

CDx4AC245、CDx4ACT245 三态同相八路总线收发器

1 特性

- 缓冲输入
- 典型传播延迟
 - $V_{CC} = 5V$ 、 $T_A = 25^\circ C$ 且 $C_L = 50pF$ 时为 4ns
- 防 SCR 闩锁 CMOS 工艺和电路设计
- 双极 FAST™/AS/S 的速度，同时功耗显著降低
- 平衡传播延迟
- 交流类型的工作电压范围为 1.5V 至 5.5V，并在电源电压的 30% 时具有平衡的抗噪性能
- $\pm 24mA$ 输出驱动电流
 - 扇出到 15 个 FAST™ IC
 - 驱动 50Ω 传输线路

2 说明

'AC245 和 'ACT245 是采用高级 CMOS 逻辑技术的八路总线收发器。

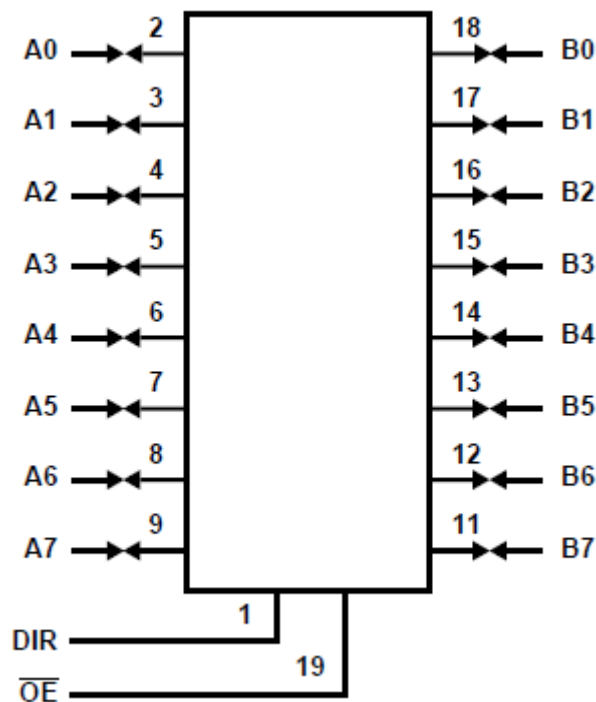
器件信息

器件型号	封装 ⁽¹⁾	封装尺寸 ⁽²⁾	本体尺寸 ⁽³⁾
CD74AC245/ CD74ACT245	N (PDIP , 20)	24.33mm x 9.4mm	24.33mm x 6.35mm
	DW (SOIC , 20)	12.80mm x 10.3mm	12.80mm x 7.50mm
CD54AC245/ CD54ACT245	J (CDIP , 20)	24.2mm x 7.62mm	24.2mm x 6.92mm
CD74ACT245	DB (SSOP , 20)	7.2mm x 7.8mm	7.2mm x 5.3mm

(1) 更多相关信息，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 (正逻辑)



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3 Pin Configuration and Functions

