

SN74LS299

8-Bit Shift/Storage Register with 3-State Outputs

The SN74LS299 is an 8-Bit Universal Shift/Storage Register with 3-state outputs. Four modes of operation are possible: hold (store), shift left, shift right and load data.

The parallel load inputs and flip-flop outputs are multiplexed to reduce the total number of package pins. Separate outputs are provided for flip-flops Q_0 and Q_7 to allow easy cascading. A separate active LOW Master Reset is used to reset the register.

- Common I/O for Reduced Pin Count
- Four Operation Modes: Shift Left, Shift Right, Load and Store
- Separate Shift Right Serial Input and Shift Left Serial Input for Easy Cascading
- 3-State Outputs for Bus Oriented Applications
- Input Clamp Diodes Limit High-Speed Termination Effects
- ESD > 3500 Volts

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 Q_0, Q_7			-0.4	mA
I_{OL}	Output Current – Low Q_0, Q_7			8.0	mA
I_{OH}	Output Current – High $I/O_0 - I/O_7$			-2.6	mA
I_{OL}	Output Current – Low $I/O_0 - I/O_7$			24	mA

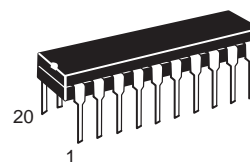


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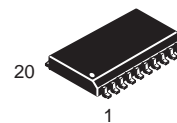
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**LOW
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SCHOTTKY**



**PLASTIC
N SUFFIX
CASE 738**



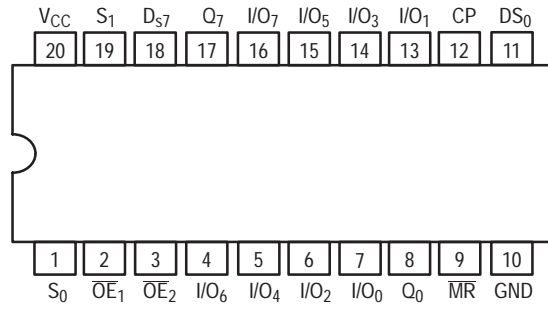
**SOIC
DW SUFFIX
CASE 751D**

ORDERING INFORMATION

Device	Package	Shipping
SN74LS299N	16 Pin DIP	1440 Units/Box
SN74LS299DW	16 Pin	2500/Tape & Reel

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CONNECTION DIAGRAM DIP (TOP VIEW)

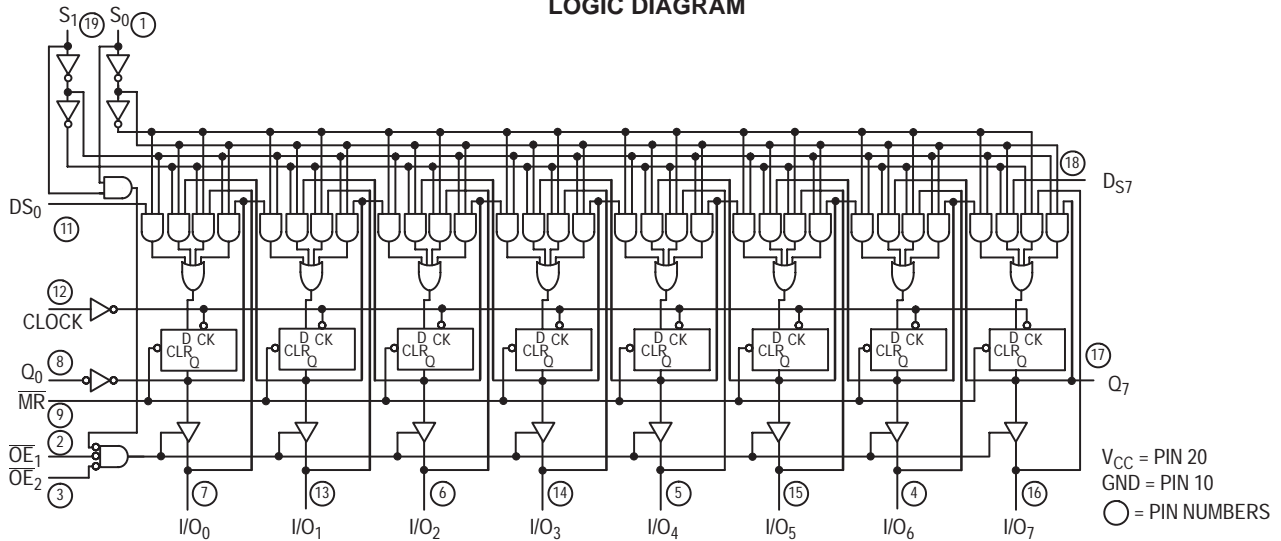


NOTE:
The Flatpak version has the same pinouts (Connection Diagram) as the Dual In-Line Package.

