

SNx4HC245 3 ステート出力オクタール・バス・トランシーバ

1 特長

- 広い動作電圧範囲: 2V~6V
- バス・ラインを直接、または最大 15 の LSTTL 負荷を駆動する大電流 3 ステート出力
- 低消費電力、 I_{CC} : 80 μ A 以下
- $t_{pd} = 12$ ns (標準値)
- 5V で ± 6 mA の出力駆動能力
- 低い入力電流: 1 μ A 以下
- MIL-PRF-38535 準拠の製品については、特に記述のない限り、すべてのパラメータはテスト済みです。他のすべての製品については、量産プロセスにすべてのパラメータのテストが含まれているとは限りません。

2 アプリケーション

- サーバー
- PC およびノートパソコン
- ネットワーク・スイッチ
- ウェアラブルなヘルスケア / フィットネス機器
- テレコム・インフラストラクチャ
- 電子 POS

3 概要

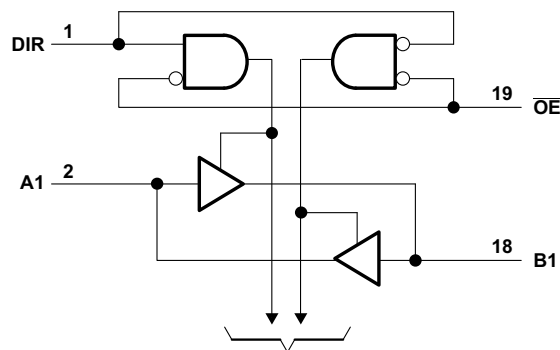
これらのオクタール・バス・トランシーバは、データ・バス間の非同期双方向通信用に設計されています。制御機能を実装しているため、外部のタイミング要件は最小限です。

このデバイスを使うと、方向制御 (DIR) 入力の論理レベルに応じて、A バスから B バス、または B バスから A バスへデータを転送できます。出力イネーブル (\overline{OE}) 入力を使用すると、バスが実質的に絶縁されるように本デバイスを無効化できます。

製品情報 (1)

部品番号	パッケージ	本体サイズ (公称)
SNx4HC245	DB (SSOP, 20)	7.20mm × 5.30mm
	DW (SOIC, 20)	12.80mm × 7.50mm
	N (PDIP, 20)	24.33mm × 6.35mm
	NS (SO, 20)	12.60mm × 5.30mm
	PW (TSSOP, 20)	6.50mm × 4.40mm

- (1) 利用可能なパッケージについては、このデータシートの末尾にある注文情報を参照してください。



To Seven Other Channels

論理図 (正論理)



Table of Contents

1 特長.....	1	8.3 Feature Description.....	9
2 アプリケーション.....	1	8.4 Device Functional Modes.....	9
3 概要.....	1	9 Application and Implementation.....	10
4 Revision History.....	2	9.1 Application Information.....	10
5 Pin Configuration and Functions.....	3	9.2 Typical Application.....	10
6 Specifications.....	4	10 Power Supply Recommendations.....	12
6.1 Absolute Maximum Ratings.....	4	11 Layout.....	12
6.2 ESD Ratings.....	4	11.1 Layout Guidelines.....	12
6.3 Recommended Operating Conditions.....	4	11.2 Layout Example.....	12
6.4 Thermal Information.....	5	12 Device and Documentation Support.....	13
6.5 Electrical Characteristics.....	5	12.1 Related Links.....	13
6.6 Switching Characteristics, $C_L = 50$ pF.....	6	12.2 Receiving Notification of Documentation Updates..	13
6.7 Switching Characteristics, $C_L = 150$ pF.....	6	12.3 サポート・リソース.....	13
6.8 Operating Characteristics.....	7	12.4 Trademarks.....	13
6.9 Typical Characteristics.....	7	12.5 Electrostatic Discharge Caution.....	13
7 Parameter Measurement Information.....	8	12.6 Glossary.....	13
8 Detailed Description.....	9	13 Mechanical, Packaging, and Orderable Information.....	13
8.1 Overview.....	9		
8.2 Functional Block Diagram.....	9		

