

# SN74LS377

## Octal D Flip-Flop with Enable

The SN74LS377 is an 8-bit register built using advanced Low Power Schottky technology. This register consists of eight D-type flip-flops with a buffered common clock and a buffered common clock enable.

- 8-Bit High Speed Parallel Registers
- Positive Edge-Triggered D-Type Flip Flops
- Fully Buffered Common Clock and Enable Inputs
- True and Complement Outputs
- Input Clamp Diodes Limit High Speed Termination Effects

### GUARANTEED OPERATING RANGES

Symbol	Parameter	Min	Typ	Max	Unit
$V_{CC}$	Supply Voltage	4.75	5.0	5.25	V
$T_A$	Operating Ambient Temperature Range	0	25	70	°C
$I_{OH}$	Output Current – High			-0.4	mA
$I_{OL}$	Output Current – Low			8.0	mA

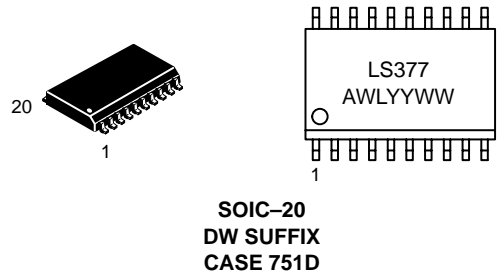
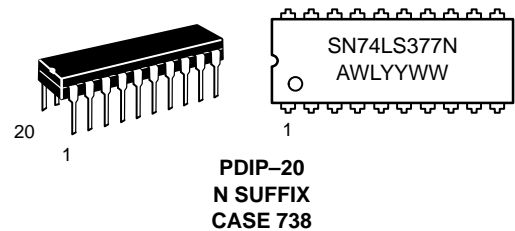


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### MARKING DIAGRAMS



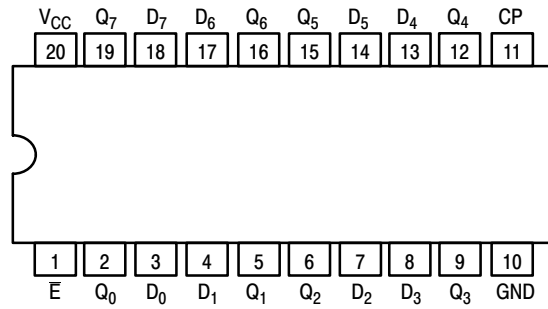
A = Assembly Location  
 WL = Wafer Lot  
 YY = Year  
 WW = Work Week

### ORDERING INFORMATION

Device	Package	Shipping
SN74LS377N	PDIP-20	1440 Units/Box
SN74LS377DW	SOIC-20	2500/Tape & Reel

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CONNECTION DIAGRAM DIP (TOP VIEW)



NOTE:  
The Flatpak version  
has the same pinouts  
(Connection Diagram) as  
the Dual In-Line Package.

## PIN NAMES

$\bar{E}$  Enable (Active LOW) Input  
 $D_0 - D_3$  Data Inputs  
 CP Clock (Active HIGH Going Edge) Input  
 $Q_0 - Q_3$  True Outputs  
 $\bar{Q}_0 - \bar{Q}_3$  Complemented Outputs

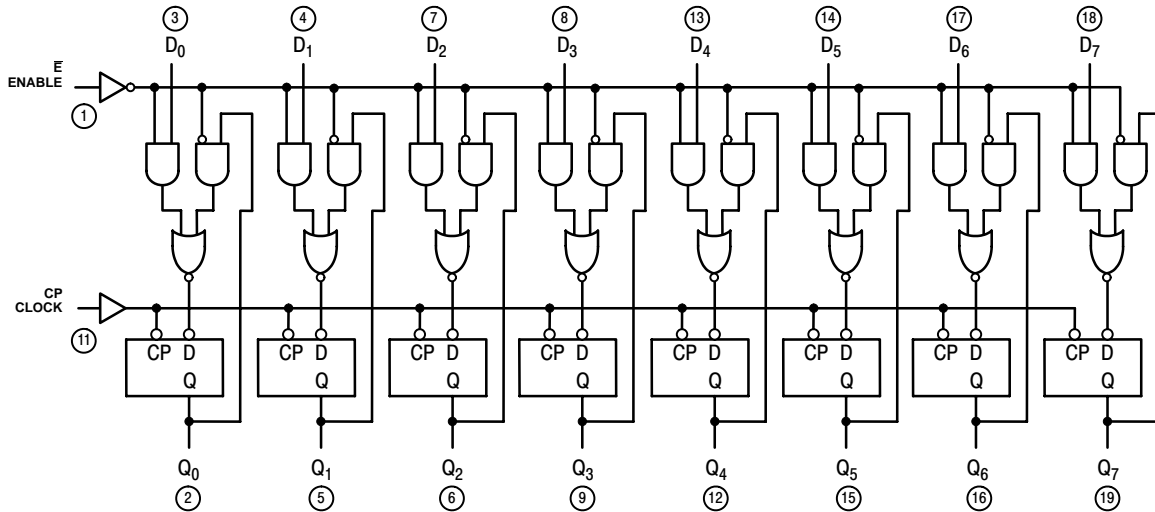
## LOADING (Note a)