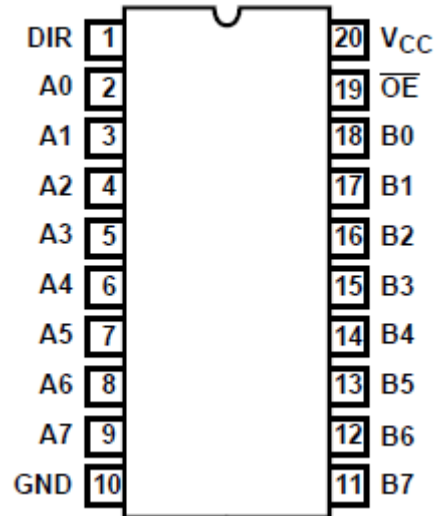


图 3-1. CD54AC245, CD54ACT245 (CERDIP), CD74AC245, CD74ACT245 (PDIP, SOIC, SSOP) Top View

Pin Functions

PIN		TYPE ¹	DESCRIPTION
NO.	NAME		
1	DIR	I/O	Direction Pin
2	A0	I/O	A1 Input/Output
3	A1	I/O	A2 Input/Output
4	A2	I/O	A3 Input/Output
5	A3	I/O	A4 Input/Output
6	A4	I/O	A5 Input/Output
7	A5	I/O	A6 Input/Output
8	A6	I/O	A7 Input/Output
9	A7	I/O	A8 Input/Output
10	GND	—	Ground Pin
11	B7	I/O	B7 Input/Output
12	B6	I/O	B6 Input/Output
13	B5	I/O	B5 Input/Output
14	B4	I/O	B4 Input/Output
15	B3	I/O	B3 Input/Output
16	B2	I/O	B2 Input/Output
17	B1	I/O	B1 Input/Output
18	B0	I/O	B0 Input/Output
19	OE	I/O	Output Enable
20	V _{CC}	—	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		-0.5	6	V
I _{IK}	Input diode current	V _I < -0.5V or V _I > V _{CC} + 0.5V		± 20	mA
I _{OK}	Output diode current	V _O < -0.5V or V _O > V _{CC} + 0.5V		± 50	mA
I _O	Output source or sink current per output pin	V _O > -0.5V or V _O < V _{CC} + 0.5V		± 50	mA
I _{OK} ⁽²⁾	V _{CC} or ground current	I _{CC} or I _{GND}		± 100	mA
T _{stg}	Storage temperature		-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) For up to 4 outputs per device, add ±25mA for each additional output.

4.2 Recommended Operating Conditions

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

		CDx4AC245		CDx4ACT245		UNIT
		MIN	MAX	MIN	MAX	
V _{CC}	Supply voltage ⁽¹⁾	1.5V	5.5V	4.5V	5.5V	V
V _I , V _O	Input or Output Voltage	0V	V _{CC}	0V	V _{CC}	V
dt/dv	Input Rise and Fall Slew Rate	1.5V to 3V		50		ns
		3.6V to 5.5V		20		
		4.5V to 5.5V		10		
T _A	Temperature range	- 55	125	- 55	125	°C

- (1) Unless otherwise specified, all voltages are referenced to ground.

4.3 Thermal Information

THERMAL METRIC ⁽¹⁾		CDx4AC14/ CDx4ACT14			UNIT
		N (PDIP)	DW (SOIC)	DB (SSOP)	
		20 PINS			
R _{θJA}	Junction-to-ambient thermal resistance	69	98.6	105.4	°C/W

- (1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report, [SPRA953](#).

4.4 Electrical Characteristics

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

PARAMETER		TEST CONDITIONS		V _{CC}	T _A = 25°C		-40°C TO 85°C		-55°C TO 125°C		UNIT
		V _I (V)	I _O (mA)		MIN	MAX	MIN	MAX	MIN	MAX	
AC TYPES											
V _{IH}	High-level input voltage			1.5	1.2		1.2		1.2		V
				3	2.1		2.1		2.1		
				5.5	3.85		3.85		3.85		
V _{IL}	Low-level input voltage	V _{IL}		1.5	0.3		0.3		0.3		V
				3	0.9		0.9		0.9		
				5.5	1.65		1.65		1.65		
V _{OH}	High-level output voltage	V _{IH} or V _{IL}	-0.05	1.5	1.4		1.4		1.4		V _{VOH}
			-0.05	3	2.9		2.9		2.9		
			-0.05	4.5	4.4		4.4		4.4		
			-4	3	2.58		2.48		2.4		
			-24	4.5	3.94		3.8		3.7		
			-75	5.5			3.85				
			-50	5.5					3.85		
V _{OL}	Low-level output voltage	V _{IH} or V _{IL}	0.05	1.5 V		0.1		0.1		0.1	V
			0.05	3 V		0.1		0.1		0.1	
			0.05	4.5 V		0.1		0.1		0.1	
			12	3 V		0.36		0.44		0.5	
			24	4.5 V		0.36		0.44		0.5	
			75 ¹	5.5 V				1.65			
			50 ¹	5.5 V						1.65	
I _I	Input leakage current	V _{CC} or GND		5.5		± 0.1		± 1		± 1	μ A
I _{OZ}	Three-state leakage current	V _{IH} or V _{IL} , V _O = V _{CC} or GND		5.5 V		± 0.5		± 5		± 10	μ A
I _{CC}	Quiescent supply current MSI	V _{CC} or GND	0	5.5 V		8		80		160	μ A
ACT TYPES											
V _{IH}	High-level input voltage			4.5 V to 5.5 V		2		2		2	V
V _{IL}	Low-level input voltage			4.5 V to 5.5 V			0.8		0.8		V
V _{OH}	High-level output voltage	V _{IH} or V _{IL}	-0.05	4.5 V	4.4		4.4		4.4	0.8	V
			-24	4.5 V	3.94		3.8		3.7		
			-75 ¹	5.5 V			3.85				
			-50	5.5 V					3.85		

