SN74ACT32 四路双输入正或门

1 特性

- 4.5V 至 5.5V V_{CC} 运行
- 输入电压高达 5.5V
- t_{pd} 最大值为 10ns（5V 时）
- 输入兼容 TTL 电压

2 说明

'ACT32 器件是四路双输入正或门。该器件以正逻辑执行布尔函数 Y = A + B 或 Y = $\overline{A}$ • $\overline{B}$。

器件信息

器件型号	封装(1)	封装尺寸(2)	本体尺寸(3)
SN74ACT32	PW（TSSOP，14）	5mm × 6.4mm	5mm × 4.40mm
	D（SOIC，14）	8.65mm × 6mm	8.65mm × 3.9mm
	DB（SSOP，14）	6.2mm × 7.8mm	6.2mm × 5.3mm
	N（PDIP，14）	19.3mm × 9.4mm	19.3mm × 6.35mm
	NS（SOP，14）	10.2mm × 7.8mm	10.3mm × 5.3mm

(1) 如需了解更多信息，请参阅第 10 节。
(2) 封装尺寸（长 × 宽）为标称值，并包括引脚（如适用）。
(3) 本体尺寸（长 × 宽）为标称值，不包括引脚。

逻辑图，每个逻辑门（正逻辑）

Table of Contents

3 Pin Configuration and Functions

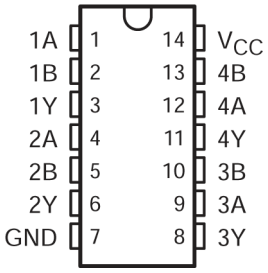


图 3-1. SN74ACT32 D, DB, N, NS, or PW Package (Top View)

表 3-1. Pin Functions

PIN		TYPE(1)	DESCRIPTION
NAME	SN74ACT32 D, DB, DGV, N, NS, PW, RGY, BQA		
1A	1	I	1A Input
1B	2	I	1B Input
1Y	3	O	1Y Output
2A	4	I	2A Input
2B	5	I	2B Input
2Y	6	O	2Y Output
3A	9	I	3A Input
3B	10	I	3B Input
3Y	8	O	3Y Output
4A	12	I	4A Input
4B	13	I	4B Input
4Y	11	O	4Y Output
GND	7	—	Ground Pin
NC	—	—	No Connection
V_{CC}	14	—	Power Pin

(1) Signal Types: I = Input, O = Output, I/O = Input or Output.

4 Specifications

4.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) (1)

			MIN	MAX	UNIT
V_{CC}	Supply voltage range		– 0.5	7	V
V_I (2)	Input voltage range		- 0.5	V_{CC} + 0.5	V
V_O (2)	Output voltage range		- 0.5	V_{CC} + 0.5	V
I_{IK}	Input clamp current	(V_I < 0 or V_I > V_{CC})		±20	mA
I_{OK}	Output clamp current	(V_O < 0 or V_O > V_{CC})		±20	mA
I_O	Continuous output current	(V_O = 0 or V_{CC})		±50	mA
	Continuous current through V_{CC} or GND			±200	mA
T_{stg}	Storage temperature range		– 65	150	°C

(1) Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

4.2 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)(1)

		SN74ACT32		UNIT
		MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	V
V_{IH}	High-level input voltage	2		V
V_{IL}	Low-level input voltage		0.8	V
V_I	Input voltage	0	V_{CC}	V
V_O	Output voltage	0	V_{CC}	V
I_{OH}	High-level output current		-24	mA
I_{OL}	Low-level output current		24	mA
$\Delta t/\Delta v$	Input transition rise or fall rate		8	ns/V
T_A	Operating free-air temperature	– 40	85	°C

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

4.3 Thermal Information

THERMAL METRIC(1)		SN74ACT32					UNIT
		D (SOIC)	DB (SSOP)	N (PDIP)	NS (SOP)	PW (TSSOP)	
		14	14	14	14	14	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	119.9	96	80	76	145.7	°C/W

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC package thermal metrics* application report.

4.4 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS		V_{CC}	T_A = 25°C			SN74ACT32		UNIT
				MIN	TYP	MAX	MIN	MAX	
V_{OH}	I_{OH} = –50 µA		4.5 V	4.4			4.4		V
			5.5 V	5.4			5.4		
	I_{OH} = –24 mA		4.5 V	3.86			3.76		
			5.5 V	4.86			4.76		
	I_{OH} = –50 mA (1)		5.5 V						
	I_{OH} = –75 mA (1)		5.5 V				3.85		
V_{OL}	I_{OL} = 50 µA		4.5 V		0.001	0.1		0.1	V
			5.5 V		0.001	0.1		0.1	
	I_{OL} = 24 mA		5.5 V			0.36		0.44	
			5.5 V			0.36		0.44	
	I_{OL} = 50 mA (1)		5.5 V						
	I_{OL} = 75 mA (1)		5.5 V					1.65	
I_I	V_I = V_{CC} or GND		5.5 V			±0.1		±1	µA
I_{CC}	V_I = V_{CC} or GND,	I_O = 0	5.5 V			2		20	µA
ΔI_{CC} (2)	One input at 3.4 V, Other inputs at V_{CC} or GND		5.5 V		0.6			1.5	mA
C_i	V_I = V_{CC} or GND		5 V		2.6				pF

(1) Not more than one output should be tested at a time, and the duration of the test should not exceed 2 ms.
(2) This is the increase in supply current for each input that is at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

4.5 Switching Characteristics

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Load Circuit and Voltage Waveforms)

