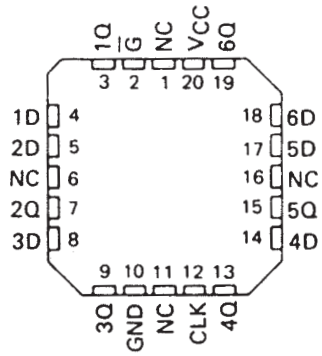
SN54LS377 . . . FK PACKAGE
(TOP VIEW)



SN54LS378 . . . J OR W PACKAGE
SN74LS378 . . . D OR N PACKAGE
(TOP VIEW)

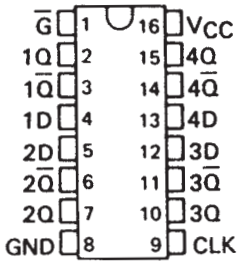


SN54LS378 . . . FK PACKAGE
(TOP VIEW)

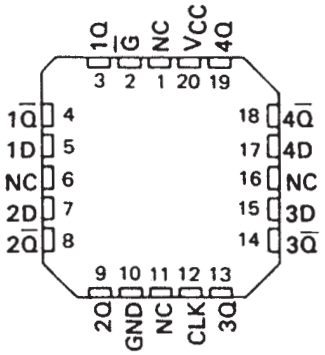


NC – No internal connection

SN54LS379 . . . J OR W PACKAGE
SN74LS379 . . . D OR N PACKAGE
(TOP VIEW)

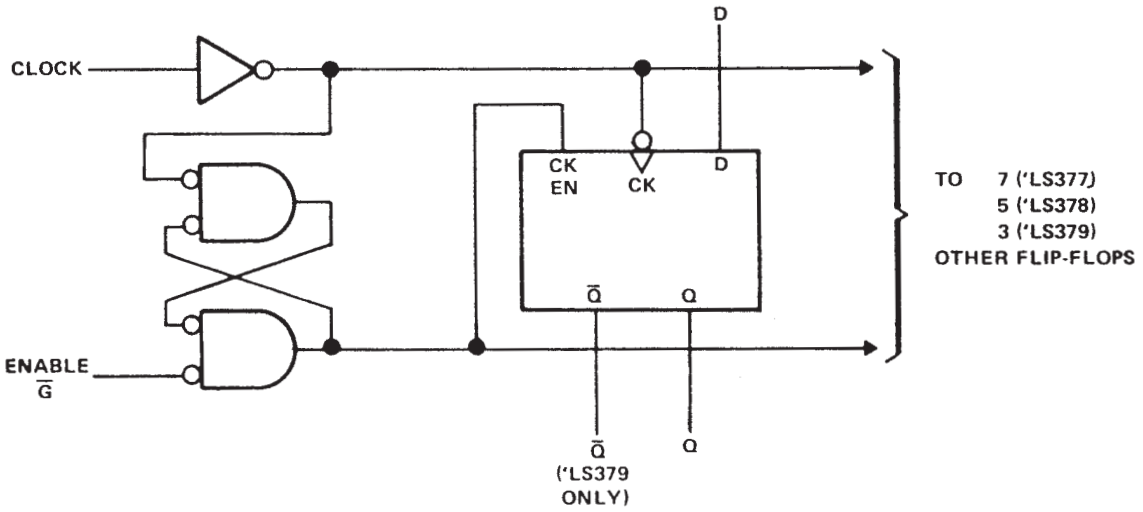


SN54LS379 . . . FK PACKAGE
(TOP VIEW)