4 Revision History

資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

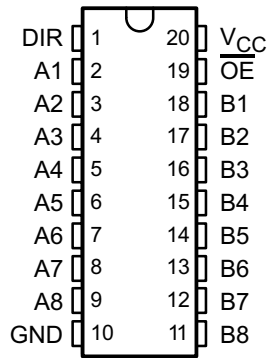
Changes from Revision E (September 2015) to Revision F (August 2022) Page

- 最新のデータシート規格を反映するように、文書全体にわたって採番方式、書式、表、図、相互参照を更新..... **1**

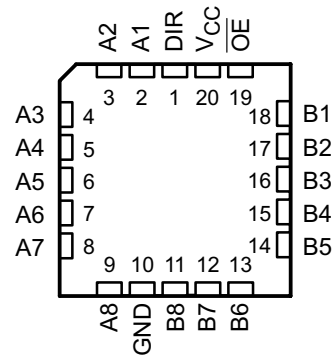
Changes from Revision D (August 2003) to Revision E (July 2015) Page

- 「デバイスの比較」セクション、「熱に関する情報」セクション、「ESD 定格」セクション、「アプリケーションと実装」セクション、「電源に関する推奨事項」セクション、「レイアウト」セクションを追加。..... **1**
- 「特長」の一覧に軍事利用についての免責事項を追加。..... **1**
- Updated FK package pinout drawing..... **3**

5 Pin Configuration and Functions



5-1. DB, DGV, DW, N, J, W, or PW Package 20-Pin SSOP, TVSOP, SOIC, PDIP CDIP, CFP, or TSSOP Top View



5-2. FK Package 20-Pin LCCC Top View

PIN		TYPE ⁽¹⁾	DESCRIPTION
NO.	NAME		
1	DIR	I/O	Direction Pin
2	A1	I/O	A1 Input/Output
3	A2	I/O	A2 Input/Output
4	A3	I/O	A3 Input/Output
5	A4	I/O	A4 Input/Output
6	A5	I/O	A5 Input/Output
7	A6	I/O	A6 Input/Output
8	A7	I/O	A7 Input/Output
9	A8	I/O	A8 Input/Output
10	GND	—	Ground Pin
11	B8	I/O	B8 Input/Output
12	B7	I/O	B7 Input/Output
13	B6	I/O	B6 Input/Output
14	B5	I/O	B5 Input/Output
15	B4	I/O	B4 Input/Output
16	B3	I/O	B3 Input/Output
17	B2	I/O	B2 Input/Output
18	B1	I/O	B1 Input/Output
19	OE	I/O	Output Enable
20	VCC	—	Power Pin

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

6 Specifications

6.1 Absolute Maximum Ratings

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

			MIN	MAX	UNIT
V _{CC}	Supply voltage		-0.5	7	V
I _{IK}	Input clamp current ⁽²⁾	V _I < 0 or V _I > V _{CC}		±20	mA
I _{OK}	Output clamp current ⁽²⁾	V _O < 0 or V _O > V _{CC}		±20	mA
I _O	Continuous output current	V _O = 0 to V _{CC}		±35	mA
	Continuous current through V _{CC} or GND			±70	mA
T _{stg}	Storage temperature		-65	150	°C
T _J	Junction Temperature			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.

6.2 ESD Ratings

			VALUE	UNIT
V _(ESD)	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±3000	V
		Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾	±1000	

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

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

			SN54HC245			SN74HC245			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC}	Supply voltage		2	5	6	2	5	6	V
V _{IH}	High-level input voltage	V _{CC} = 2 V	1.5			1.5			V
		V _{CC} = 4.5 V	3.15			3.15			
		V _{CC} = 6 V	4.2			4.2			
V _{IL}	Low-level input voltage	V _{CC} = 2 V			0.5			0.5	V
		V _{CC} = 4.5 V			1.35			1.35	
		V _{CC} = 6 V			1.8			1.8	
V _I	Input voltage		0		V _{CC}	0		V _{CC}	V
V _O	Output voltage		0		V _{CC}	0		V _{CC}	V
Δt/Δv	Input transition rise and fall time	V _{CC} = 2 V			1000			1000	ns
		V _{CC} = 4.5 V			500			500	
		V _{CC} = 6 V			400			400	
T _A	Operating free-air temperature		-55		125	-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](#).