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

PARAMETER	TEST CONDITIONS		V _{CC}	T _A = 25°C		-40°C TO 85°C		-55°C TO 125°C		UNIT
	V _I (V)	I _O (mA)		MIN	MAX	MIN	MAX	MIN	MAX	
V _{OL} Low-level output voltage	V _{IH} or V _{IL}	0.05	4.5	0.1		0.1		0.1		V
		24	4.5	0.36		0.44		0.5		
		75 ¹	5.5			1.65				
		50 ¹	5.5					1.65		
									V	
I _I Input leakage current	V _{CC} or GND		5.5 V	± 0.1		± 1		± 1		µA
I _{OZ} Three-state or leakage current	V _{IH} or V _{IL} , V _O = V _{CC} or GND		5.5 V	± 0.5		± 5		± 10		µA
I _{CC} Quiescent supply current MSI	V _{CC} or GND	0	5.5 V	8		80		160		µA
Δ I _{CC} Additional supply current per input pin TTL inputs high 1 unit load	V _{CC} -2.1		4.5 to 5.5	2.4		2.8		3		mA

1. Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation. Test verifies a minimum 50Ω transmission-line-drive capability at 85°C, 75Ω at 125°C.

4.5 Switching Characteristics

Input t_r, t_f = 3ns, C_L = 50pF (Worst Case). Over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	V _{CC} (V)	-40°C TO 85°C			-55°C TO 125°C			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
AC TYPES								
t _{PLH} , t _{PHL} Propagation delay, data to output	1.5			96			106	ns
	3.3	3.2		10.8	3		11.9	
	5	2.2		7.7	2.1		8.5	
t _{PLZ} , t _{PHZ} Propagation delay, output disable to output	1.5			159			175	ns
	3.3	4.7		15.9	4.4		17.5	
	5	3.7		12.7	3.5		14	
t _{PZL} , t _{PZH} Propagation delay, output enable to output	1.5			159			175	ns
	3.3	5.6		19	5.3		21	
	5	3.7		12.7	3.5			
V _{OHV} Minimum (Valley) V _{OH} During switching of other outputs (output under test not switching)	5	4 at 25°C			4 at 25°C			V

Input t_r , $t_f = 3\text{ns}$, $C_L = 50\text{pF}$ (Worst Case). Over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER		V_{CC} (V)	-40°C TO 85°C			-55°C TO 125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V_{OLP}	Maximum (Peak) V_{OL} During switching of other outputs (output under test not switching)	5	1 at 25°C			1 at 25°C			V
C_O	Three-state output capacitance		15			15			pF
C_I	Input capacitance		10			10			pF
C_{PD}	Power dissipation capacitance		57			57			pF
ACT TYPES									
t_{PLH} , t_{PHL}	Propagation delay, data to output	5	2.7		9.1	2.5		10	ns
t_{PLZ} , t_{PHZ}	Propagation delay, output disable to output	5	3.7		12.7	3.5		14	ns
t_{PZL} , t_{PZH}	Propagation delay, output enable to output	5	3.8		13.1	3.6		14.4	ns
V_{OHV}	Minimum (Valley) V_{OH} During switching of other outputs (output under test not switching)	5	4 at 25°C			4 at 25°C			V
V_{OLP}	Maximum (Peak) V_{OL} During switching of other outputs (output under test not switching)	5	1 at 25°C			1 at 25°C			V
C_O	Three-state output capacitance		15			15			pF
C_I	Input capacitance		10			10			pF
C_{PD}	Power dissipation capacitance		57			57			pF