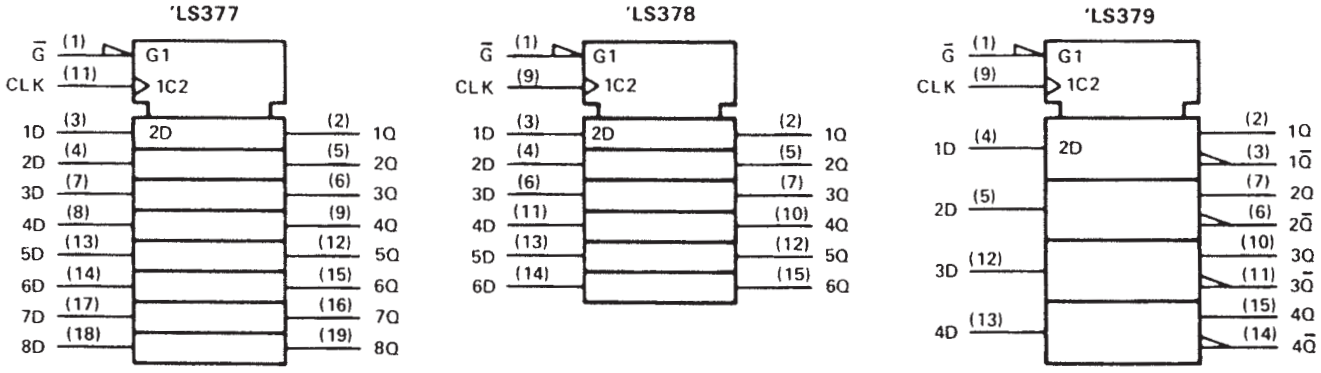


NC – No internal connection

logic diagram (positive logic)



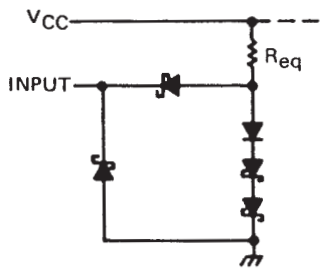
logic symbols†



† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for DW, J, and N packages.

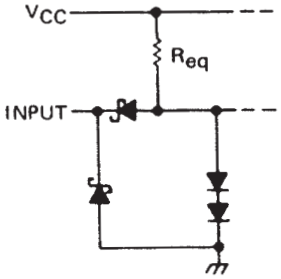
schematics of inputs and outputs

EQUIVALENT OF DATA INPUT



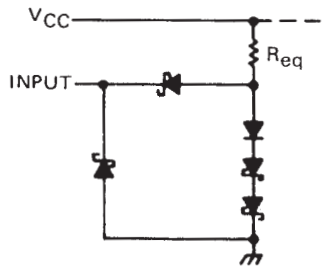
'LS379 : R_{eq} = 30 kΩ NOM
others : R_{eq} = 25 kΩ NOM

EQUIVALENT OF CLOCK INPUTS



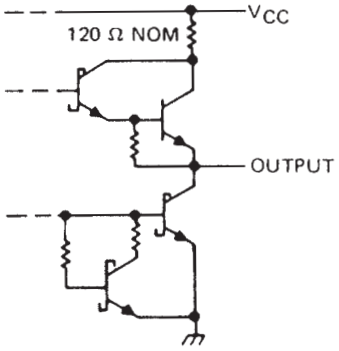
'LS379 :R_{eq} = 17 kΩ NOM
others :R_{eq} = 20 kΩ NOM

EQUIVALENT OF ENABLE INPUTS



'LS379 :R_{eq} = 25 kΩ NOM
others :R_{eq} = 20 kΩ NOM

TYPICAL OF ALL OUTPUTS



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

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage . . . . . 7 V
Operating free-air temperature range: SN54LS' . . . . . −55°C to 125°C
SN74LS' . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

recommended operating conditions

		SN54LS'			SN74LS'			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}		4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}				−400			−400	μA
Low-level output current, I_{OL}				4			8	mA
Clock frequency, f_{clock}		0		30	0		30	MHz
Width of clock pulse, t_w		20			20			ns
Setup time, t_{su}	Data input	20↑			20↑			ns
	Enable active-state	25↑			25↑			
	Enable inactive-state	10↑			10↑			
Hold time, t_h	Data and enable	5↑			5↑			ns
Operating free-air temperature, T_A		−55		125	0		70	°C

↑The arrow indicates that the rising edge of the clock pulse is used for reference.

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

PARAMETER		TEST CONDITIONS†			SN54LS'			SN74LS'			UNIT
					MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH}	High-level input voltage				2			2			V
V_{IL}	Low-level input voltage						0.7			0.8	V
V_{IK}	Input clamp voltage	V_{CC} = MIN,	I_I = −18 mA				−1.5			−1.5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IL} = V_{IL} max,	V_{IH} = 2 V, I_{OH} = −400 μA		2.5	3.5		2.7	3.5		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IL} = V_{IL} max	V_{IH} = 2 V,	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
				I_{OL} = 8 mA					0.35	0.5	
I_I	Input current at maximum input voltage	V_{CC} = MAX,	V_I = 7 V				0.1			0.1	mA
I_{IH}	High-level input current	V_{CC} = MAX,	V_I = 2.7 V				20			20	μA
I_{IL}	Low-level input current	V_{CC} = MAX,	V_I = 0.4 V				−0.4			−0.4	mA
I_{OS}	Short-circuit output current§	V_{CC} = MAX			−20		−100	−20		−100	mA
I_{CC}	Supply current	V_{CC} = MAX,	See Note 2	'LS377		17	28		17	28	mA
				'LS378		13	22		13	22	mA
				'LS379		9	15		9	15	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ Note more than one input should be shorted at a time, and duration of the short-circuit should not exceed one second.
NOTE 2: With all outputs open and ground applied to all data and enable inputs, I_{CC} is measured after a momentary ground, then 4.5 V, is applied to clock.