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾		SNx4HC245					UNIT
		DB (SSOP)	DW (SOIC)	N (PDIP)	NS (SOP)	PW (TSSOP)	
		20 PINS					
R _{θJA}	Junction-to-ambient thermal resistance	92.1	77.0	57.0	74.1	99.7	°C/W
R _{θJC(top)}	Junction-to-case (top) thermal resistance	53.9	41.5	48.6	40.6	34.0	°C/W
R _{θJB}	Junction-to-board thermal resistance	47.2	44.8	38.0	41.6	50.7	°C/W
ψ _{JT}	Junction-to-top characterization parameter	16.5	16.8	25.4	14.8	1.8	°C/W
ψ _{JB}	Junction-to-board characterization parameter	46.8	44.3	37.8	41.2	50.1	°C/W

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

6.5 Electrical Characteristics

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

PARAMETER		TEST CONDITIONS	V _{CC}	T _A = 25°C			SN54HC245		SN74HC245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	High-Level Output Voltage	V _I = V _{IH} or V _{IL}	I _{OH} = -20 μA	2 V	1.9	1.998	1.9	1.9	V		
				4.5 V	4.4	4.499	4.4	4.4			
				6 V	5.9	5.999	5.9	5.9			
			I _{OH} = -6 mA	4.5 V	3.98	4.3	3.7	3.84			
			I _{OH} = -7.8 mA	6 V	5.48	5.8	5.2	5.34			
V _{OL}	Low-Level Output Voltage	V _I = V _{IH} or V _{IL}	I _{OL} = 20 μA	2 V	0.002	0.1	0.1	0.1	V		
				4.5 V	0.001	0.1	0.1	0.1			
				6 V	0.001	0.1	0.1	0.1			
			I _{OL} = 6 mA	4.5 V	0.17	0.26	0.4	0.33			
			I _{OL} = 7.8 mA	6 V	0.15	0.26	0.4	0.33			
I _I	Input Current	DIR or \overline{OE}	V _I = V _{CC} or 0	6 V	±0.1	±100	±1000	±1000	nA		
I _{OZ}	Off-State (High-Impedance State) Output Current	A or B	V _O = V _{CC} or 0	6 V	±0.01	±0.5	±10	±5	μA		
I _{CC}	Supply Current		V _I = V _{CC} I _O = 0 or 0,	6 V		8	160	80	μA		
C _i	Input Capacitance	DIR or \overline{OE}		2 V to 6 V	3	10	10	10	pF		

6.6 Switching Characteristics, $C_L = 50 \text{ pF}$

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

(see [7-1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			SN54HC245		SN74HC245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A or B	B or A	2 V		40	105		160		130	ns
			4.5 V		15	21		32		26	
			6 V		12	18		27		22	
t_{en}	\overline{OE}	A or B	2 V		125	230		340		290	ns
			4.5 V		23	46		68		58	
			6 V		20	39		58		49	
t_{dis}	\overline{OE}	A or B	2 V		74	200		300		250	ns
			4.5 V		25	40		60		50	
			6 V		21	34		51		43	
t_t		A or B	2 V		20	60		90		75	ns
			4.5 V		8	12		18		15	
			6 V		6	10		15		13	

6.7 Switching Characteristics, $C_L = 150 \text{ pF}$

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

(see [7-1](#))

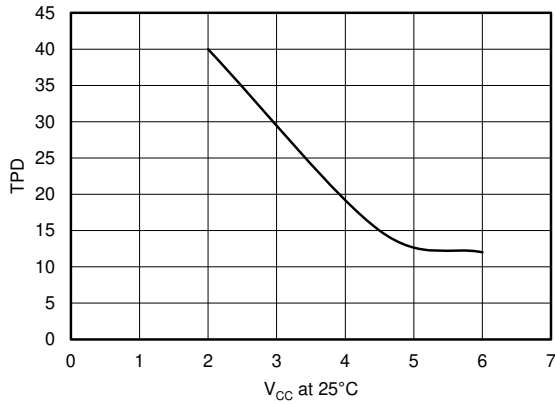
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			SN54HC245		SN74HC245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A or B	B or A	2 V		54	135		200		170	ns
			4.5 V		18	27		40		34	
			6 V		15	23		34		29	
t_{en}	\overline{OE}	A or B	2 V		150	270		405		335	ns
			4.5 V		31	54		81		67	
			6 V		25	46		69		56	
t_t		A or B	2 V		45	210		315		265	ns
			4.5 V		17	42		63		53	
			6 V		13	36		53		45	

