

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

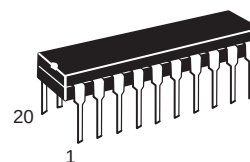


ON Semiconductor

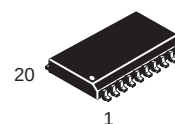
Formerly a Division of Motorola

<http://onsemi.com>

**LOW
POWER
SCHOTTKY**



**PLASTIC
N SUFFIX
CASE 738**



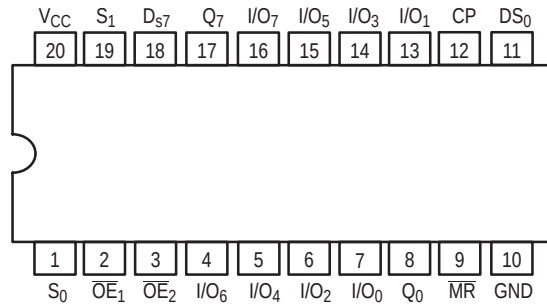
**SOIC
DW SUFFIX
CASE 751D**

ORDERING INFORMATION

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

SN74LS299

CONNECTION DIAGRAM DIP (TOP VIEW)



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

PIN NAMES

CP	Clock Pulse (Active Positive-Going Edge) Input
DS0	Serial Data Input for Right Shift
DS7	Serial Data Input for Left Shift
I/O _n	Parallel Data Input or Parallel Output (3-State)
OE ₁ , OE ₂	3-State Output Enable (Active LOW) Inputs
Q ₀ , Q ₇	Serial Outputs
MR	Asynchronous Master Reset (Active LOW) Input
S ₀ , S ₁	Mode Select Inputs

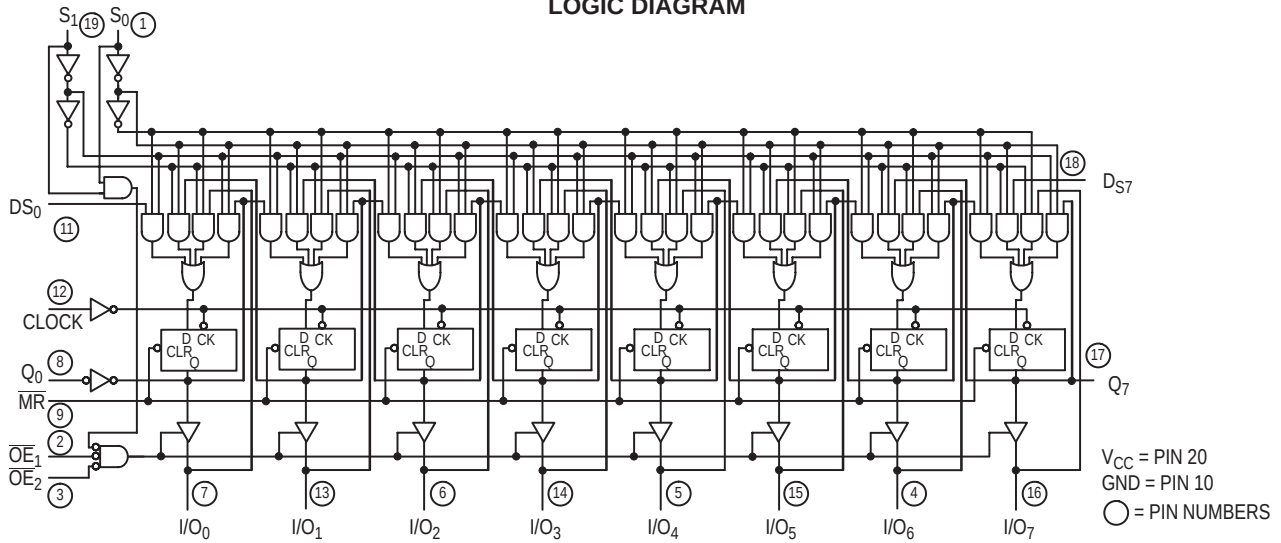
LOADING (Note a)

	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 _n	0.5 U.L.	0.25 U.L.
OE ₁ , OE ₂	0.5 U.L.	0.25 U.L.
Q ₀ , Q ₇	10 U.L.	5 U.L.
MR	0.5 U.L.	0.25 U.L.
S ₀ , S ₁	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



SN74LS299

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.
H	L	H	L	L		D	X	Shift Right; D→Q ₀ & I/O ₀ ; Q ₀ →Q ₁ & I/O ₁ ; etc.
H	H	L	X	X		X	D	Shift Left; D→Q ₇ ; Q ₇ →Q ₆ ; etc.
H	H	L	L	L		X	D	Shift Left; D→Q ₇ & I/O ₇ ; Q ₇ →Q ₆ & I/O ₆ ; etc.
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

SN74LS299

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	V _{CC} = MAX, V _{IN} = 5.5 V	
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.

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	

3-STATE WAVEFORMS

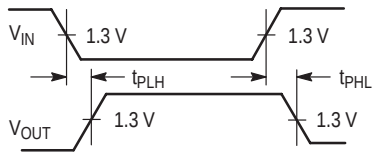


Figure 1.

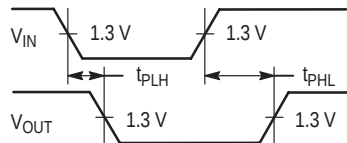


Figure 2.

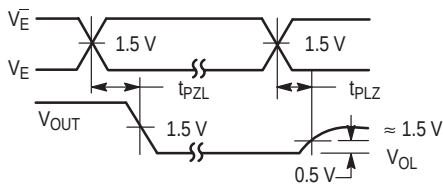


Figure 3.