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
f_{max}	Maximum clock frequency	C_L = 15 pF, R_L = 2 kΩ, See Note 3	30	40		MHz
t_{PLH}	Propagation delay time, low-to-high-level output from clock			17	27	ns
t_{PHL}	Propagation delay time, high-to-low-level output from clock			18	27	ns

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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PRODUCT FOLDER | PRODUCT INFO: FEATURES | DESCRIPTION | DATASHEETS | PRICING/AVAILABILITY/PKG | APPLICATION NOTES | USER GUIDES | MORE LITERATURE

PRODUCT SUPPORT: TRAINING

SN54LS377, Octal D-type Flip-Flops With Enable

DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN54LS377	SN74LS377
Voltage Nodes (V)	5	5
Vcc range (V)	4.5 to 5.5	4.75 to 5.25
Input Level	TTL	TTL
Output Level	TTL	TTL
Output Drive (mA)		-0.4/8
Output	2S	2S
No. of Bits	8	8
Static Current		28
th (ns)		5
tpd max (ns)		27
tsu (ns)		20

FEATURES

Back to Top

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TECHNICAL DOCUMENTS

Back to Top

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DATASHEET

Back to Top

Full datasheet in Acrobat PDF: sn54ls377.pdf (180 KB) (Updated: 03/01/1988)

APPLICATION NOTES

Back to Top

View Application Notes for Digital Logic

- Designing With Logic (Rev. C) (SDYA009C - Updated: 06/01/1997)
- Designing with the SN54/74LS123 (Rev. A) (SDLA006A - Updated: 03/01/1997)
- Evaluation of Nickel/Palladium/Gold-Finished Surface-Mount Integrated Circuits (SZZA026 - Updated: 06/20/2001)
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- Live Insertion (SDYA012 - Updated: 10/01/1996)
- TI IBIS File Creation, Validation, and Distribution Processes (SZZA034 - Updated: 08/29/2002)
- Understanding and Interpreting Texas Instruments Standard-Logic Products Data Sh (Rev. A) (SZZA036A - Updated: 02/27/2003)

MORE LITERATURE

Back to Top

- Enhanced Plastic Portfolio Brochure (SGZB004, 387 KB - Updated: 08/19/2002)
- Logic Reference Guide (SCYB004, 1032 KB - Updated: 10/23/2001)
- MicroStar Junior BGA Design Summary (SCET004, 167 KB - Updated: 07/28/2000)
- Military Brief (SGYN138, 803 KB - Updated: 10/10/2000)
- Overview of IEEE Std 91-1984, Explanation of Logic Symbols Training Booklet (Rev. A) (SDYZ001A, 138 KB - Updated: 07/01/1996)
- Palladium Lead Finish User's Manual (SDYV001, 2041 KB - Updated: 11/01/1996)
- QML Class V Space Products Military Brief (Rev. A) (SGZN001A, 257 KB - Updated: 10/07/2002)

USER GUIDES

Back to Top

- LOGIC Pocket Data Book (SCYD013, 4837 KB - Updated: 12/05/2002)

PRICING/AVAILABILITY/PKG

Back to Top

DEVICE INFORMATION
Updated Daily

ORDERABLE DEVICE	STATUS	PACKAGE TYPE | PINS	TEMP (°C)	DSCC NUMBER	PRODUCT CONTENT	BUDGETARY PRICING QTY | $US	STD PACK QTY
JM38510/32504B2A	ACTIVE	LCCC (FK) | 20	-55 TO 125		View Contents	1KU | 8.37	1
SN54LS377J	ACTIVE	CDIP (J) | 20	-55 TO 125		View Contents	1KU | 1.70	1
JM38510/32504BRA	ACTIVE	CDIP (J) | 20	-55 TO 125		View Contents	1KU | 3.00	1
JM38510/32504BSA	ACTIVE	CFP (W) | 20	-55 TO 125		View Contents	1KU | 7.87	1
SNJ54LS377FK	ACTIVE	LCCC (FK) | 20	-55 TO 125		View Contents	1KU | 7.87	1

