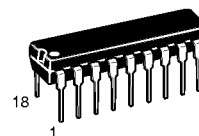


# 7-Segment LED Display Decoder/Driver with Serial Interface CMOS

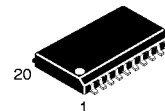
The MC14499 is a 7-segment alphanumeric LED decoder/driver with a serial interface port to provide communication with CMOS microprocessors and microcomputers. This device features NPN output drivers which allow interfacing to common cathode LED displays through external series resistors.

- High-Current Segment Drivers On-Chip
- CMOS MPU compatible Input Levels
- Wide Operating Voltage Range: 4.5 to 6.5 V
- Operating Temperature Range: 0 to 70°C
- Drives Four Characters with Decimal Points
- Also See MC14489

## MC14499



**P SUFFIX**  
PLASTIC DIP  
CASE 707

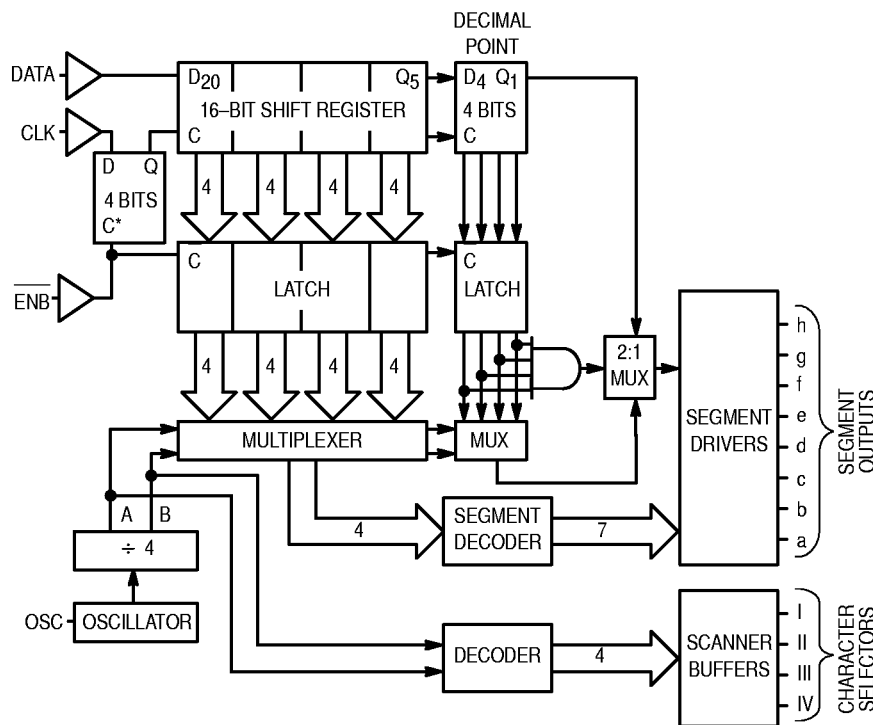


**DW SUFFIX**  
SOG PACKAGE  
CASE 751D

### ORDERING INFORMATION

MC14499P Plastic DIP  
MC14499DW SOG Package

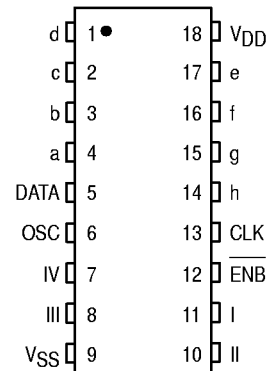
### BLOCK DIAGRAM



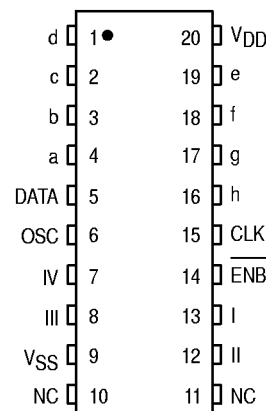
\* Transparent Latch

### PIN ASSIGNMENTS

#### PLASTIC DIP



#### SOG PACKAGE



NC = NO CONNECTION

**MAXIMUM RATINGS\*** (Voltages referenced to V<sub>SS</sub>)

Rating	Symbol	Value	Unit
DC Supply Voltage	V <sub>DD</sub>	- 0.5 to + 7	V
Input Voltage, All Inputs	V <sub>in</sub>	- 0.5 to V <sub>DD</sub> + 0.5	V
Storage Temperature Range	T <sub>stg</sub>	- 65 to + 150	°C

\* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the limits in the Electrical Characteristics table or Circuit Operation section.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields; however, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit. For proper operation, it is recommended that V<sub>in</sub> and V<sub>out</sub> be constrained to the range V<sub>SS</sub> ≤ (V<sub>in</sub> or V<sub>out</sub>) ≤ V<sub>DD</sub>.

