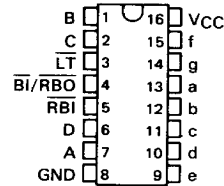


TYPES SN54LS347, SN74LS347 BCD-TO-SEVEN-SEGMENT DECODERS/DRIVERS

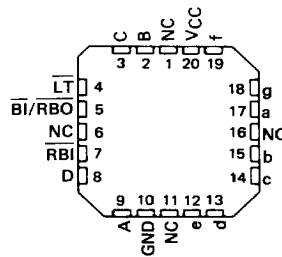
D2426, NOVEMBER 1977—REVISED DECEMBER 1983

- **Low-Voltage Version of SN54LS47/SN74LS47**
- **Open-Collector Outputs Drive Indicators Directly**
- **Lamp-Test Provision**
- **Leading/Trailing Zero Suppression**
- **Lamp Intensity Modulation Capability**

SN54LS347 ... J OR W PACKAGE
SN74LS347 ... D, J OR N PACKAGE
(TOP VIEW)



SN54LS347 ... FK PACKAGE
SN74LS347 ... FN PACKAGE
(TOP VIEW)



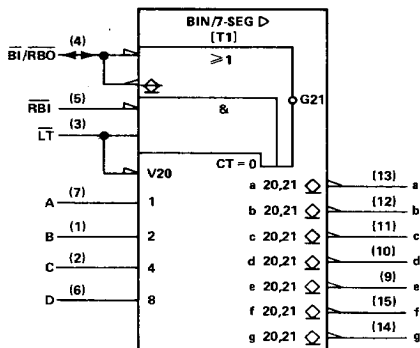
NC - No internal connection

description

The 'LS347 feature active-low outputs designed for driving common-anode VLEDs or incandescent indicators directly. These circuits also have full ripple-blanking input/output controls and a lamp test input. Segment identification and resultant displays are shown on the next page. Display patterns for BCD input counts above 9 are unique symbols to authenticate input conditions.

The 'LS347 incorporate automatic leading and/or trailing-edge zero-blanking control ($\overline{\text{RBI}}$ and $\overline{\text{RBO}}$). Lamp test ($\overline{\text{LT}}$) may be performed at any time when the $\overline{\text{BI/RBO}}$ node is at a high level. These devices also contain an overriding blanking input ($\overline{\text{BI}}$) which can be used to control the lamp intensity by pulsing or to inhibit the outputs. Inputs and outputs are entirely compatible for use with TTL logic outputs.

logic symbol†



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

PRODUCTION DATA
This document contains information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

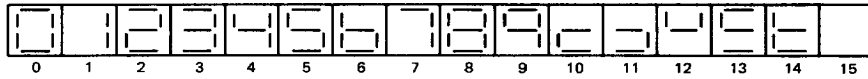
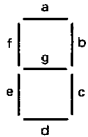
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TTL DEVICES

TYPES SN54LS347, SN74LS347 BCD-TO-SEVEN-SEGMENT DECODERS/DRIVERS

TYPE	DRIVER OUTPUTS				TYPICAL POWER DISSIPATION
	ACTIVE LEVEL	OUTPUT CONFIGURATION	SINK CURRENT	MAX VOLTAGE	
SN54LS347	low	open-collector	12 mA	7 V	35 mW
SN74LS347	low	open-collector	24 mA	7 V	35 mW