TI INVENTORY STATUS
As Of 09:00 AM GMT, 17 Apr 2003

IN STOCK	IN PROGRESS QTY | DATE	LEAD TIME
23*	3712 | 20 May	6 WKS
	>10k | 27 May	
615*	26 | 06 May	6 WKS
	>10k | 20 May	
90*	>10k | 20 May	6 WKS
2139*	903 | 06 May	6 WKS
	>10k | 20 May	
271*	3580 | 20 May	6 WKS

REPORTED DISTRIBUTOR INVENTORY
As Of 09:00 AM GMT, 17 Apr 2003

DISTRIBUTOR COMPANY | REGION	IN STOCK	PURCHASE
None Reported View Distributors		
Avnet | Americas	323	BUY NOW
None Reported View Distributors		
EBV Electronik | Europe	900	BUY NOW
Avnet | Americas	133	BUY NOW
None Reported View Distributors		

Product Folder: SN54LS377, Octal D-type Flip-Flops With Enable

									>10k | 27 May				
SNJ54LS377J	ACTIVE	CDIP (J) | 20	-55 TO 125		View Contents	1KU | 2.00	1	88*	>10k | 20 May	6 WKS	Avnet | Americas	82	BUY NOW
											Avnet-SILICA | Europe	81	BUY NOW
											EBV Electronik | Europe	80	BUY NOW
SNJ54LS377W	ACTIVE	CFP (W) | 20	-55 TO 125		View Contents	1KU | 7.87	1	68*	>10k | 20 May	6 WKS	None Reported View Distributors		

Table Data Updated on: 4/17/2003

PRODUCT FOLDER | PRODUCT INFO: FEATURES | DESCRIPTION | DATASHEETS | PRICING/AVAILABILITY/PKG | APPLICATION NOTES | USER GUIDES | MORE LITERATURE

PRODUCT SUPPORT: TRAINING

SN54LS378, Hex D-type Flip-Flops With Enable
DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN54LS378	SN74LS378
Voltage Nodes (V)	5	5
Vcc range (V)	4.5 to 5.5	4.75 to 5.25
Input Level	TTL	TTL
Output Level	TTL	TTL
Output Drive (mA)		-0.4/8
Output	2S	2S
No. of Bits	6	6
Static Current		22
th (ns)		5
tpd max (ns)		27
tsu (ns)		20

FEATURES

Back to Top

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Back to Top

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Back to Top

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Back to Top

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PRICING/AVAILABILITY/PKG

Back to Top

DEVICE INFORMATION Updated Daily

TI INVENTORY STATUS As Of 09:00 AM GMT, 17 Apr 2003

REPORTED DISTRIBUTOR INVENTORY As Of 09:00 AM GMT, 17 Apr 2003

ORDERABLE DEVICE	STATUS	PACKAGE TYPE | PINS	TEMP (°C)	DSCC NUMBER	PRODUCT CONTENT	BUDGETARY PRICING QTY | $US	STD PACK QTY	IN STOCK	IN PROGRESS QTY | DATE	LEAD TIME	DISTRIBUTOR COMPANY | REGION	IN STOCK	PURCHASE
5962-8992501EA	ACTIVE	CDIP (J) | 16	-55 TO 125		View Contents	1KU | 2.00	1	41*	>10k | 20 May	6 WKS	None Reported View Distributors		
SN54LS378J	ACTIVE	CDIP (J) | 16	-55 TO 125		View Contents	1KU | 1.49	1	26*	>10k | 20 May	6 WKS	EBV Electronik | Europe	150	BUY NOW
											Avnet | Americas	17	BUY NOW
SNJ54LS378FK	OBSOLETE	LCCC (FK) | 20	-55 TO 125		View Contents	1KU |		0*		Call**	None Reported View Distributors		
SNJ54LS378J	ACTIVE	CDIP (J) | 16	-55 TO 125	5962-8992501EA	View Contents	1KU | 2.00	1	196*	>10k | 20 May	6 WKS	None Reported View Distributors		
SNJ54LS378W	ACTIVE	CFP (W) | 16	-55 TO 125	5962-8992501FA	View Contents	1KU | 7.15	1	0*	>10k | 20 May	6 WKS	None Reported View Distributors		

Table Data Updated on: 4/17/2003

Product Folder: SN54LS378, Hex D-type Flip-Flops With Enable