

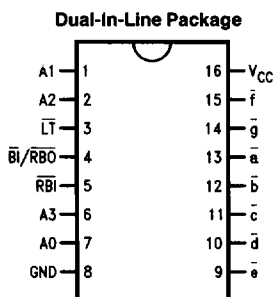


## 54LS247/DM74LS247 BCD to 7-Segment Decoder/Driver with Open-Collector Outputs

### General Description

The 'LS247 has active LOW open-collector outputs guaranteed to sink 12 mA (Military) or 24 mA (Commercial). It has the same electrical characteristics and pin connections as the 'LS47. The only difference is that the 'LS247 will light the top bar (segment a) for numeral 6 and the bottom bar (segment d) for number 9. For detailed description and specifications please refer to the 'LS47 data sheet.

### Connection Diagram

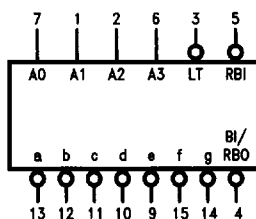


TL/F/9822-1

Order Number 54LS247DMQB, 54LS247FMQB,  
DM74LS247M or DM74LS247N

See NS Package Number J16A, M16A, N16E or W16A

### Logic Symbol



V<sub>CC</sub> = Pin 16  
GND = Pin 8

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Pin Names	Description
A0-A3	BCD Inputs
RBI	Ripple Blanking Input (Active LOW)
LT	Lamp Test Input (Active LOW)
BI/RBO	Blanking Input (Active LOW) or Ripple Blanking Output (Active LOW)
a-g	Segment Outputs (Active LOW)

## Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7V
Input Voltage	7V
Operating Free Air Temperature Range	
54LS	-55°C to +125°C
DM74LS	0°C to +70°C
Storage Temperature Range	-65°C to +150°C

Note: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

## Recommended Operating Conditions

Symbol	Parameter	54LS247			DM74LS247			Units
		Min	Nom	Max	Min	Nom	Max	
V <sub>CC</sub>	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub>	High Level Input Voltage	2			2			V
V <sub>IL</sub>	Low Level Input Voltage			0.7			0.8	V
I <sub>OH</sub>	High Level Output Current			-50			-50	μA
I <sub>OL</sub>	Low Level Output Current			12			24	mA
T <sub>A</sub>	Free Air Operating Temperature	-55		125	0		70	°C

## Electrical Characteristics over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = -18 mA			-1.5	V
V <sub>OH</sub>	High Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OH</sub> = Max V <sub>IL</sub> = Max	54LS 2.4			V
			DM74LS 2.4	3.4		
I <sub>OFF</sub>	Output High Current Segment Outputs	V <sub>CC</sub> = 5.5V, V <sub>M</sub> = 15V			250	μA
V <sub>OL</sub>	Low Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = Max V <sub>IH</sub> = Min	54LS DM74LS		0.5 0.5	V
		I <sub>OL</sub> = 12 mA, V <sub>CC</sub> = Min	DM74LS	0.25	0.5	
I <sub>I</sub>	Input Current @ Max Input Voltage	V <sub>CC</sub> = Max, V <sub>I</sub> = 10V			0.1	mA
I <sub>IH</sub>	High Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 2.7V			20	μA
I <sub>IL</sub>	Low Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V			-0.4	mA
		V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V BI/RBO Input			-1.2	mA
I <sub>OS</sub>	Short Circuit Output Current	V <sub>CC</sub> = Max (Note 2)	54LS	-0.3	-2.0	mA
			DM74LS	-0.3	-2.0	
I <sub>CC</sub>	Supply Current	V <sub>CC</sub> = Max			13	mA

Note 1: All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

**Switching Characteristics**  $V_{CC} = +5V$ ,  $T_A = +25^\circ C$  (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	$R_L = 2\text{ k}\Omega$ (54LS = 685 $\Omega$ )		Units
		$C_L = 15\text{ pF}$		
		Min	Max	
$t_{PLH}$	Propagation Delay Time Low to High Level Output		100	ns
$t_{PLH}$	Propagation Delay Time High to Low Level Output		100	ns