**ELECTRICAL CHARACTERISTICS** (V<sub>DD</sub> = 4.5 to 6.5 V)

Characteristic	Symbol	0°C		25°C		70°C		Unit
		Min	Max	Min	Max	Min	Max	
Serial Port Input Voltage '0' Level '1' Level	V <sub>IL</sub>	—	0.3 × V <sub>DD</sub>	—	0.3 × V <sub>DD</sub>	—	0.3 × V <sub>DD</sub>	V
	V <sub>IH</sub>	0.7 × V <sub>DD</sub>	—	0.7 × V <sub>DD</sub>	—	0.7 × V <sub>DD</sub>	—	
Serial Port Input Current (V <sub>in</sub> = 0 to V <sub>DD</sub> )	I <sub>in</sub>	—	± 0.1	—	± 0.1	—	± 1.0	µA
Oscillator Input Voltage '0' Level '1' Level	V <sub>IL</sub>	—	0.25 × V <sub>DD</sub>	—	0.25 × V <sub>DD</sub>	—	0.2 × V <sub>DD</sub>	V
	V <sub>IH</sub>	0.75 × V <sub>DD</sub>	—	0.75 × V <sub>DD</sub>	—	0.8 × V <sub>DD</sub>	—	
Oscillator Input Current V <sub>OSC</sub> = 0 V <sub>OSC</sub> = V <sub>DD</sub>	I <sub>IL</sub>	—	100	30	80	10	—	µA
	I <sub>IH</sub>	—	- 100	- 30	- 80	- 10	—	
Segment Driver Voltage Below V <sub>DD</sub> I <sub>out</sub> = 50 mA I <sub>out</sub> = 10 mA	ΔV <sub>OH</sub>	—	1.1	—	1.0	—	1.1	V
		—	0.8	—	0.75	—	0.8	
Segment Driver Off Leakage V <sub>out</sub> = 0	I <sub>OZ</sub>	—	100	—	50	—	100	µA
Digit Drivers Source (On) Sink (Off)	I <sub>OH</sub> I <sub>OL</sub>	6	—	5.5	—	4	—	mA
		- 0.2	—	- 0.2	—	- 0.1	—	
Supply Current V <sub>in</sub> = 0, I <sub>out</sub> = 0, C <sub>OSC</sub> = 0.015 µF	I <sub>DD</sub>	—	1	—	1	—	1	mA
Maximum Power Dissipation	P <sub>D</sub>	—	500	—	500	—	500	mW

