

## Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

## Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

# 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<sub>0</sub> and Q<sub>7</sub> 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 <sub>CC</sub>	Supply Voltage	4.75	5.0	5.25	V
T <sub>A</sub>	Operating Ambient Temperature Range	0	25	70	°C
I <sub>OH</sub>	Output Current – High Q <sub>0</sub> , Q <sub>7</sub>			-0.4	mA
I <sub>OL</sub>	Output Current – Low Q <sub>0</sub> , Q <sub>7</sub>			8.0	mA
I <sub>OH</sub>	Output Current – High I/O <sub>0</sub> – I/O <sub>7</sub>			-2.6	mA
I <sub>OL</sub>	Output Current – Low I/O <sub>0</sub> – I/O <sub>7</sub>			24	mA

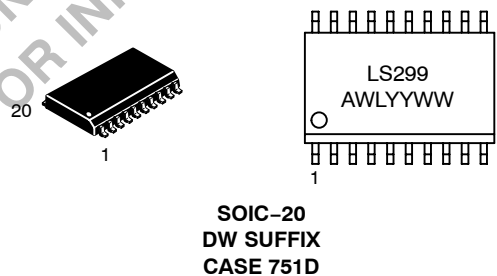
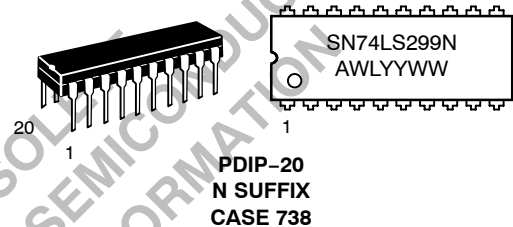


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### MARKING DIAGRAMS



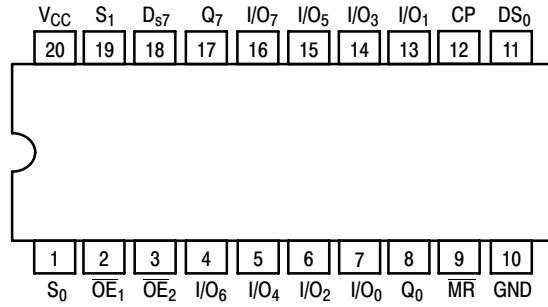
A = Assembly Location  
 WL = Wafer Lot  
 YY = Year  
 WW = Work Week

### ORDERING INFORMATION

Device	Package	Shipping
SN74LS299N	PDIP-20	1440 Units/Box
SN74LS299DW	SOIC-WIDE	38 Units/Rail
SN74LS299DWR2	SOIC-WIDE	2500/Tape & Reel

# SN74LS299

CONNECTION DIAGRAM DIP (TOP VIEW)

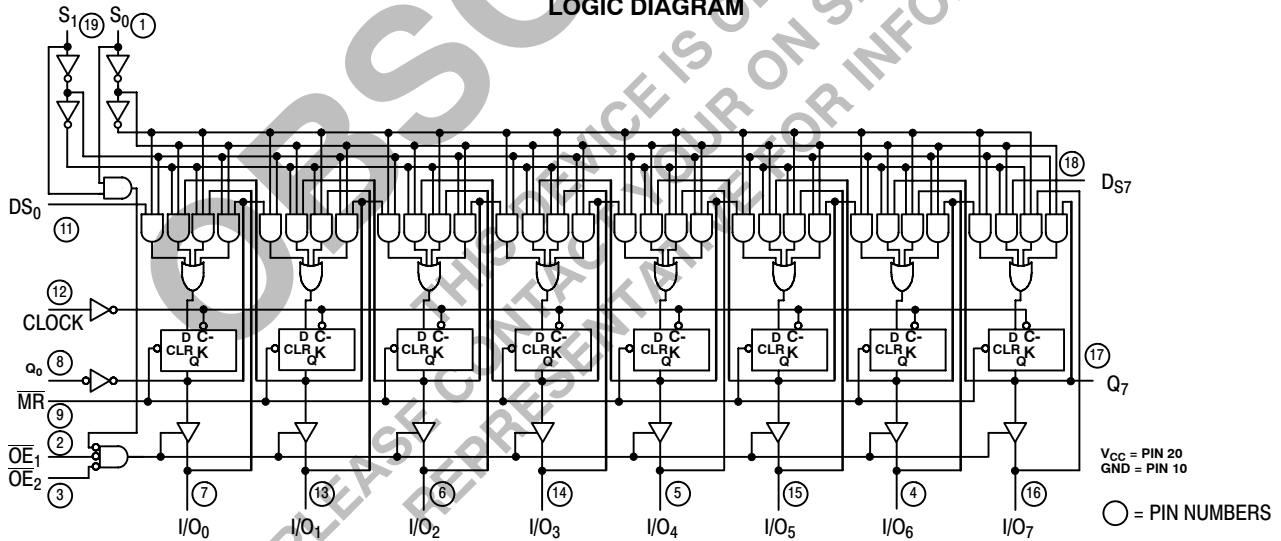


NOTE:  
The Flatpak version has the same pinouts (Connection Diagram) as the Dual In-Line Package.