	HIGH	LOW
$\bar{E}$	0.5 U.L.	0.25 U.L.
$D_0 - D_3$	0.5 U.L.	0.25 U.L.
CP	0.5 U.L.	0.25 U.L.
$Q_0 - Q_3$	10 U.L.	5 U.L.
$\bar{Q}_0 - \bar{Q}_3$	10 U.L.	5 U.L.

## NOTES:

a) 1 TTL Unit Load (U.L.) = 40  $\mu$ A HIGH/1.6 mA LOW.

## LOGIC DIAGRAM



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## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
V <sub>IH</sub>	Input HIGH Voltage	2.0			V	Guaranteed Input HIGH Voltage for All Inputs
V <sub>IL</sub>	Input LOW Voltage			0.8	V	Guaranteed Input LOW Voltage for All Inputs
V <sub>IK</sub>	Input Clamp Diode Voltage		-0.65	-1.5	V	V <sub>CC</sub> = MIN, I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	2.7	3.5		V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = MAX, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> per Truth Table
V <sub>OL</sub>	Output LOW Voltage		0.25	0.4	V	I <sub>OL</sub> = 4.0 mA V <sub>CC</sub> = V <sub>CC</sub> MIN, V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> per Truth Table
			0.35	0.5	V	
I <sub>IH</sub>	Input HIGH Current			20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V
				0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V
I <sub>IL</sub>	Input LOW Current			-0.4	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4 V
I <sub>OS</sub>	Short Circuit Current (Note 1.)	-20		-100	mA	V <sub>CC</sub> = MAX
I <sub>CC</sub>	Power Supply Current			28	mA	V <sub>CC</sub> = MAX, NOTE 1

NOTE: With all inputs open and GND applied to all data and enable inputs, I<sub>CC</sub> is measured after a momentary GND, then 4.5 V is applied to clock.  
1. Not more than one output should be shorted at a time, nor for more than 1 second.

## AC CHARACTERISTICS (T<sub>A</sub> = 25°C, V<sub>CC</sub> = 5.0 V)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
f <sub>MAX</sub>	Maximum Clock Frequency	30	40		MHz	V <sub>CC</sub> = 5.0 V C <sub>L</sub> = 15 pF
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, Clock to Output		17 18	27 27	ns	

## AC SETUP REQUIREMENTS (T<sub>A</sub> = 25°C, V<sub>CC</sub> = 5.0 V)

Symbol	Parameter		Limits			Unit	Test Conditions
			Min	Typ	Max		
t <sub>W</sub>	Any Pulse Width		20			ns	V <sub>CC</sub> = 5.0 V
t <sub>s</sub>	Data Setup Time		20			ns	
t <sub>s</sub>	Enable Setup Time	Inactive — State	10			ns	
		Active — State	25			ns	
t <sub>h</sub>	Any Hold Time		5.0			ns	

## DEFINITION OF TERMS




SETUP TIME (t<sub>s</sub>) — is defined as the minimum time required for the correct logic level to be present at the logic input prior to the clock transition from LOW-to-HIGH in order to be recognized and transferred to the outputs.

HOLD TIME (t<sub>h</sub>) — is defined as the minimum time following the clock transition from LOW-to-HIGH that the

logic level must be maintained at the input in order to ensure continued recognition. A negative HOLD TIME indicates that the correct logic level may be released prior to the clock transition from LOW-to-HIGH and still be recognized.