**SWITCHING CHARACTERISTICS** (V<sub>DD</sub> = 5 V ± 10%, T<sub>A</sub> = 0 to 70°C)

Characteristic	Figure No.	Symbol	Min	Max	Unit
Clock High Time	2	t <sub>CH</sub>	2	—	µs
Clock Low Time	2	t <sub>CL</sub>	2	—	µs
Clock Rise Time	2	t <sub>CR</sub>	—	2	µs
Clock Fall Time	2	t <sub>CF</sub>	—	2	µs
Enable Lead Time	2	t <sub>E LEAD</sub>	200	—	ns
Enable Lag Time	2	t <sub>E LAG</sub>	200	—	ns
Data Set-Up Time	2	t <sub>D SUP</sub>	200	—	ns
Data Hold Time	2	t <sub>D HOLD</sub>	1	—	µs
Scanner Frequency*	4	1/t <sub>SCAN</sub>	50	300	Hz
OSC/Digit Lead Time	4	t <sub>OD</sub>	—	10	µs
OSC/Segment Lead Time	4	t <sub>OS</sub>	—	10	µs
Digit Overlap	4	t <sub>OV</sub>	—	5	µs

\* Scanner Capacitance = 0.022 µF.



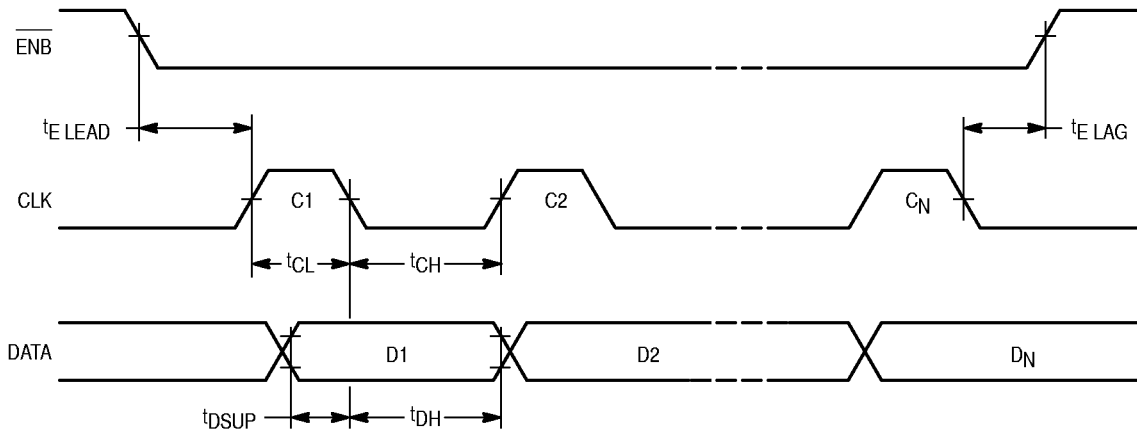


Figure 2a. Serial Input, Positive Clock

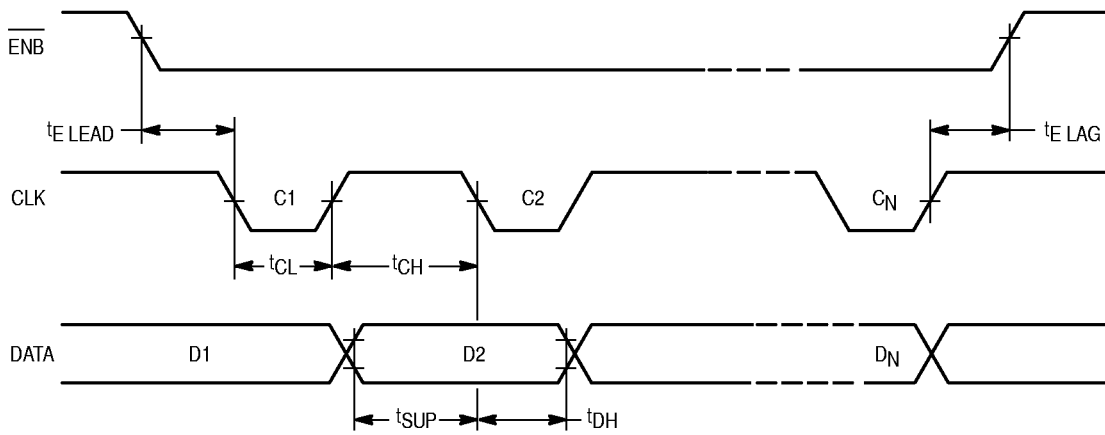