PIN NAMES		LOADING (Note a)	
		HIGH	LOW
CP	Clock Pulse (Active Positive-Going Edge) Input	0.5 U.L.	0.25 U.L.
DS0	Serial Data Input for Right Shift	0.5 U.L.	0.25 U.L.
DS7	Serial Data Input for Left Shift	0.5 U.L.	0.25 U.L.
I/O _n	Parallel Data Input or Parallel Output (3-State)	0.5 U.L.	0.25 U.L.
		65 U.L.	15 U.L.
$\overline{OE}_1, \overline{OE}_2$	3-State Output Enable (Active LOW) Inputs	0.5 U.L.	0.25 U.L.
Q ₀ , Q ₇	Serial Outputs	10 U.L.	5 U.L.
\overline{MR}	Asynchronous Master Reset (Active LOW) Input	0.5 U.L.	0.25 U.L.
S ₀ , S ₁	Mode Select Inputs	1 U.L.	0.5 U.L.

NOTES:
a) 1 TTL Unit Load (U.L.) = 40 μ A HIGH/1.6 mA LOW.

LOGIC DIAGRAM



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FUNCTION TABLE

INPUTS								RESPONSE
MR	S ₁	S ₀	OE ₁	OE ₂	CP	DS ₀	DS ₇	
L	X	X	H	X	X	X	X	Asynchronous Reset; Q ₀ = Q ₇ = LOW I/O Voltage Undetermined
L	X	X	X	H	X	X	X	
L	H	H	X	X	X	X	X	
L	L	X	L	L	X	X	X	Asynchronous Reset; Q ₀ = Q ₇ = LOW I/O Voltage LOW
L	X	L	L	L	X	X	X	
H	L	H	X	X	┌	D	X	Shift Right; D→Q ₀ ; Q ₀ →Q ₁ ; etc. Shift Right; D→Q ₀ & I/O ₀ ; Q ₀ →O ₁ & I/O ₁ ; etc.
H	L	H	L	L	└	D	X	
H	H	L	X	X	┌	X	D	Shift Left; D→Q ₇ ; Q ₇ →Q ₆ ; etc. Shift Left; D→Q ₇ & I/O ₇ ; Q ₇ →Q ₆ & I/O ₆ ; etc.
H	H	L	L	L	└	X	D	
H	H	H	X	X	┌	X	X	Parallel Load; I/O _n →Q _n
H	L	L	H	X	X	X	X	Hold: I/O Voltage undetermined
H	L	L	X	H	X	X	X	
H	L	L	L	L	X	X	X	Hold: I/O _n = Q _n

