SN74LS247

BCD-to-Seven-Segment Decoders/Drivers

The SN74LS247 is a BCD-to-Seven-Segment Decoder/Drivers.

The LS247 composes the 6 and 9 with the tails. The LS247 has active-low outputs for direct drive of indicators.

The LS247 features a lamp test input and have full ripple-blanking input/output controls. An automatic leading and/or trailing-edge zero-blanking control (RBI and RBO) is incorporated and an overriding blanking input (BI) is contained which may be used to control the lamp intensity by pulsing or to inhibit the output's lamp test may be performed at any time when the BI/RBO node is at high level. Segment identification and resultant displays are shown below. Display pattern for BCD input counts above 9 are unique symbols to authenticate input conditions.

- Open-Collector Outputs Drive Indicators Directly
- Lamp-Test Provision
- Leading/Trailing Zero Suppression

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 BI/RBO			–50	μA
I_{OL}	Output Current – Low BI/RBO			3.2	mA
$V_{O(off)}$	Off–State Output Voltage a – g			15	V
$I_{O(on)}$	On–State Output Current a – g			24	mA

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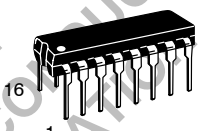
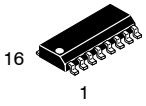
LOW POWER SCHOTTKY



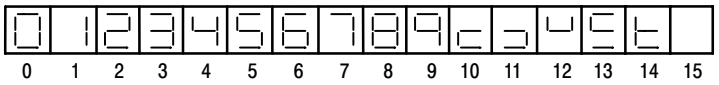
PLASTIC
N SUFFIX
CASE 648



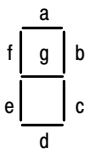
SOIC
D SUFFIX
CASE 751B

ORDERING INFORMATION

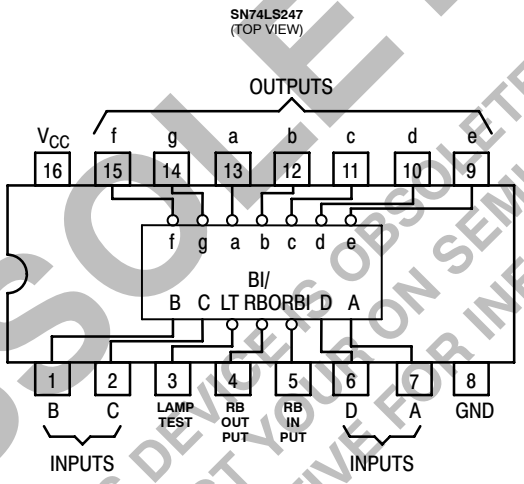
Device	Package	Shipping
SN74LS247N	16 Pin DIP	2000 Units/Box
SN74LS247D	SOIC–16	38 Units/Rail
SN74LS247DR2	SOIC–16	2500/Tape & Reel