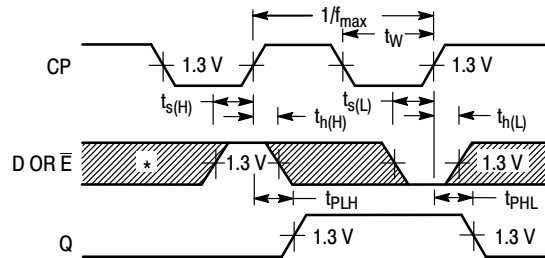
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## TRUTH TABLE

$\bar{E}$	CP	$D_n$	$Q_n$	$\bar{Q}_n$
H		X	No Change	No Change
L		H	H	L
L		L	L	H

L = LOW Voltage Level  
H = HIGH Voltage Level  
X = Immaterial

## AC WAVEFORM

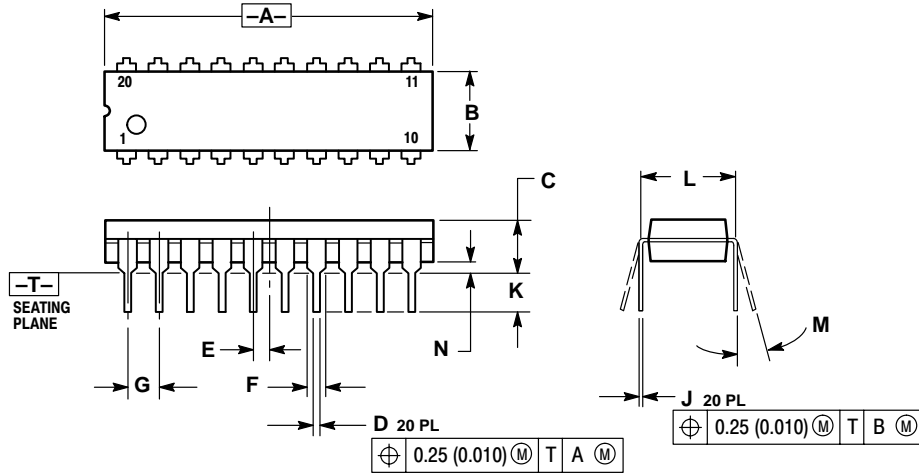


\*The shaded areas indicate when the input is permitted to change for predictable output performance.

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## PACKAGE DIMENSIONS

**N SUFFIX**  
**PLASTIC PACKAGE**  
**CASE 738-03**  
**ISSUE E**



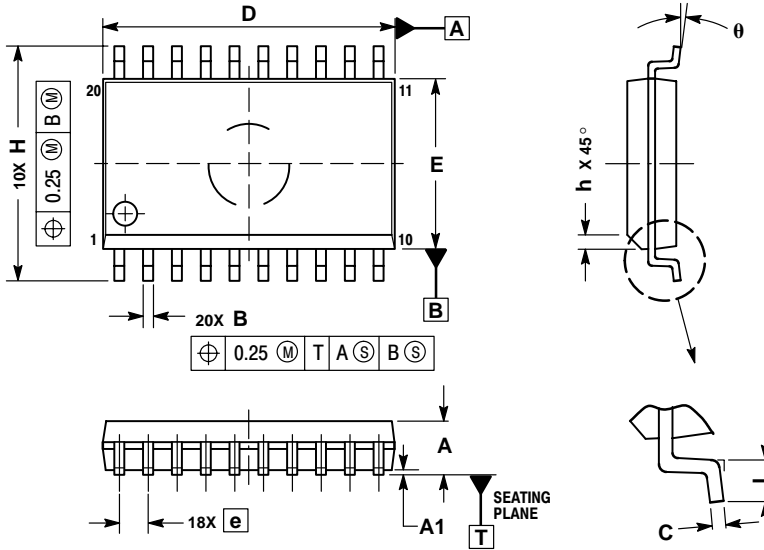
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
  4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.010	1.070	25.66	27.17
B	0.240	0.260	6.10	6.60
C	0.150	0.180	3.81	4.57
D	0.015	0.022	0.39	0.55
E	0.050 BSC		1.27 BSC	
F	0.050	0.070	1.27	1.77
G	0.100 BSC		2.54 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.140	2.80	3.55
L	0.300 BSC		7.62 BSC	
M	0°	15°	0°	15°
N	0.020	0.040	0.51	1.01

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## PACKAGE DIMENSIONS

### D SUFFIX PLASTIC SOIC PACKAGE CASE 751D-05 ISSUE F



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	2.35	2.65
A1	0.10	0.25
B	0.35	0.49
C	0.23	0.32
D	12.65	12.95
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.25	0.75
L	0.50	0.90
θ	0°	7°

**Notes**

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