H = HIGH Voltage Level

L = LOW Voltage Level

X = Immaterial

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DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter	Limits			Unit	Test Conditions	
		Min	Typ	Max			
V _{IH}	Input HIGH Voltage	2.0			V	Guaranteed Input HIGH Voltage for All Inputs	
V _{IL}	Input LOW Voltage			0.8	V	Guaranteed Input LOW Voltage for All Inputs	
V _{IK}	Input Clamp Diode Voltage		-0.65	-1.5	V	V _{CC} = MIN, I _{IN} = -18 mA	
V _{OH}	Output HIGH Voltage I/O ₀ -I/O ₇	2.4	3.1		V	V _{CC} = MIN, I _{OH} = MAX	
V _{OH}	Output HIGH Voltage Q ₀ , Q ₇	2.7	3.4		V	V _{CC} = MIN, I _{OH} = MAX	
V _{OL}	Output LOW Voltage I/O ₀ -I/O ₇		0.25	0.4	V	I _{OL} = 12 mA	V _{CC} = V _{CC} MIN, V _{IN} = V _{IL} or V _{IH} per Truth Table
			0.35	0.5	V	I _{OL} = 24 mA	
V _{OL}	Output LOW Voltage I/O ₀ -I/O ₇			0.4	V	I _{OL} = 4.0 mA	V _{CC} = V _{CC} MIN, V _{IN} = V _{IL} or V _{IH} per Truth Table
				0.5	V	I _{OL} = 8.0 mA	
I _{OZH}	Output Off Current HIGH I/O ₀ -I/O ₇			40	μA	V _{CC} = MAX, V _{OUT} = 2.7 V	
I _{OZL}	Output Off Current LOW I/O ₀ -I/O ₇			-400	μA	V _{CC} = MAX, V _{OUT} = 0.4 V	
I _{IH}	Input HIGH Current	Others		20	μA	V _{CC} = MAX, V _{IN} = 2.7 V	
		S ₀ , S ₁ , I/O ₀ -I/O ₇		40	μA		
		Others		0.1	mA	V _{CC} = MAX, V _{IN} = 7.0 V	
		S ₀ , S ₁		0.2	mA		
		I/O ₀ -I/O ₇		0.1	mA		
I _{IL}	Input LOW Current	Others		-0.4	mA	V _{CC} = MAX, V _{IN} = 0.4 V	
		S ₀ , S ₁		-0.8	mA		
I _{OS}	Short Circuit Current (Note 1)	Q ₀ , Q ₇	-20	-100	mA	V _{CC} = MAX	
		I/O ₀ -I/O ₇	-30	-130	mA	V _{CC} = MAX	
I _{CC}	Power Supply Current			53	mA	V _{CC} = MAX	

Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

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AC CHARACTERISTICS ($T_A = 25^\circ\text{C}$, $V_{CC} = 5.0\text{ V}$)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
f_{MAX}	Maximum Clock Frequency	25	35		MHz	$C_L = 15\text{ pF}$
t_{PHL} t_{PLH}	Propagation Delay, Clock to Q_0 or Q_7		26 22	39 33	ns	
t_{PHL}	Propagation Delay, Clear to Q_0 or Q_7		27	40	ns	
t_{PHL} t_{PLH}	Propagation Delay, Clock to I/O_0 – I/O_7		26 17	39 25	ns	$C_L = 45\text{ pF}$, $R_L = 667\ \Omega$
t_{PHL}	Propagation Delay, Clear to I/O_0 – I/O_7		26	40	ns	
t_{PZH} t_{PZL}	Output Enable Time		13 19	21 30	ns	
t_{PHZ} t_{PLZ}	Output Disable Time		10 10	15 15	ns	$C_L = 5.0\text{ pF}$

AC SETUP REQUIREMENTS ($T_A = 25^\circ\text{C}$, $V_{CC} = 5.0\text{ V}$)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t_W	Clock Pulse Width HIGH	25			ns	$V_{CC} = 5.0\text{ V}$
t_W	Clock Pulse Width LOW	13			ns	
t_W	Clear Pulse Width LOW	20			ns	
t_s	Data Setup Time	20			ns	
t_s	Select Setup Time	35			ns	
t_h	Data Hold Time	0			ns	
t_h	Select Hold Time	10			ns	
t_{rec}	Recovery Time	20			ns	

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3-STATE WAVEFORMS

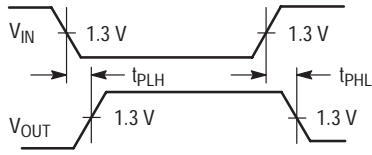


Figure 1.

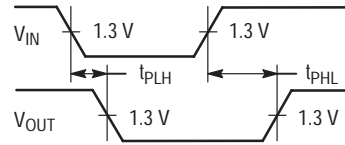


Figure 2.

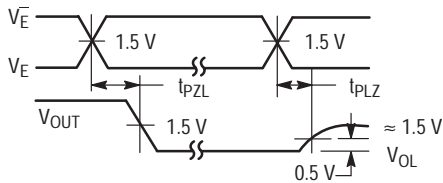


Figure 3.