6.8 Operating Characteristics

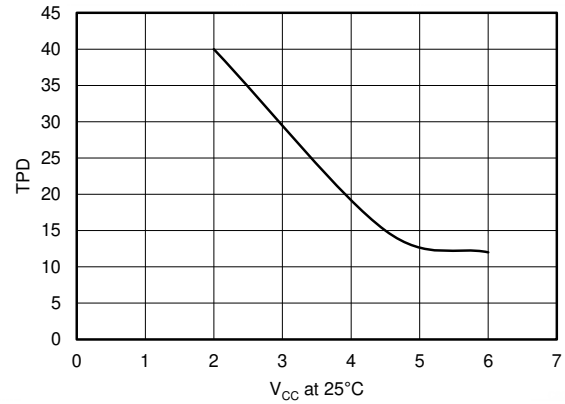
$T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance per transceiver	No load	40	pF

6.9 Typical Characteristics



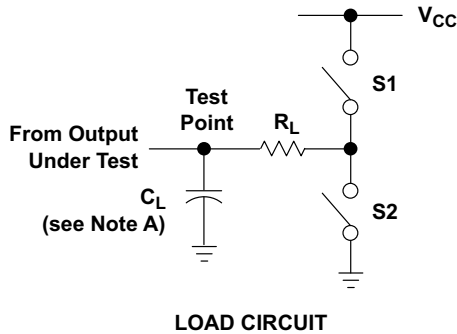
6-1. TPD vs V_{CC} at 25°C



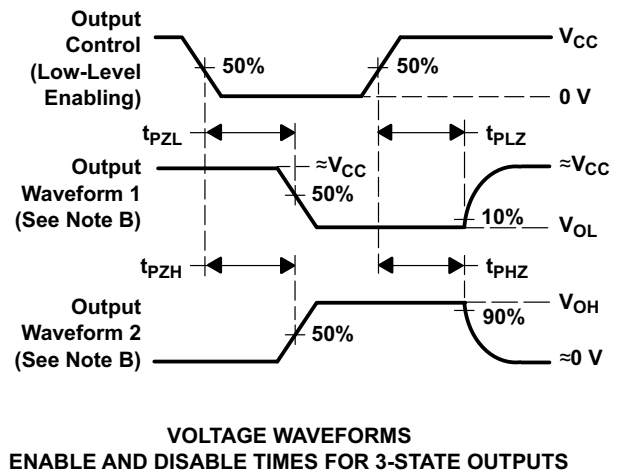
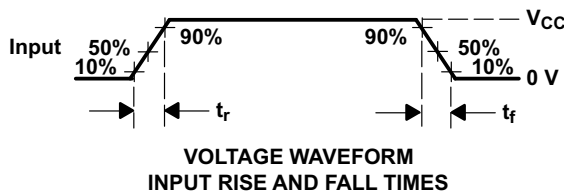
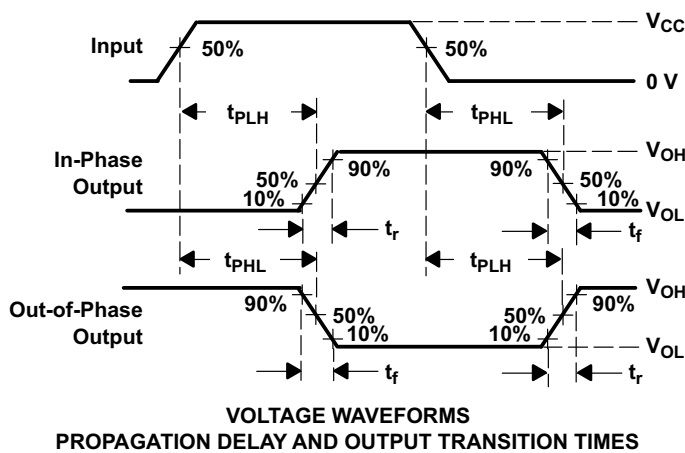
6-2. TPD vs V_{CC} at 25°C

7 Parameter Measurement Information

7.1



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



- A. C_L includes probe and test-fixture capacitance.
- B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- C. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r = 6$ ns, $t_f = 6$ ns.
- D. The outputs are measured one at a time with one input transition per measurement.
- E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
- F. t_{PZL} and t_{PZH} are the same as t_{en} .
- G. t_{PLH} and t_{PHL} are the same as t_{pd} .