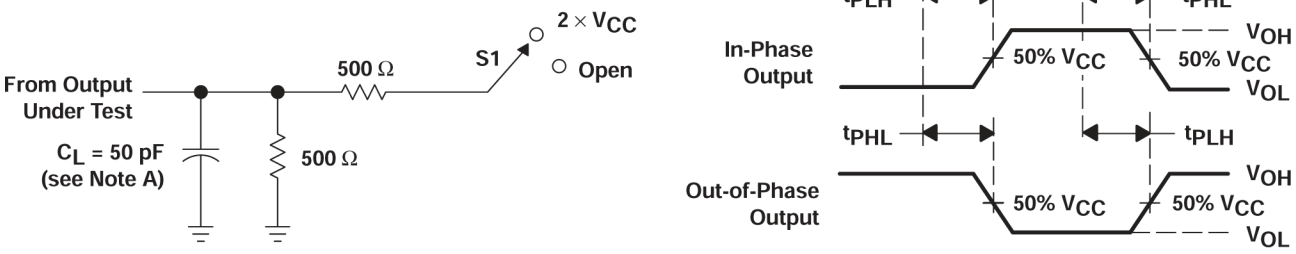
PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C			SN74ACT32		UNIT
			MIN	TYP	MAX	MIN	MAX	
t_{PLH}	A or B	Y	1	6.5	9	1	10	ns
t_{PHL}			1	6.5	9	1	10	

4.6 Operating Characteristics

V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS		TYP	UNIT
C_{pd}	Power dissipation capacitance	C_L = 50 pF,	f = 1 MHz	40	pF

5 Parameter Measurement Information



LOAD CIRCUIT VOLTAGE WAVEFORMS

A. C_L includes probe and jig capacitance.

B. All input pulses are supplied by generators having the following characteristics: PRR ⩽ 1 MHz, Z_O = 50 Ω, t_r ⩽ 2.5 ns, t_f ⩽ 2.5 ns.

C. The outputs are measured one at a time with one input transition per measurement.

图 5-1. Load Circuit and Voltage Waveforms

TEST	S1
t_{PLH}/t_{PHL}	Open

6 Detailed Description

6.1 Functional Block Diagram

图 6-1. Logic Diagram, Each Gate (Positive Logic)

6.2 Device Functional Modes

表 6-1. Function Table
(Each Gate)

INPUTS		OUTPUT
A	B	Y
H	X	H
X	H	H
L	L	L

7 Application and Implementation

备注

以下应用部分中的信息不属于 TI 器件规格的范围，TI 不担保其准确性和完整性。TI 的客 户应负责确定器件是否适用于其应用。客户应验证并测试其设计，以确保系统功能。

7.1 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Recommended Operating Conditions*. Each V_{CC} terminal should have a good bypass capacitor to prevent power disturbance. A 0.1-μF capacitor is recommended for this device. It is acceptable to parallel multiple bypass capacitors to reject different frequencies of noise. The 0.1-μF and 1-μF capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results, as shown in *Layout Example*.

7.2 Layout

7.2.1 Layout Guidelines

When using multiple-input and multiple-channel logic devices inputs must not ever be left floating. In many cases, functions or parts of functions of digital logic devices are unused; for example, when only two inputs of a triple-input AND gate are used. Such unused input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. All unused inputs of digital logic devices must be connected to a logic high or logic low voltage, as defined by the input voltage specifications, to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally, the inputs are tied to GND or V_{CC}, whichever makes more sense for the logic function or is more convenient.

7.2.2 Layout Example

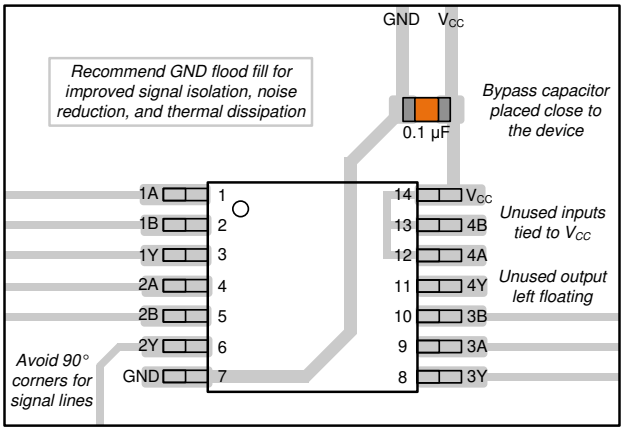


图 7-1. Example layout for the SN74ACT32

8 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

8.1 Documentation Support (Analog)

8.1.1 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
SN74ACT32	Click here	Click here	Click here	Click here	Click here

8.2 接收文档更新通知

要接收文档更新通知，请导航至 ti.com 上的器件产品文件夹。点击*通知* 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

8.3 支持资源

TI E2E™ 中文支持论坛是工程师的重要参考资料，可直接从专家处获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题，获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的使用条款。

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ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

8.6 术语表

TI 术语表　　本术语表列出并解释了术语、首字母缩略词和定义。

9 Revision History

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision C (October 2003) to Revision D (July 2024)	Page
• 添加了*器件信息* 表、*引脚功能* 表、*ESD 等级* 表、*热性能信息* 表、*器件功能模式*、“应用和实施”部分、*器件和文档支持* 部分以及*机械、封装和可订购信息* 部分	1
• Updated R θ JA values: D = 86 to 119.9, PW = 113 to 145.7, all values in °C/W	5

10 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74ACT32D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	-40 to 85	ACT32	
SN74ACT32DBR	ACTIVE	SSOP	DB	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AD32	Samples
SN74ACT32DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT32	Samples
SN74ACT32N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74ACT32N	Samples
SN74ACT32NSR	ACTIVE	SO	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT32	Samples
SN74ACT32PW	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI	-40 to 85	AD32	
SN74ACT32PWR	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AD32	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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