NUMERICAL DESIGNATIONS AND RESULTANT DISPLAYS



SEGMENT IDENTIFICATION

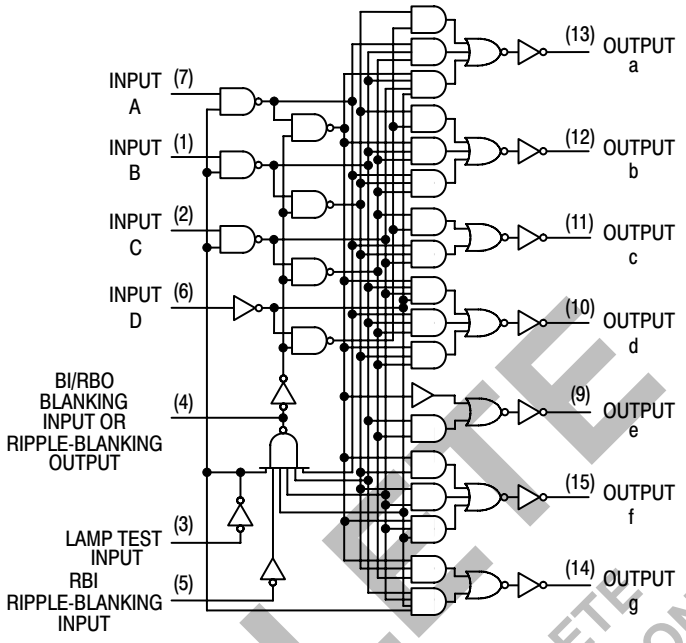


CIRCUIT FEATURES LAMP INTENSITY MODULATION CAPABILITY

TYPE	DRIVER OUTPUTS				TYPICAL POWER DISSIPATION
	ACTIVE LEVEL	OUTPUT CONFIGURATION	SINK CURRENT	MAX VOLTAGE	
SN74LS247	low	open-collector	24 mA	15 V	35 mW

LOGIC DIAGRAM

LS247



LS247
FUNCTION TABLE

DECIMAL OR FUNCTION	INPUTS						BI/RBO†	OUTPUTS							NOTE
	LT	RBI	D	C	B	A		a	b	c	d	e	f	g	
0	H	H	L	L	L	L	H	ON	ON	ON	ON	ON	ON	OFF	
1	H	X	L	L	L	H	H	OFF	ON	ON	OFF	OFF	OFF	OFF	
2	H	X	L	L	H	L	H	ON	ON	OFF	ON	ON	OFF	ON	
3	H	X	L	L	H	H	H	ON	ON	ON	ON	OFF	OFF	ON	
4	H	X	L	H	L	L	H	OFF	ON	ON	OFF	OFF	ON	ON	
5	H	X	L	H	L	H	H	ON	OFF	ON	ON	OFF	ON	ON	
6	H	X	L	H	H	L	H	ON	OFF	ON	ON	ON	ON	ON	
7	H	X	L	H	H	H	H	ON	ON	ON	OFF	OFF	OFF	OFF	1
8	H	X	H	L	L	L	H	ON	ON	ON	ON	ON	ON	ON	
9	H	X	H	L	L	H	H	ON	ON	ON	ON	OFF	ON	ON	
10	H	X	H	L	H	L	H	OFF	OFF	OFF	ON	ON	OFF	ON	
11	H	X	H	L	H	H	H	OFF	OFF	ON	ON	OFF	OFF	ON	
12	H	X	H	H	L	L	H	OFF	ON	OFF	OFF	OFF	ON	ON	
13	H	X	H	H	L	H	H	ON	OFF	OFF	ON	OFF	ON	ON	
14	H	X	H	H	H	L	H	OFF	OFF	OFF	ON	ON	ON	ON	
15	H	X	H	H	H	H	H	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
BI	X	X	X	X	X	X	L	OFF	OFF	OFF	OFF	OFF	OFF	OFF	2
RBI	H	L	L	L	L	L	L	OFF	OFF	OFF	OFF	OFF	OFF	OFF	3
LT	L	X	X	X	X	X	H	ON	ON	ON	ON	ON	ON	ON	4

H = HIGH Level, L = LOW Level, X = Irrelevant

NOTES:
1. The blanking input (BI) must be open or held at a high logic level when output functions 0 through 15 are desired. The ripple-blanking input (RBI) must be open or high if blanking of a decimal zero is not desired.
2. When a low logic level is applied directly to the blanking input (BI), all segment outputs are off regardless of the level of any other input.
3. When ripple-blanking input (RBI) and inputs A, B, C, and D are at a low level with the lamp test input high, all segment outputs go off and the ripple-blanking output (RBO) goes to a low level (response condition).
4. When the blanking input/ripple blanking output (BI/RBO) is open or held high and a low is applied to the lamp-test input, all segment outputs are on.

† BI/RBO is wire-AND logic serving as blanking input (BI) and/or ripple-blanking output (RBO).