Figure 2b. Serial Input, Negative Clock

Figure 2. Serial Input

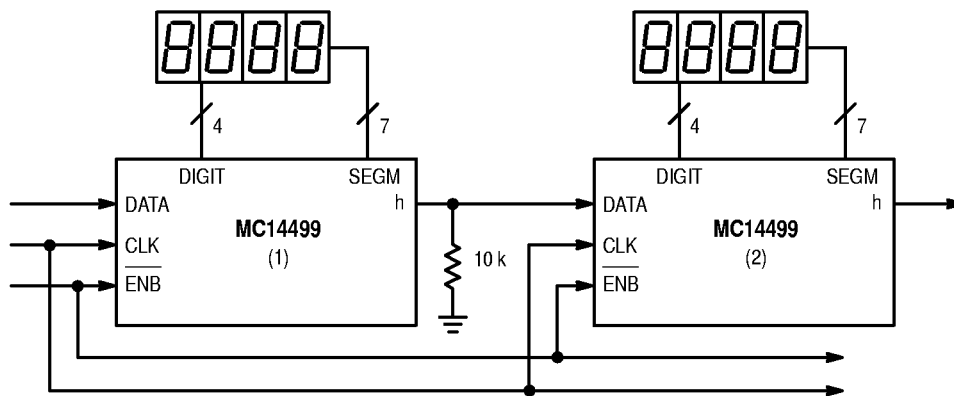


Figure 3. Cascading MC14499s

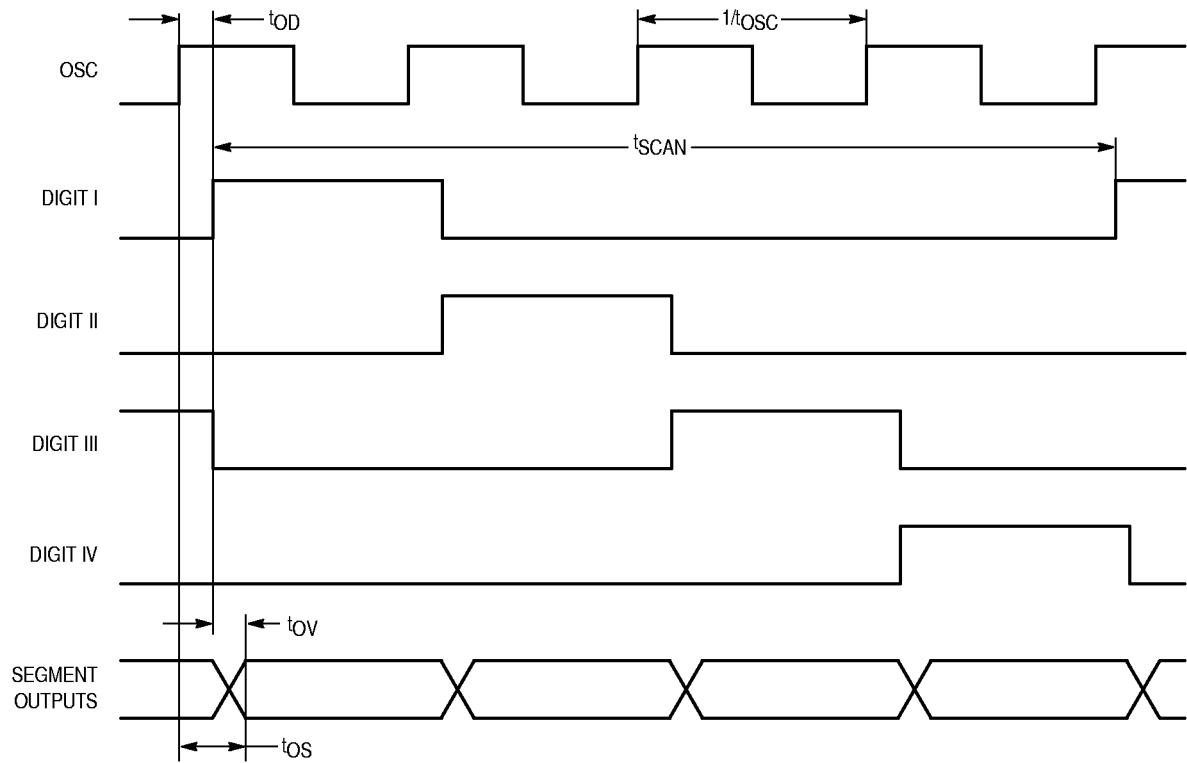


Figure 4. Scanner Waveforms

0000	0	1000	8
0001	1	1001	9
0010	2	1010	A
0011	3	1011	1
0100	4	1100	11
0101	5	1101	U
0110	6	1110	DASH -
0111	7	1111	BLANK

Figure 5. Segment Code

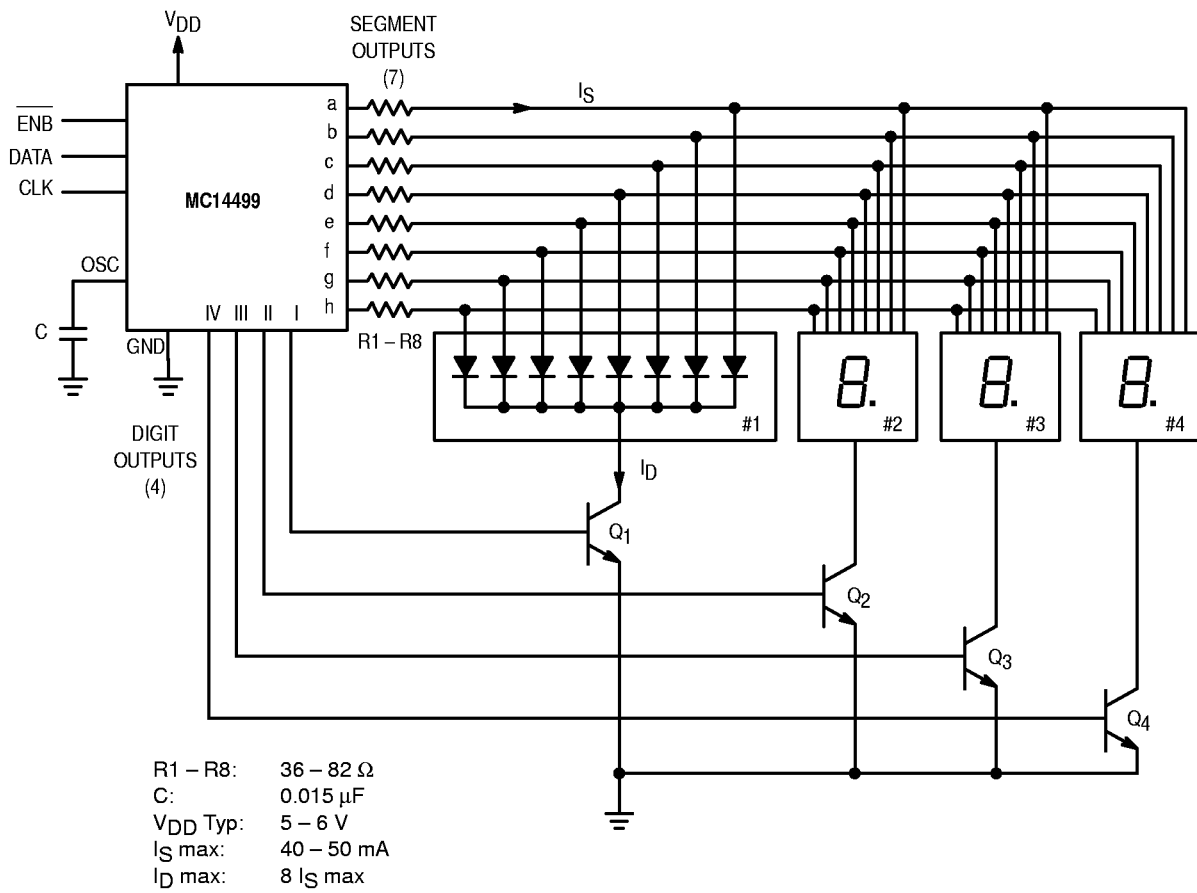
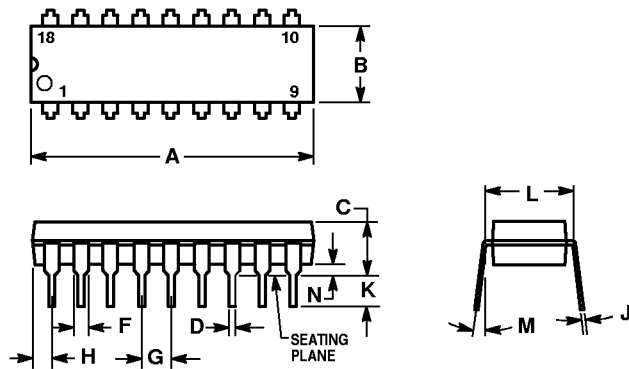