- Limits tested 100%
- 3.3V Min is at 3.6V, Max is at 3V
- 5V Min is at 5.5V, Max is at 4.5V
- CPD is used to determine the dynamic power consumption per channel
 - AC: $PD = V_{CC}^2 f_i (CPD + CL)$
 - ACT: $PD = V_{CC}^2 f_i (CPD + CL) + V_{CC} \Delta ICC$ where f_i = input frequency, CL = output load capacitance, V_{CC} = supply voltage

4.6 Timing Diagrams

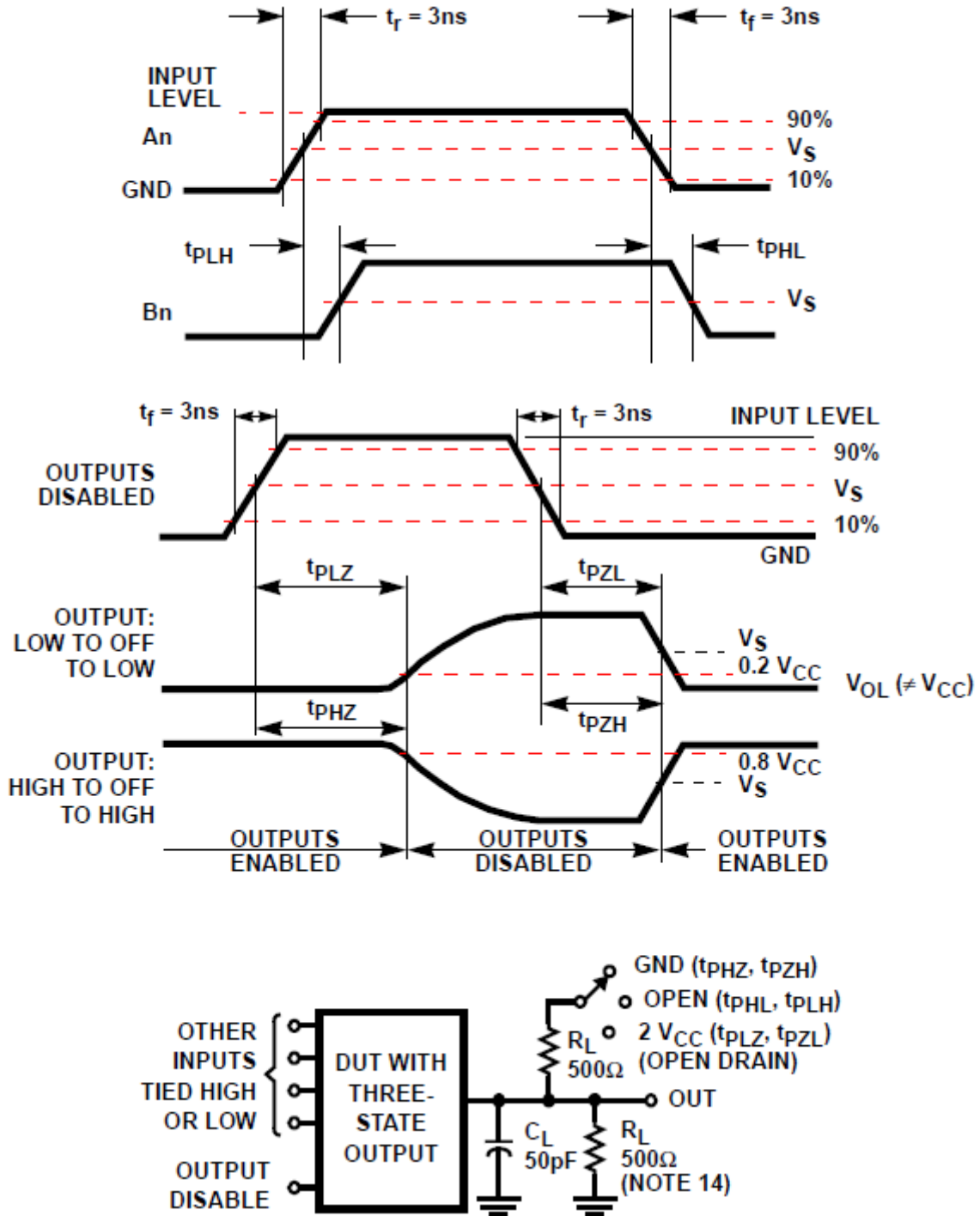


图 4-1. THREE-STATE PROPAGATION DELAY TIMES AND TEST CIRCUIT

图 4-1. SIMULTANEOUS SWITCHING TRANSIENT WAVEFORMS

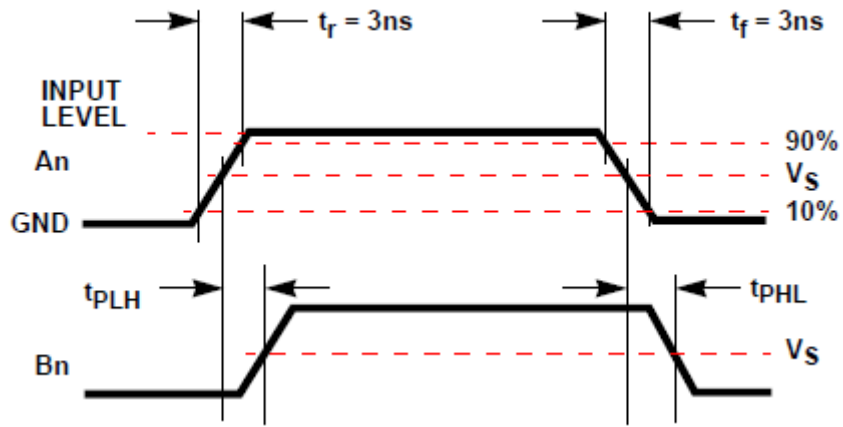
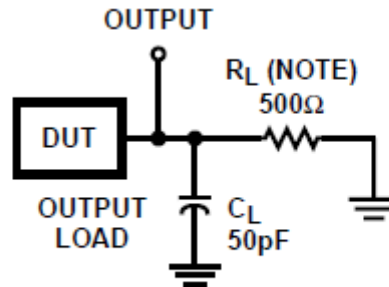


图 4-3. PROPAGATION DELAY TIMES



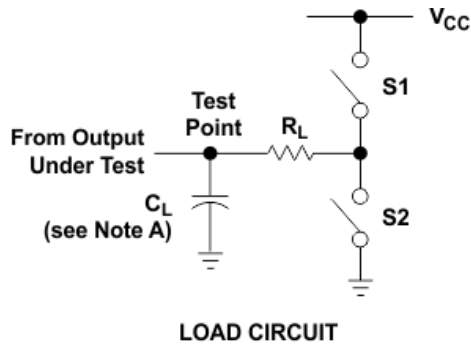
NOTE: For AC Series Only: When $V_{CC} = 1.5\text{V}$, $R_L = 1\text{k}\Omega$.

表 4-1.

