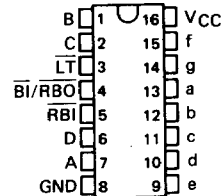


TYPES SN54LS447, SN74LS447 BCD-TO-SEVEN-DECODERS/DRIVERS

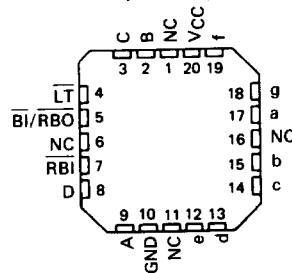
D2428, NOVEMBER 1977 - REVISED DECEMBER 1983

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

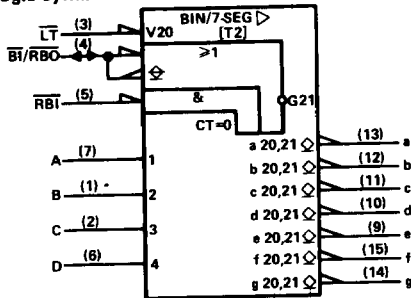
SN54LS447 ... J PACKAGE
SN74LS447 ... D, J OR N PACKAGE
(TOP VIEW)



SN54LS447 ... FK PACKAGE
SN74LS447 ... FN PACKAGE
(TOP VIEW)



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						$\overline{\text{BI/RBO}}^{\dagger}$	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	OFF
1	H	X	L	L	L	H	H	ON	ON	OFF	OFF	OFF	OFF	ON	ON
2	H	X	L	L	H	L	H	ON	ON	OFF	ON	ON	OFF	ON	ON
3	H	X	L	L	H	H	H	ON	ON	ON	ON	OFF	OFF	ON	ON
4	H	X	L	H	L	L	H	ON	ON	ON	OFF	OFF	ON	ON	ON
5	H	X	L	H	L	H	H	ON	OFF	ON	ON	OFF	ON	ON	ON
6	H	X	L	H	H	L	H	ON	OFF	ON	ON	ON	ON	ON	ON
7	H	X	L	H	H	H	H	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
8	H	X	H	L	L	L	H	ON	ON	ON	ON	ON	ON	ON	ON
9	H	X	H	L	L	H	H	ON	ON	ON	ON	OFF	ON	ON	ON
10	H	X	H	L	H	L	H	OFF	OFF	OFF	ON	ON	OFF	ON	ON
11	H	X	H	L	H	H	H	OFF	OFF	ON	ON	OFF	OFF	ON	ON
12	H	X	H	H	L	L	H	OFF	ON	OFF	OFF	OFF	ON	ON	ON
13	H	X	H	H	L	H	H	ON	OFF	OFF	ON	OFF	ON	ON	ON
14	H	X	H	H	H	L	H	OFF	OFF	OFF	ON	ON	ON	ON	ON
15	H	X	H	H	H	H	H	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
$\overline{\text{BI}}$	X	X	X	X	X	X	L	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
$\overline{\text{RBI}}$	H	L	L	L	L	L	L	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LT	L	X	X	X	X	X	H	ON	ON	ON	ON	ON	ON	ON	ON

H = high level, L = low level, X = irrelevant

- NOTES:
1. The blanking input ($\overline{\text{BI}}$) must be open or held at a high logic level when output functions 0 through 15 are desired. The ripple-blanking input ($\overline{\text{RBI}}$) 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 ($\overline{\text{BI}}$), all segment outputs are off regardless of the level of any other input.
 3. When ripple-blanking input ($\overline{\text{RBI}}$) 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 ($\overline{\text{RBO}}$) goes to a low level (response condition).
 4. When the blanking input/ripple blanking output ($\overline{\text{BI/RBO}}$) is open or held high and a low is applied to the lamp-test input, all segment outputs are on.

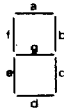
$\dagger \overline{\text{BI/RBO}}$ is wire-AND logic serving as blanking input ($\overline{\text{BI}}$) and/or ripple-blanking output ($\overline{\text{RBO}}$).

3

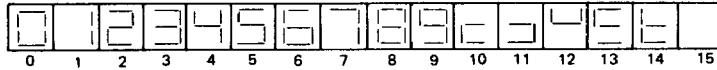
TTL DEVICES

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



SEGMENT
IDENTIFICATION



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°C to 125°C
SN74LS447	0°C to 70°C
Storage temperature range	-65°C to 150°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	a thru g		7	V
On-state output current, $I_{O(on)}$	a thru g		12	a thru g		24	mA
High-level output current, I_{OH}	$\overline{BI}/\overline{RBO}$		-50	$\overline{BI}/\overline{RBO}$		-50	μA
Low-level output current, I_{OL}	$\overline{BI}/\overline{RBO}$		1.6	$\overline{BI}/\overline{RBO}$		3.2	mA
Operating free-air temperature, T_A	-55		125	0		70	$^\circ\text{C}$

3

TTL DEVICES

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	TYP‡	MAX	
V _{IH} High-level input voltage		2			2			V
V _{IL} Low-level input voltage				0.7			0.8	V
V _{IK} Input clamp voltage				-1.5			-1.5	V
V _{OH} High-level output voltage	$\overline{BI}/\overline{RBO}$ V _{CC} = MIN, I _I = -18 mA V _{IH} = 2 V, V _{IL} = V _{IL max} , I _{OH} = -50 μA	2.4	4.2		2.4	4.2		V
V _{OL} Low-level output voltage	$\overline{BI}/\overline{RBO}$ V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = V _{IL max}			I _{OL} = 1.6 mA 0.25 0.4			I _{OL} = 3.2 mA 0.25 0.4	V
I _{O(off)} Off-state output current	a thru g V _{CC} = MAX, V _{IH} = 2 V, V _{IL} = V _{IL max} , V _{O(off)} = 7 V			250			250	μA
V _{O(on)} On-state output voltage	a thru g V _{CC} = MAX, V _{IH} = 2 V, V _{IL} = V _{IL max}			I _{O(on)} = 12 mA 0.25 0.4			I _{O(on)} = 24 mA 0.35 0.5	V
I _I Input current at maximum input voltage	V _{CC} = MAX, V _I = 7 V			0.1			0.1	mA
I _{IH} High-level input current	V _{CC} = MAX, V _I = 2.7 V			20			20	μA
I _{IL} Low-level input current	Any input except $\overline{BI}/\overline{RBO}$ $\overline{BI}/\overline{RBO}$ V _{CC} = MAX, V _I = 0.4 V			-0.4			-0.4	mA
I _{OS} Short-circuit output current	$\overline{BI}/\overline{RBO}$ V _{CC} = MAX			-0.3			-2	mA
I _{CC} Supply current	V _{CC} = 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_{CC} = 5 V, T_A = 25°C.

NOTE 2: I_{CC} is measured with all outputs open and all inputs at 4.5 V.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{off} Turn-off time from A input	C _L = 15 pF, R _L = 665 Ω, See Note 4			100	ns
t _{on} Turn-on time from A input				100	
t _{off} Turn-off time from \overline{RBI} input				100	ns
t _{on} Turn-on time from \overline{RBI} input				100	

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

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TTL DEVICES