National Semiconductor

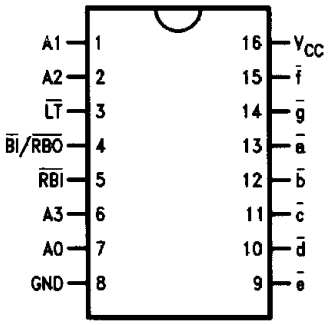
54LS247/DM74LS247
BCD to 7-Segment Decoder/Driver with Open-Collector Outputs

General Description

The 'LS247 has active LOW open-collector outputs guaranteed to sink 12 mA (Military) or 24 mA (Commercial). It has the same electrial characteristics and pin connections as the 'LS47. The only difference is that the 'LS247 will ight 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

Dual-In-Line Package



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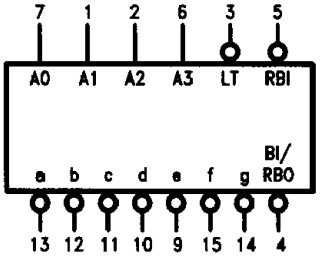
Order Number 54LS247DMQB, 54LS247FMQB, DM74LS247M or DM74LS247N
See NS Package Number J16A, M16A, N16E or W16A

Logic Symbol



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V_{CC} = Pin 16
GND = Pin 8

Pin Names	Description
A0–A3	BCD Inputs
$\overline{RBI}$	Ripple Blanking Input (Active LOW)
$\overline{LT}$	Lamp Test Input (Active LOW)
$\overline{BI}/\overline{RBO}$	Blanking Input (Avtive LOW) or Ripple Blanking Output (Active LOW)
$\overline{a}$–$\overline{g}$	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_{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.7			0.8	V
I_{OH}	High Level Output Current			−50			−50	μa
I_{OL}	Low Level Output Current			12			24	mA
T_A	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_I	Input Clamp Voltage	V_{CC} = Min, I_I = − 18 mA				−1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max	54LS	2.4			V
			DM74LS	2.4	3.4		
I_{OFF}	Output High Current Segement Outputs	V_{CC} = 5.5V, V_M = 15V				250	μA
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IH} = Min	54LS			0.5	V
			DM74LS		0.35	0.5	
		I_{OL} = 12 mA, V_{CC} = Min	DM74LS		0.25	0.5	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 10V				0.1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.7V				20	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.4V				−0.4	mA
		V_{CC} = Max, V_I = 0.4V, $\overline{BI}/\overline{RBO}$ Input				−1.2	mA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	54LS	−0.3		−2.0	mA
			DM74LS	−0.3		−2.0	
I_{CC}	Supply Current	V_{CC} = Max				13	mA

Note 1: All typicals are at V_{CC} = 5V, T_A = 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 $V_{CC} = +5V, T_A = +25°C$ (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	$R_L = 2\ k\Omega$ (54LS = 665Ω) $C_L = 15\ pF$		Units
		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