PIN NAMES	LOADING (Note a)	
	HIGH	LOW
CP	0.5 U.L.	0.25 U.L.
DS0	0.5 U.L.	0.25 U.L.
DS7	0.5 U.L.	0.25 U.L.
I/O <sub>n</sub>	0.5 U.L.	0.25 U.L.
Parallel Output (3-State)	65 U.L.	15 U.L.
$\overline{OE}_1, \overline{OE}_2$	0.5 U.L.	0.25 U.L.
Q <sub>0</sub> , Q <sub>7</sub>	10 U.L.	5 U.L.
$\overline{MR}$	0.5 U.L.	0.25 U.L.
S <sub>0</sub> , S <sub>1</sub>	1 U.L.	0.5 U.L.

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

## LOGIC DIAGRAM



# SN74LS299

## FUNCTION TABLE

INPUTS								RESPONSE
MR	S <sub>1</sub>	S <sub>0</sub>	OE <sub>1</sub>	OE <sub>2</sub>	CP	DS <sub>0</sub>	DS <sub>7</sub>	
L	X	X	H	X	X	X	X	Asynchronous Reset; Q <sub>0</sub> = Q <sub>7</sub> = 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 <sub>0</sub> = Q <sub>7</sub> = LOW I/O Voltage LOW
L	X	L	L	L	X	X	X	
H	L	H	X	X	┌	D	X	Shift Right; D→Q <sub>0</sub> ; Q <sub>0</sub> →Q <sub>1</sub> ; etc.
H	L	H	L	L	└	D	X	
H	H	L	X	X	┌	X	D	Shift Left; D→Q <sub>7</sub> ; Q <sub>7</sub> →Q <sub>6</sub> ; etc.
H	H	L	L	L	└	X	D	
H	H	H	X	X	┌	X	X	Parallel Load; I/O <sub>n</sub> →Q <sub>n</sub>
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 <sub>n</sub> = Q <sub>n</sub>

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

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# SN74LS299

## 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 I/O <sub>0</sub> -I/O <sub>7</sub>	2.4	3.1		V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = MAX
V <sub>OH</sub>	Output HIGH Voltage Q <sub>0</sub> , Q <sub>7</sub>	2.7	3.4		V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = MAX
V <sub>OL</sub>	Output LOW Voltage I/O <sub>0</sub> -I/O <sub>7</sub>		0.25	0.4	V	I <sub>OL</sub> = 12 mA
			0.35	0.5	V	I <sub>OL</sub> = 24 mA
V <sub>OL</sub>	Output LOW Voltage I/O <sub>0</sub> -I/O <sub>7</sub>			0.4	V	I <sub>OL</sub> = 4.0 mA
				0.5	V	I <sub>OL</sub> = 8.0 mA
I <sub>OZH</sub>	Output Off Current HIGH I/O <sub>0</sub> -I/O <sub>7</sub>			40	μA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 2.7 V
I <sub>OZL</sub>	Output Off Current LOW I/O <sub>0</sub> -I/O <sub>7</sub>			-400	μA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0.4 V
I <sub>IH</sub>	Input HIGH Current	Others		20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V
		S <sub>0</sub> , S <sub>1</sub> , I/O <sub>0</sub> -I/O <sub>7</sub>		40	μA	
		Others		0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V
		S <sub>0</sub> , S <sub>1</sub>		0.2	mA	
		I/O <sub>0</sub> -I/O <sub>7</sub>		0.1	mA	
I <sub>IL</sub>	Input LOW Current	Others		-0.4	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4 V
		S <sub>0</sub> , S <sub>1</sub>		-0.8	mA	
I <sub>OS</sub>	Short Circuit Current (Note 1)	Q <sub>0</sub> , Q <sub>7</sub>	-20	-100	mA	V <sub>CC</sub> = MAX
		I/O <sub>0</sub> -I/O <sub>7</sub>	-30	-130	mA	V <sub>CC</sub> = MAX
I <sub>CC</sub>	Power Supply Current			53	mA	V <sub>CC</sub> = MAX

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

## SN74LS299

### 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	

# SN74LS299

## 3-STATE WAVEFORMS

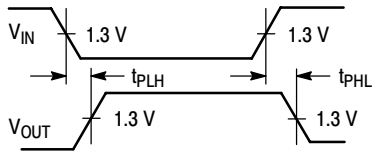


Figure 1.

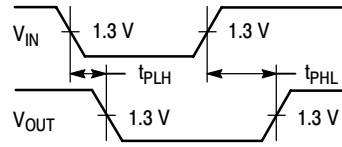


Figure 2.