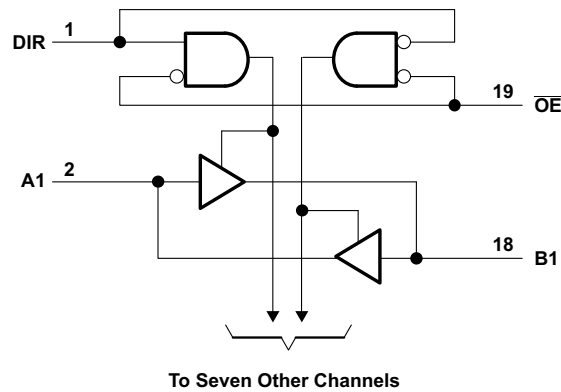
 **7-1. Load Circuit and Voltage Waveforms**

8 Detailed Description

8.1 Overview

These octal bus transceivers are designed for asynchronous two-way communication between data buses. The control-function implementation minimizes external timing requirements. The SNx4HC245 devices allow data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable (OE) input can be used to disable the device so that the buses are effectively isolated. To ensure the high-impedance state during power up or power down, OE should be tied to VCC through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

8.2 Functional Block Diagram



Logic Diagram (Positive Logic)

8.3 Feature Description

The SNx4HC245 devices have a wide operating VCC range from 2 V to 6 V with slower edge rates to minimize output ringing.

8.4 Device Functional Modes

表 8-1 lists the function modes of the SNx4HC245.

表 8-1. 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

9 Application and Implementation

注

以下のアプリケーション情報は、TI の製品仕様に含まれるものではなく、TI ではその正確性または完全性を保証いたしません。個々の目的に対する製品の適合性については、お客様の責任で判断していただくこととなります。お客様は自身の設計実装を検証しテストすることで、システムの機能を確認する必要があります。

9.1 Application Information

The SNx4HC245 is a low-drive CMOS device that can be used for a multitude of bus interface type applications where output ringing is a concern. The low drive and slow edge rates will minimize overshoot and undershoot on the outputs.

9.2 Typical Application

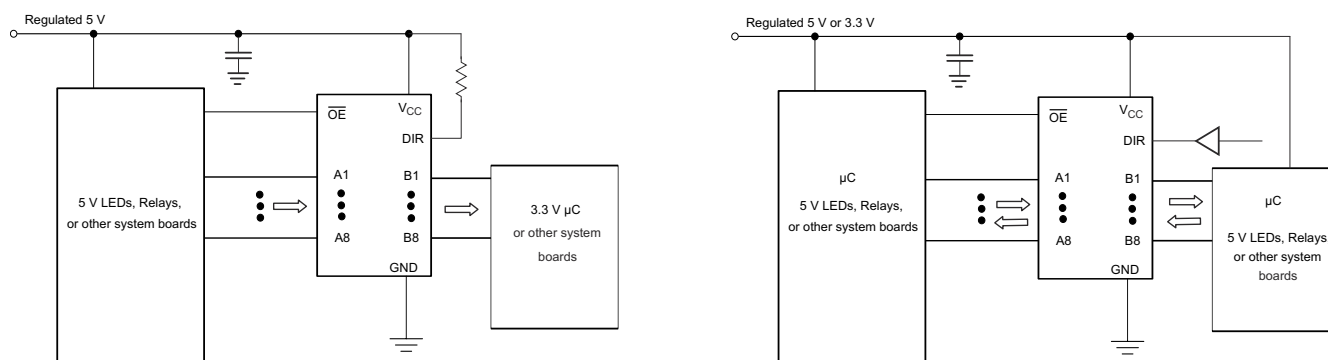


図 9-1. Typical Application Schematic

9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. Outputs can be combined to produce higher drive but the high drive will also create faster edges into light loads, so routing and load conditions should be considered to prevent ringing.