FONT TABLE T1 – NUMERICAL DESIGNATIONS AND RESULTANT DISPLAYS

SEGMENT IDENTIFICATION

FUNCTION TABLE

DECIMAL OR FUNCTION	INPUTS						$\overline{\text{BI}}/\text{RBO}^\dagger$	OUTPUTS							NOTE
	$\overline{\text{LT}}$	$\overline{\text{RBI}}$	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
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	ON	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	OFF	OFF	ON	ON	ON	ON	ON	
7	H	X	L	H	H	H	H	ON	ON	ON	OFF	OFF	OFF	OFF	
8	H	X	L	L	L	L	H	ON	ON	ON	ON	ON	ON	ON	
9	H	X	H	L	L	H	H	ON	ON	ON	OFF	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	OF	OFF	ON	ON	ON	ON	
15	H	X	H	H	H	H	H	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
$\overline{\text{BI}}$	X	X	X	X	X	X	L	OFF	OFF	OFF	OFF	OFF	OFF	OFF	2
$\overline{\text{RBI}}$	H	L	L	L	L	L	L	OFF	OFF	OFF	OFF	OFF	OFF	OFF	3
$\overline{\text{LT}}$	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 ($\overline{\text{BI}}$) 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 ($\overline{\text{BI}}/\overline{\text{RBO}}$) is open or held at a low is applied to the lamp test input, all segment outputs are on.

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

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TYPES SN54LS347, SN74LS347 BCD-TO-SEVEN-SEGMENT DECODERS/DRIVERS

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: SN54LS347	-55°C to 125°C
SN74LS347	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

		SN54LS347			SN74LS347			UNIT
		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				0.8			V
$V_{O(off)}$	Off-state output voltage	a thru g			7			V
$I_{O(on)}$	On-state output current	a thru g			12			mA
I_{OH}	High-level output current	$\overline{BI}/\overline{RBO}$			-50			μA
I_{OL}	Low-level output current	$\overline{BI}/\overline{RBO}$			1.6			mA
T_A	Operating free-air temperature	-55			125			$^\circ\text{C}$

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

PARAMETER	TEST CONDITIONS†	SN54LS347			SN74LS347			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	$V_{CC} = \text{MIN}, I_I = -18$ mA	-1.5			-1.5			V
V_{OH}	$\overline{BI}/\overline{RBO}$ $V_{CC} = \text{MIN}, V_{IH} = 2$ V, $V_{IL} = \text{MAX}, I_{OH} = -50$ μA	2.4	4.2		2.4	4.2		V
V_{OL}	$\overline{BI}/\overline{RBO}$ $V_{CC} = \text{MIN}, V_{IH} = 2$ V, $V_{IL} = \text{MAX}, I_{OL} = 1.6$ mA	0.25			0.25			V
	$V_{CC} = \text{MAX}, V_{IH} = 2$ V, $V_{IL} = \text{MAX}, I_{OL} = 3.2$ mA				0.35			
$I_{O(off)}$	a thru g $V_{CC} = \text{MAX}, V_{O(off)} = 7$ V	0.25			0.25			mA
$V_{O(on)}$	a thru g $V_{CC} = \text{MAX}, V_{IH} = 2$ V, $V_{IL} = \text{MAX}, I_{O(on)} = 12$ mA	0.25			0.25			V
	$V_{CC} = \text{MAX}, V_{IH} = 2$ V, $V_{IL} = \text{MAX}, I_{O(on)} = 24$ mA				0.35			
I_I	$V_{CC} = \text{MAX}, V_I = 7$ V	0.1			0.1			mA
I_{IH}	$V_{CC} = \text{MAX}, V_I = 2.7$ V	20			20			μA
I_{IL}	Any input except $\overline{BI}/\overline{RBO}$ $V_{CC} = \text{MAX}, V_I = 0.4$ V	-0.4			-0.4			mA
	$\overline{BI}/\overline{RBO}$	-1.2			-1.2			
I_{OS}	$\overline{BI}/\overline{RBO}$ $V_{CC} = \text{MAX}$	-0.3			-0.3			mA
I_{CC}	$V_{CC} = \text{MAX},$ See Note 2	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, $T_A = 25^\circ\text{C}$.

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

switching characteristics, $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{off}	Turn-off time from A input			100	ns
t_{on}	Turn-on time from A input	$R_L = 665$ Ω ,	$C_L = 15$ pF	100	
t_{off}	Turn-off time from \overline{RBI} input	See Note 3		100	ns
t_{on}	Turn-on time from \overline{RBI} input			100	

NOTE 3: See General Information Section for load circuits and voltage waveforms, t_{off} corresponds to t_{pLH} and t_{on} corresponds to t_{pHL} .

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TTL DEVICES



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