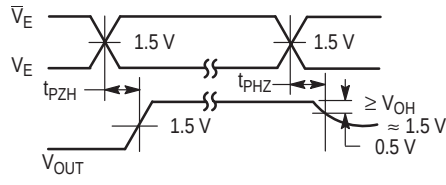
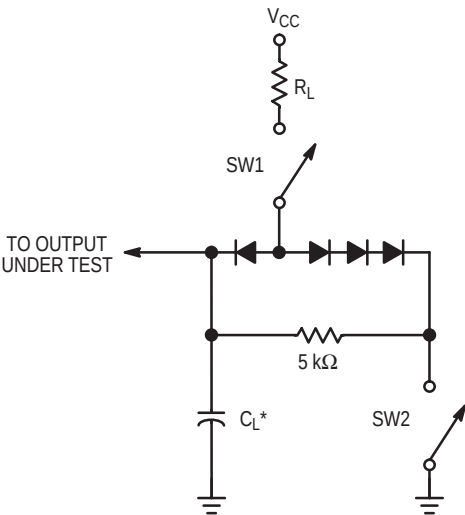


Figure 4.

AC LOAD CIRCUIT



* Includes Jig and Probe Capacitance.

Figure 5.

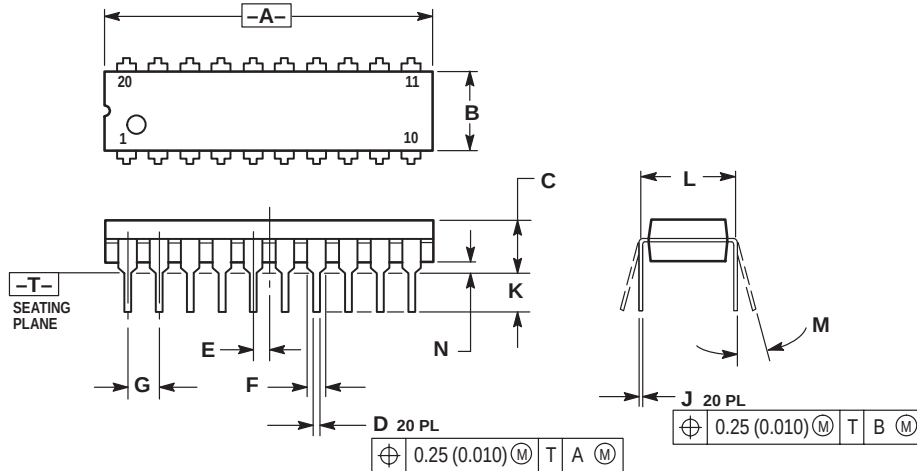
SWITCH POSITIONS

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

SN74LS299

PACKAGE DIMENSIONS

N SUFFIX PLASTIC PACKAGE CASE 738-03 ISSUE E

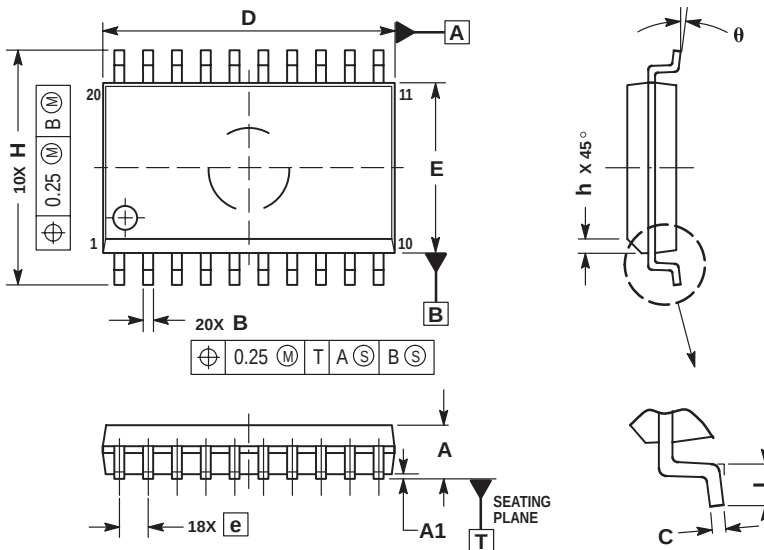


NOTES:

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

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°

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer.

PUBLICATION ORDERING INFORMATION

North America Literature Fulfillment:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

EUROPE: LDC for ON Semiconductor – European Support

German Phone: (+1) 303-308-7140 (M–F 2:30pm to 5:00pm Munich Time)
Email: ONlit-german@hibbertco.com
French Phone: (+1) 303-308-7141 (M–F 2:30pm to 5:00pm Toulouse Time)
Email: ONlit-french@hibbertco.com
English Phone: (+1) 303-308-7142 (M–F 1:30pm to 5:00pm UK Time)
Email: ONlit@hibbertco.com

ASIA/PACIFIC: LDC for ON Semiconductor – Asia Support

Phone: 303-675-2121 (Tue–Fri 9:00am to 1:00pm, Hong Kong Time)
Toll Free from Hong Kong 800-4422-3781
Email: ONlit-asia@hibbertco.com

JAPAN: ON Semiconductor, Japan Customer Focus Center
4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-8549

Phone: 81-3-5487-8345
Email: r14153@onsemi.com

Fax Response Line: 303-675-2167
800-344-3810 Toll Free USA/Canada

ON Semiconductor Website: <http://onsemi.com>

For additional information, please contact your local
Sales Representative.