9.2.2 Detailed Design Procedure

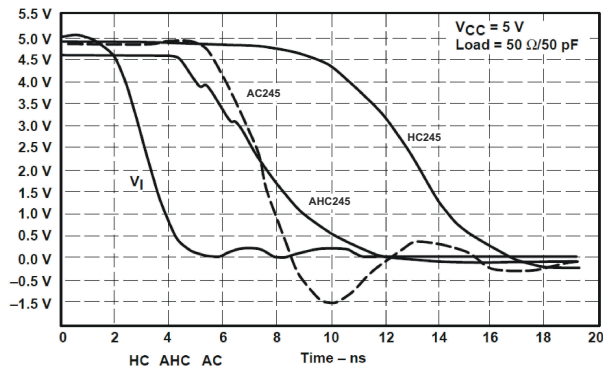
1. Recommended Input Conditions

- Rise time and fall time specs: See $(\Delta t/\Delta V)$ in the [セクション 6.3](#).
- Specified high and low levels: See $(V_{IH}$ and $V_{IL})$ in the [セクション 6.3](#).

2. Recommend Output Conditions

- Load currents should not exceed 25 mA per output and 75 mA total for the part.
- Outputs should not be pulled above V_{CC} .

9.2.3 Application Curve



9-2. Switching Characteristics Comparison

10 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the [セクション 6.3](#).

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.

11 Layout

11.1 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. [図 11-1](#) 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.

11.2 Layout Example

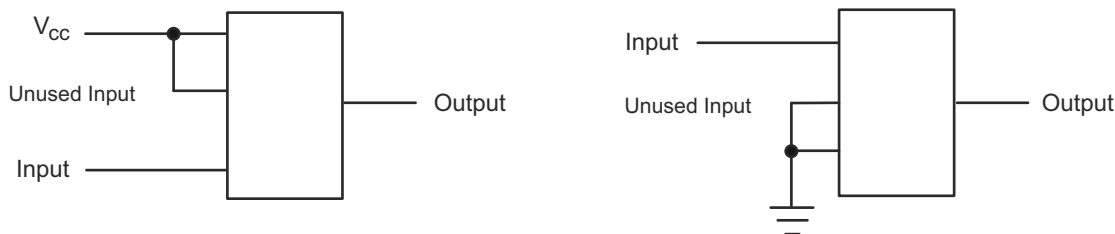


図 11-1. Layout Diagram

12 Device and Documentation Support

12.1 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 12-1. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
SN54HC245	Click here	Click here	Click here	Click here	Click here
SN74HC245	Click here	Click here	Click here	Click here	Click here

12.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](#). Click on *Subscribe to updates* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

12.3 サポート・リソース

TI E2E™ サポート・フォーラムは、エンジニアが検証済みの回答と設計に関するヒントをエキスパートから迅速かつ直接得ることができる場所です。既存の回答を検索したり、独自の質問をしたりすることで、設計に必要な支援を迅速に得ることができます。

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12.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

すべての商標は、それぞれの所有者に帰属します。

12.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

12.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

13 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
5962-8408501VRA	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8408501VR A SNV54HC245J	Samples
5962-8408501VSA	ACTIVE	CFP	W	20	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8408501VS A SNV54HC245W	Samples
84085012A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	84085012A SNJ54HC 245FK	Samples
8408501RA	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	8408501RA SNJ54HC245J	Samples
8408501SA	ACTIVE	CFP	W	20	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	8408501SA SNJ54HC245W	Samples
JM38510/65503BRA	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 65503BRA	Samples
JM38510/65503BSA	ACTIVE	CFP	W	20	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 65503BSA	Samples
M38510/65503BRA	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 65503BRA	Samples
M38510/65503BSA	ACTIVE	CFP	W	20	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 65503BSA	Samples
SN54HC245J	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54HC245J	Samples
SN74HC245DBR	ACTIVE	SSOP	DB	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC245	Samples
SN74HC245DBRG4	ACTIVE	SSOP	DB	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC245	Samples
SN74HC245DW	OBSOLETE	SOIC	DW	20		TBD	Call TI	Call TI	-40 to 85	HC245	
SN74HC245DWR	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC245	Samples
SN74HC245DWRE4	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC245	Samples
SN74HC245DWRG4	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC245	Samples
SN74HC245N	ACTIVE	PDIP	N	20	20	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74HC245N	Samples