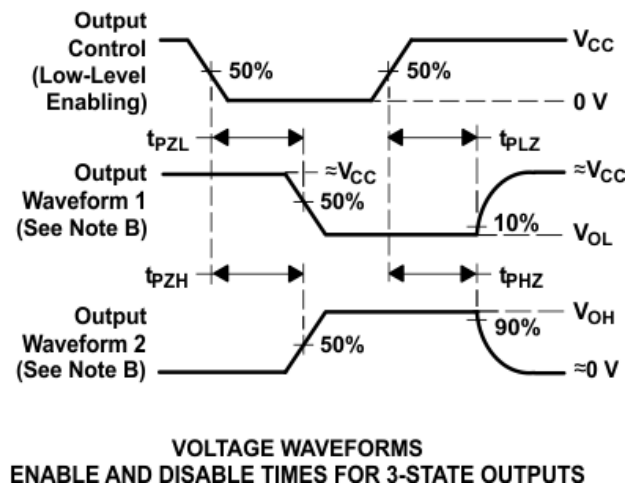
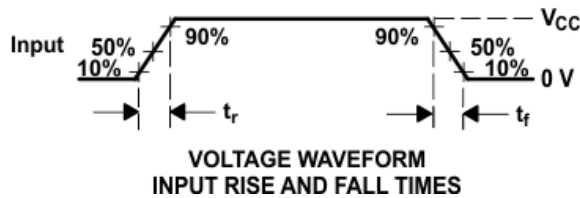
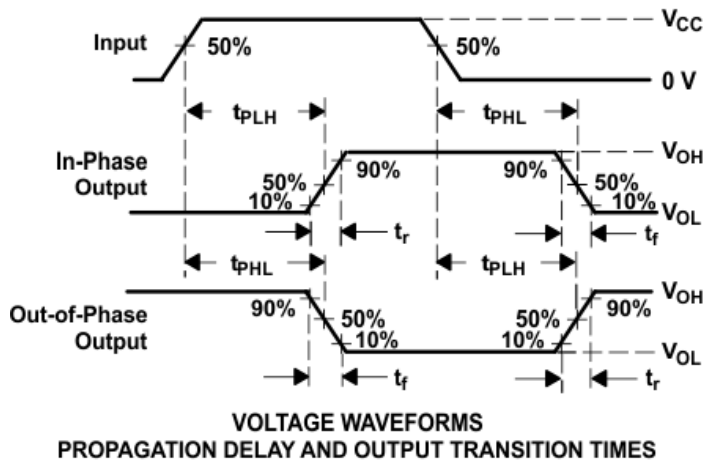
	AC	ACT
Input Level	V_{CC}	3V
Input Switching Voltage, V_S	$0.5 V_{CC}$	1.5V
Output Switching Voltage, V_S	$0.5 V_{CC}$	$0.5 V_{CC}$

图 4-4. PROPAGATION DELAY TIMES

5 Parameter Measurement Information



PARAMETER		R_L	C_L	S1	S2
t_{en}	t_{pZH}	1 k Ω	50 pF or 150 pF	Open	Closed
	t_{pZL}			Closed	Open
t_{dis}	t_{pHZ}	1 k Ω	50 pF	Open	Closed
	t_{pLZ}			Closed	Open
t_{pd} or t_t		--	50 pF or 150 pF	Open	Open

