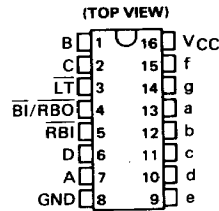


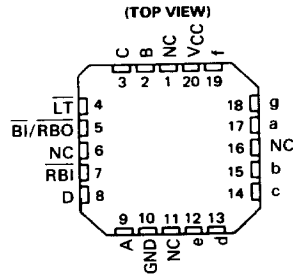
**TYPES SN54LS447, SN74LS447**  
**BCD-TO-SEVEN-DECODERS/DRIVERS**  
 D2428, NOVEMBER 1977—REVISED DECEMBER 1983

- Low-Voltage Version of SN54LS247/SN74LS247
- Open-Collector Outputs Drive Indicators Directly
- Lamp-Test Provision
- Leading/Trailing Zero Suppression
- Lamp Intensity Modulation Capability

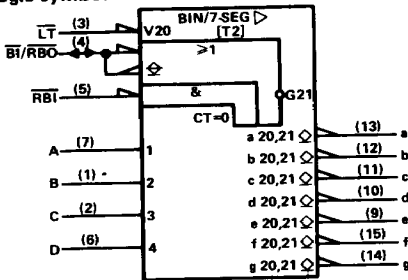
SN54LS447 ... J PACKAGE  
 SN74LS447 ... D, J OR N PACKAGE



SN54LS447 ... FK PACKAGE  
 SN74LS447 ... FN PACKAGE



logic symbol



Pin numbers shown on logic notation are for D, J or N packages.

NC - No internal connection

**FUNCTION TABLE**

DECIMAL OR FUNCTION	INPUTS					BI/RBO <sup>1</sup>	OUTPUTS							NOTE
	LT	RBI	D	C	B		A	a	b	c	d	e	f	
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	OFF	ON	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
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	ON	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	ON	ON	ON	ON	ON
14	H	X	H	H	H	L	H	OFF	OFF	OFF	ON	ON	ON	OFF
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
RBI	H	L	L	L	L	L	L	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LT	L	X	X	X	X	X	H	ON	ON	ON	ON	ON	ON	ON

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.

<sup>1</sup>BI/RBO is wire-AND logic serving as blanking input (BI) and/or ripple-blanking output (RBO).

**TEXAS INSTRUMENTS**

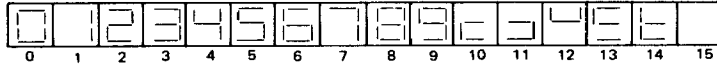
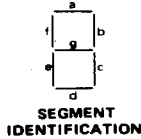
POST OFFICE BOX 225012 • DALLAS, TEXAS 75265

3-1109

3  
TTL DEVICES

# TYPES SN54LS447, SN74LS447 BCD-TO-SEVEN-SEGMENT DECODERS/DRIVERS

TYPE	DRIVER OUTPUTS				TYPICAL POWER DISSIPATION	PACKAGES
	ACTIVE LEVEL	OUTPUT CONFIGURATION	SINK CURRENT	MAX VOLTAGE		
SN54LS447	low	open-collector	12 mA	7 V	35 mW	J
SN74LS447	low	open-collector	24 mA	7 V	35 mW	J, N



FONT TABLE T2 - NUMERICAL DESIGNATIONS AND RESULTANT DISPLAYS

### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage	7 V
Peak output current ( $t_W \leq 1$ ms, duty cycle $\leq 10\%$ )	200 mA
Current forced into any output in the off state	1 mA
Operating free-air temperature range: SN54LS447	$-55^\circ\text{C}$ to $125^\circ\text{C}$
SN74LS447	$0^\circ\text{C}$ to $70^\circ\text{C}$
Storage temperature range	$-65^\circ\text{C}$ to $150^\circ\text{C}$

NOTE 1: Voltage values are with respect to network ground terminal.

### recommended operating conditions

	SN54LS447			SN74LS447			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, $V_{CC}$	4.5	5	5.5	4.75	5	5.25	V
Off-state output voltage, $V_{O(off)}$	a thru g			7			V
On-state output current, $I_{O(on)}$	a thru g			12			24 mA
High-level output current, $I_{OH}$	BI/RBO			-50			-50 $\mu\text{A}$
Low-level output current, $I_{OL}$	BI/RBO			1.6			3.2 mA
Operating free-air temperature, $T_A$	-55			125			0 70 $^\circ\text{C}$

3

TTL DEVICES

3-1110

TEXAS  
INSTRUMENTS

POST OFFICE BOX 225012 • DALLAS, TEXAS 75265

# TYPES SN54LS447, SN74LS447 BCD-TO-SEVEN-SEGMENT DECODERS/DRIVERS

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	SN54LS447		SN74LS447		UNIT
		MIN	TYP‡	MAX	MIN	
V <sub>IH</sub> High-level input voltage		2		0.7		V
V <sub>IL</sub> Low-level input voltage				-1.5		V
V <sub>IK</sub> Input clamp voltage	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA					V
V <sub>OH</sub> High-level output voltage	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL</sub> max, I <sub>OH</sub> = -50 µA	2.4	4.2	2.4	4.2	V
V <sub>OL</sub> Low-level output voltage	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL</sub> max, I <sub>OL</sub> = 1.6 mA	0.25 0.4		0.25 0.4		V
	I <sub>OL</sub> = 3.2 mA			0.35 0.5		V
I <sub>O(off)</sub> Off-state output current	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL</sub> max, V <sub>O(off)</sub> = 7 V	250		250		µA
V <sub>O(on)</sub> On-state output voltage	V <sub>CC</sub> = MAX, I <sub>O(on)</sub> = 12 mA, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL</sub> max, I <sub>O(on)</sub> = 24 mA	0.25 0.4		0.25 0.4		V
				0.35 0.5		V
I <sub>I</sub> Input current at maximum input voltage	V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V	0.1		0.1		mA
I <sub>IH</sub> High-level input current	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V	20		20		µA
I <sub>IL</sub> Low-level input current	Any input except $\overline{\text{BI}}/\overline{\text{RBO}}$ V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V	-0.4		-0.4		mA
		-1.2		-1.2		mA
I <sub>OS</sub> Short-circuit output current	V <sub>CC</sub> = MAX	-0.3	-2	-0.3	-2	mA
I <sub>CC</sub> Supply current	V <sub>CC</sub> = MAX, See Note 2	7	13	7	13	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25° C.

NOTE 2: I<sub>CC</sub> is measured with all outputs open and all inputs at 4.5 V.

switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25° C

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>off</sub> Turn-off time from A input	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 665 Ω, See Note 4			100	ns
t <sub>on</sub> Turn-on time from A input				100	ns
t <sub>off</sub> Turn-off time from $\overline{\text{RBI}}$ input				100	ns
t <sub>on</sub> Turn-on time from $\overline{\text{RBI}}$ input				100	ns

NOTE 4: See General Information Section for load circuits and voltage waveforms.

3

TTL DEVICES



POST OFFICE BOX 225012 • DALLAS, TEXAS 75265

3-1111