Figure 6. Application Example

## PACKAGE DIMENSIONS

### P SUFFIX PLASTIC DIP CASE 707-02

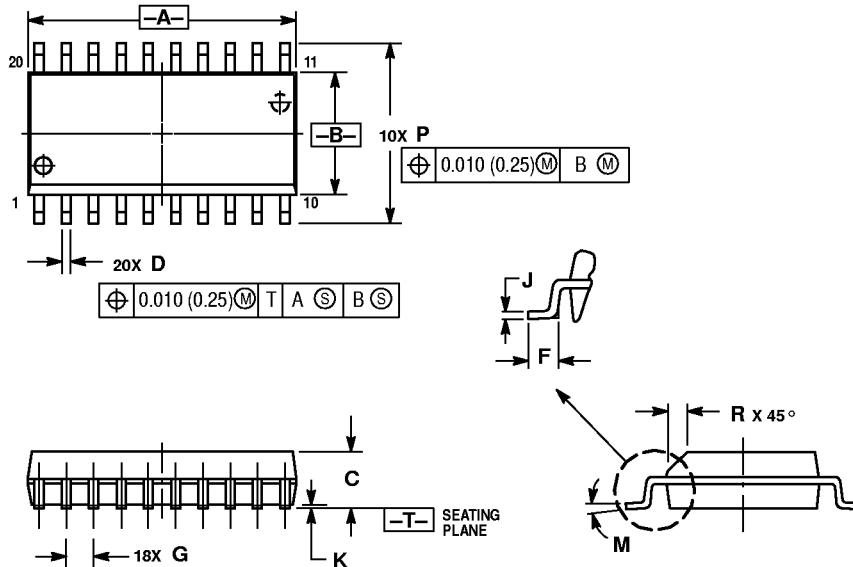


**NOTES:**

1. POSITIONAL TOLERANCE OF LEADS (D), SHALL BE WITHIN 0.25 (0.010) AT MAXIMUM MATERIAL CONDITION, IN RELATION TO SEATING PLANE AND EACH OTHER.
2. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
3. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	22.22	23.24	0.875	0.915
B	6.10	6.60	0.240	0.260
C	3.56	4.57	0.140	0.180
D	0.36	0.56	0.014	0.022
F	1.27	1.78	0.050	0.070
G	2.54 BSC		0.100 BSC	
H	1.02	1.52	0.040	0.060
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.02	0.020	0.040

### DW SUFFIX SOG PACKAGE CASE 751D-04



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.150 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029