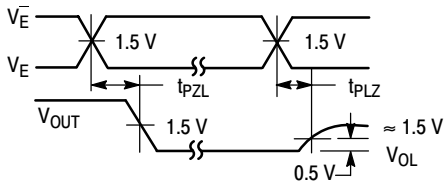


Figure 3.

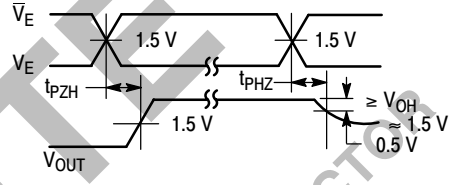
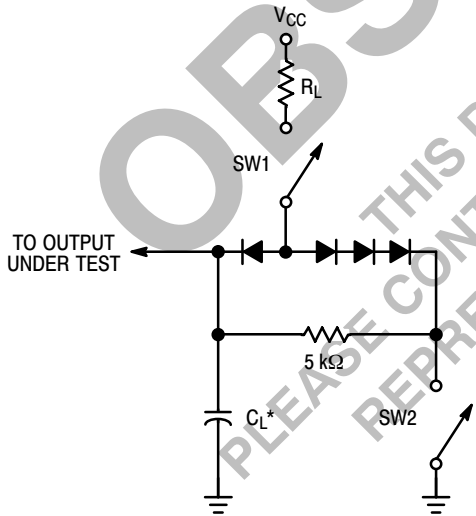


Figure 4.

## AC LOAD CIRCUIT



\* Includes Jig and Probe Capacitance.

## SWITCH POSITIONS

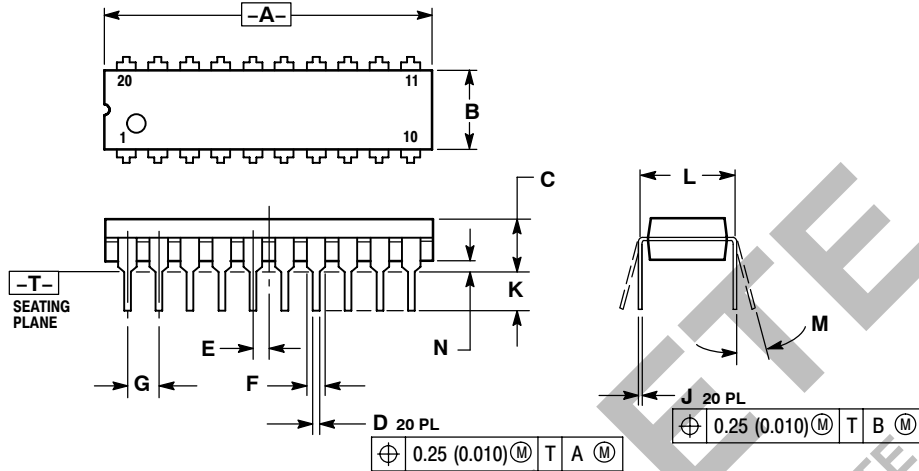
SYMBOL	SW1	SW2
$t_{PZH}$	Open	Closed
$t_{PZL}$	Closed	Open
$t_{PLZ}$	Closed	Closed
$t_{PHZ}$	Closed	Closed

Figure 5.

# SN74LS299

## PACKAGE DIMENSIONS

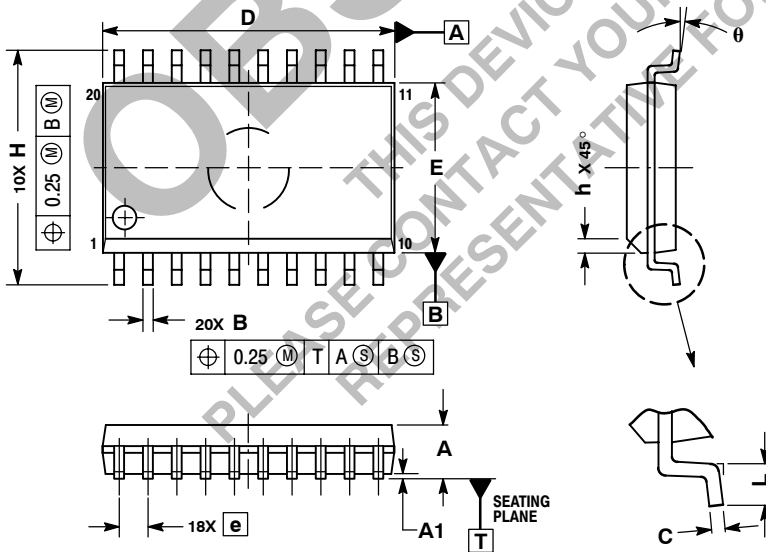
### N SUFFIX PLASTIC PACKAGE CASE 738-03 ISSUE E



- 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

### DW 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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