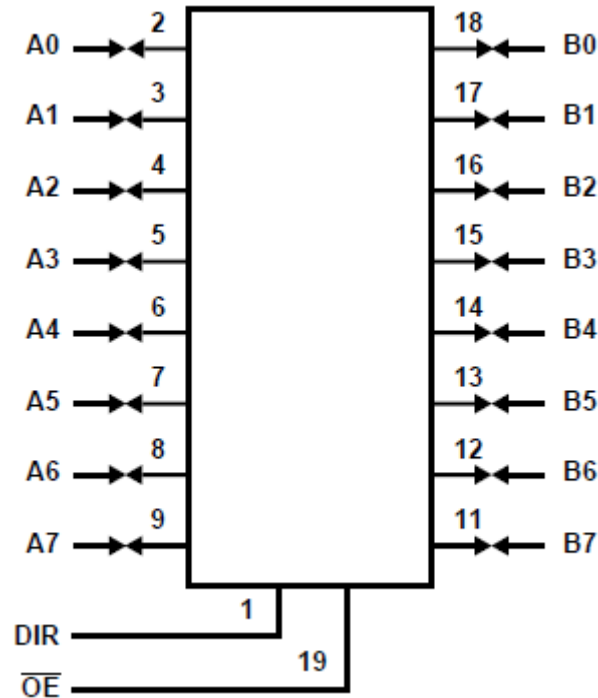


6 Detailed Description

6.1 Overview

The 'AC245 and 'ACT245 are non-inverting three-state bidirectional transceiver-buffers intended for two-way transmission from “A” bus to “B” bus or “B” bus to “A”. The logic level present on the direction input (DIR) determines the data direction. When the output enable input (OE) is HIGH, the outputs are in the high-impedance state.

6.2 Functional Block Diagram



Logic Diagram (Positive Logic)

6.3 Device Functional Modes

Function Table lists the function modes of the CDx4AC245, CDx4ACT245.

表 6-1. Function Table

INPUTS ⁽¹⁾		OPERATION
OE	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

(1) H = High Voltage Level, L = Low Voltage Level, X = Don't Care

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 MIN and MAX supply voltage rating located in the [节 4.2](#).

Each V_{CC} pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 μF is recommended; if there are multiple V_{CC} pins, then 0.01 μF or 0.022 μF is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 μF and a 1 μF are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

7.2 Layout

7.2.1 Layout Guidelines

When using multiple-bit logic devices, inputs should never float.

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 or only 3 of the 4 buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. [节 7.2.2](#) specifies the rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC} , whichever makes more sense or is more convenient. It is generally acceptable to float outputs, unless the part is a transceiver. If the transceiver has an output enable pin, it will disable the output section of the part when asserted. This will not disable the input section of the IOs, so they cannot float when disabled.

7.2.2 Layout Example

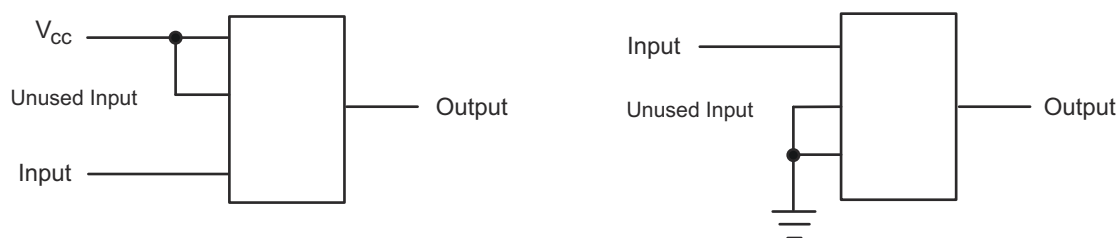


图 7-1. Layout Diagram

8 Device and Documentation Support

8.1 Documentation Support

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.

表 8-1. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
CD54AC245	Click here	Click here	Click here	Click here	Click here
CD74AC245	Click here	Click here	Click here	Click here	Click here
CD54ACT245	Click here	Click here	Click here	Click here	Click here
CD74ACT245	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](#)。

8.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

所有商标均为其各自所有者的财产。

8.5 静电放电警告



静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

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 (May 2023) to Revision D (April 2024)	Page
• 添加了 <i>应用和实施</i> 部分、 <i>器件和文档支持</i> 部分，并向 <i>器件信息</i> 表添加了封装尺寸.....	1
• Updated R ^θ JA values: DW = 58 to 98.6, DB = 70 to 105.4, all values in °C/W	4

Changes from Revision B (April 2002) to Revision C (May 2023)	Page
• 添加了 <i>封装信息</i> 表、 <i>引脚功能</i> 表和 <i>热性能信息</i> 表.....	1

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.

重要声明和免责声明

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