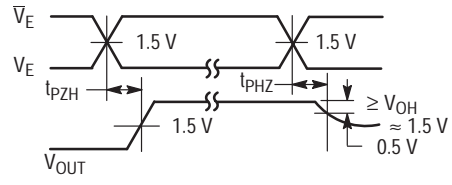
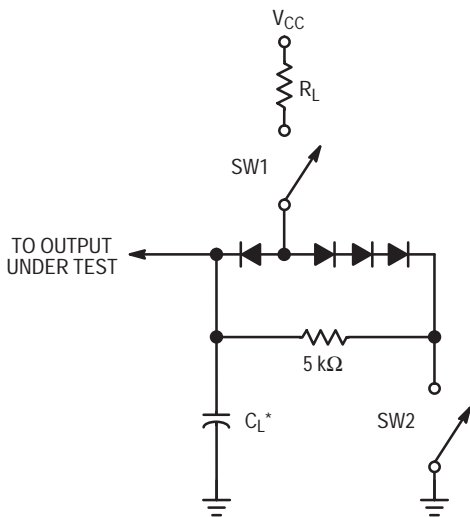


Figure 4.

AC LOAD CIRCUIT



* Includes Jig and Probe Capacitance.

Figure 5.

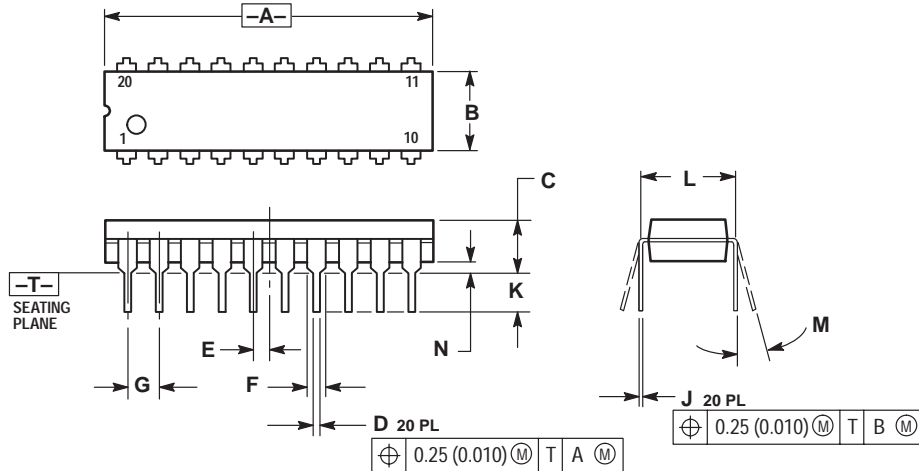
SWITCH POSITIONS

SYMBOL	SW1	SW2
t_{PZH}	Open	Closed
t_{PZL}	Closed	Open
t_{PLZ}	Closed	Closed
t_{PHZ}	Closed	Closed

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PACKAGE DIMENSIONS

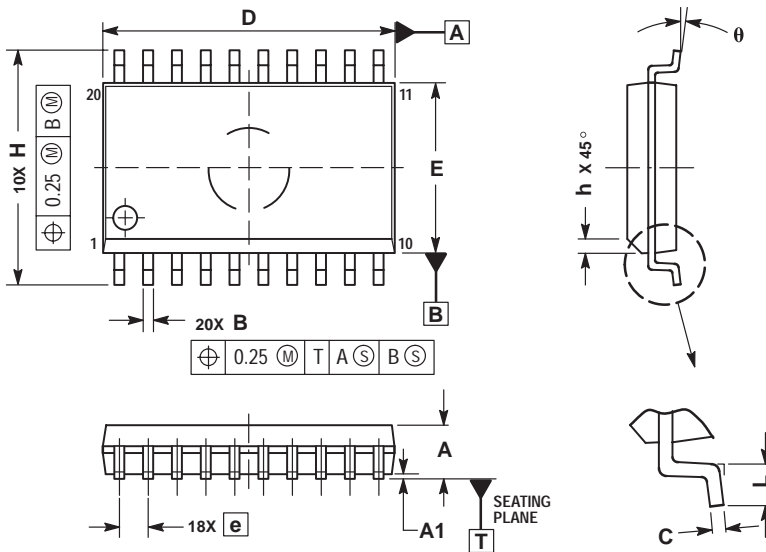
N SUFFIX PLASTIC PACKAGE CASE 738-03 ISSUE E



- 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

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
theta	0°	7°

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