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
SN74HC245NSR	ACTIVE	SOP	NS	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC245	Samples
SN74HC245NSRE4	ACTIVE	SOP	NS	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC245	Samples
SN74HC245PW	OBSOLETE	TSSOP	PW	20		TBD	Call TI	Call TI	-40 to 85	HC245	
SN74HC245PWR	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC245	Samples
SN74HC245PWRG4	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC245	Samples
SN74HC245PWT	OBSOLETE	TSSOP	PW	20		TBD	Call TI	Call TI	-40 to 85	HC245	
SNJ54HC245FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	84085012A SNJ54HC 245FK	Samples
SNJ54HC245J	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	8408501RA SNJ54HC245J	Samples
SNJ54HC245W	ACTIVE	CFP	W	20	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	8408501SA SNJ54HC245W	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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OTHER QUALIFIED VERSIONS OF SN54HC245, SN54HC245-SP, SN74HC245 :

- Catalog : [SN74HC245](#), [SN54HC245](#)
- Military : [SN54HC245](#)
- Space : [SN54HC245-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74HC245DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74HC245DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74HC245DWR	SOIC	DW	20	2000	330.0	24.4	10.9	13.3	2.7	12.0	24.0	Q1
SN74HC245DWR	SOIC	DW	20	2000	330.0	24.4	10.9	13.3	2.7	12.0	24.0	Q1
SN74HC245NSR	SOP	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74HC245NSR	SOP	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74HC245PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1
SN74HC245PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1
SN74HC245PWRG4	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HC245DBR	SSOP	DB	20	2000	356.0	356.0	35.0
SN74HC245DBR	SSOP	DB	20	2000	356.0	356.0	35.0
SN74HC245DWR	SOIC	DW	20	2000	356.0	356.0	41.0
SN74HC245DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74HC245NSR	SOP	NS	20	2000	356.0	356.0	41.0
SN74HC245NSR	SOP	NS	20	2000	367.0	367.0	45.0
SN74HC245PWR	TSSOP	PW	20	2000	356.0	356.0	35.0
SN74HC245PWR	TSSOP	PW	20	2000	356.0	356.0	35.0
SN74HC245PWRG4	TSSOP	PW	20	2000	356.0	356.0	35.0

TUBE


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
5962-8408501VSA	W	CFP	20	25	506.98	26.16	6220	NA
84085012A	FK	LCCC	20	55	506.98	12.06	2030	NA
8408501SA	W	CFP	20	25	506.98	26.16	6220	NA
JM38510/65503BSA	W	CFP	20	25	506.98	26.16	6220	NA
M38510/65503BSA	W	CFP	20	25	506.98	26.16	6220	NA
SN74HC245N	N	PDIP	20	20	506	13.97	11230	4.32
SNJ54HC245FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54HC245W	W	CFP	20	25	506.98	26.16	6220	NA

DB0020A



PACKAGE OUTLINE

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



4214851/B 08/2019

NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-150.

EXAMPLE BOARD LAYOUT

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4214851/B 08/2019

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4214851/B 08/2019

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package is hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

GENERIC PACKAGE VIEW

FK 20

LCCC - 2.03 mm max height

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



4229370VA\

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - $\triangle C$ Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - $\triangle D$ The 20 pin end lead shoulder width is a vendor option, either half or full width.

4040049/E 12/2002

DW0020A



PACKAGE OUTLINE

SOIC - 2.65 mm max height

SOIC



4220724/A 05/2016

NOTES:

- All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
- This drawing is subject to change without notice.
- This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
- This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
- Reference JEDEC registration MS-013.

EXAMPLE BOARD LAYOUT

DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:6X

4220724/A 05/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within Mil-Std 1835 GDFP2-F20

PW0020A



PACKAGE OUTLINE

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



4220206/A 02/2017

NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

EXAMPLE BOARD LAYOUT

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



SOLDER MASK DETAILS

4220206/A 02/2017

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220206/A 02/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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