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 BI/RBO	2.4	4.2		V	V_{CC} = MIN, I_{OH} = MAX, V_{IN} = V_{IH} or V_{IL} per Truth Table	
V_{OL}	Output LOW Voltage BI/RBO		0.25	0.4	V	I_{OL} = 1.6 mA	V_{CC} = V_{CC} MIN, V_{IN} = V_{IL} or V_{IH} per Truth Table
			0.35	0.5	V	I_{OL} = 3.2 mA	
$I_{O(off)}$	Off-State Output Current a−g			250	μA	V_{CC} = MAX, V_{IH} = 2.0 V, $V_{O(off)}$ = 15 V, V_{IL} = MAX	
$V_{O(on)}$	On-State Output Voltage a−g		0.25	0.4	V	$I_{O(on)}$ = 12 mA	V_{CC} = MIN, V_{IH} = 2.0 V, V_{IL} per Truth Table
			0.35	0.5	V	$I_{O(on)}$ = 24 mA	
I_{IH}	Input HIGH Current			20	μA	V_{CC} = MAX, V_{IN} = 2.7 V	
				0.1	mA	V_{CC} = MAX, V_{IN} = 7.0 V	
I_{IL}	Input LOW Current Any Input, except BI/RBO			−0.4	mA	V_{CC} = MAX, V_{IN} = 0.4 V	
	BI/RBO			−1.2			
I_{OS}	Short Circuit Current BI/RBO (Note 1)	−0.3		−2.0	mA	V_{CC} = MAX	
I_{CC}	Power Supply Current		7.0	13	mA	V_{CC} = MAX	

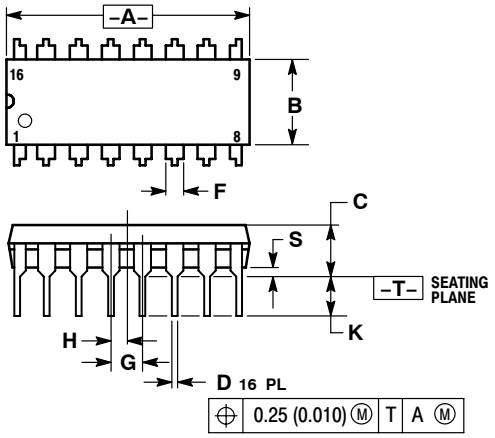
Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

AC CHARACTERISTICS (V_{CC} = 5.0 V, T_A = 25°C)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t_{PLH} t_{PHL}	Turn-Off Time from A Input Turn-On Time from A Input			100 100	ns	C_L = 15 pF, R_L = 665 Ω
t_{PHL} t_{PLH}	Turn-Off Time from RBI Input Turn-On Time from RBI Input			100 100	ns	

PACKAGE DIMENSIONS

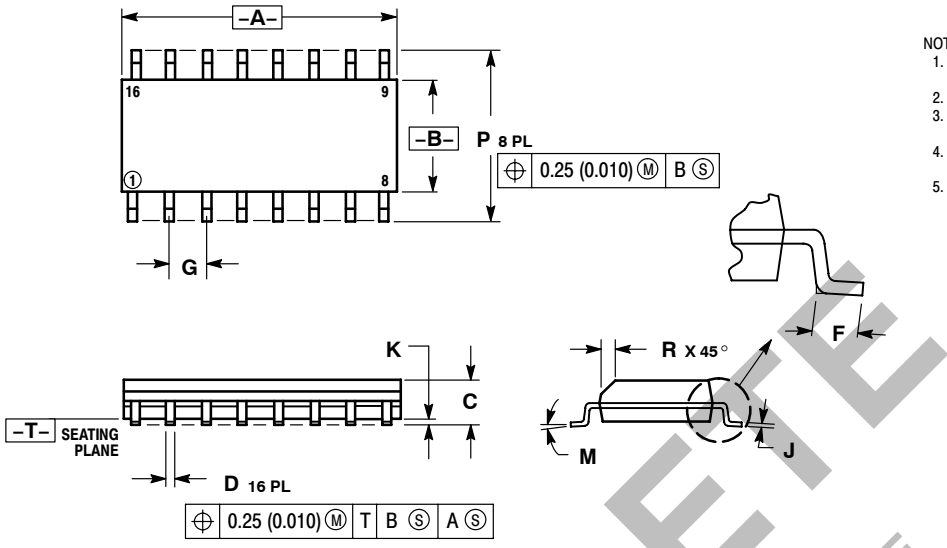
N SUFFIX
PLASTIC PACKAGE
CASE 648−08
ISSUE R



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0 °	10 °	0 °	10 °
S	0.020	0.040	0.51	1.01

D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751B–05
ISSUE J



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 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

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