

SN74AVC4T234 4 ビット、デュアル電源、単方向、非反転電圧トランスレータ

1 特長

- 広い動作 V_{CC} 範囲: 0.9V ~ 3.6V
- 3.6V I/O 許容で、混在モードの信号動作をサポート
- 最大 t_{pd} : 3.7ns (3.3V 時)
- バランスが取れた伝播遅延: $t_{PLH} = t_{PHL}$
- 小さい静的消費電力、 I_{CC} : 5 μ A 以下
- どちらかの V_{CC} が 0V になると出力を無効化
- 1.8V で ± 3 mA の出力駆動能力
- 26 Ω の直列抵抗 (A 側出力)
- I_{off} により部分的パワーダウン・モードでの動作をサポート
- 入力ヒステリシスにより、低速な入力遷移と、入力のスイッチング・ノイズ耐性強化を実現
- 最大データ・レート
 - 380Mbps (1.8V から 3.3V に変換)
 - 200Mbps (1.8V 未満から 3.3V に変換)
 - 200Mbps (2.5V または 1.8V に変換)
 - 150Mbps (1.5V に変換)
 - 100Mbps (1.2V に変換)
- JESD 78, Class II 準拠で 100mA 超のラッチアップ性能
- JESD 22 を超える ESD 保護
 - 人体モデルで 2000V (A114-A)
 - デバイス帯電モデルで 500V (C101)

2 アプリケーション

- パーソナル・エレクトロニクス
- 産業用
- エンタープライズ
- 通信機器

3 概要

この 4 ビット非反転バス・トランシーバは、2 つの独立した構成可能な電源レールを使用して B ポート入力と A ポート出力の間の非同期通信を実現します。A ポートは V_{CCA} に追従し、B ポートは V_{CCB} に追従するように設計されており、 V_{CCA} と V_{CCB} はどちらも 0.9V ~ 3.6V に設定できます。

SN74AVC4T234 ソリューションは、0.9V ~ 3.6V の V_{CC} 範囲全体にわたって非常に小さい静的および動的消費電力を達成しバッテリー寿命を延ばすことで、バッテリー駆動の携帯型アプリケーションにおける業界の低消費電力要求を満たします。また、この製品はシグナル・インテグリティを良好に維持します。

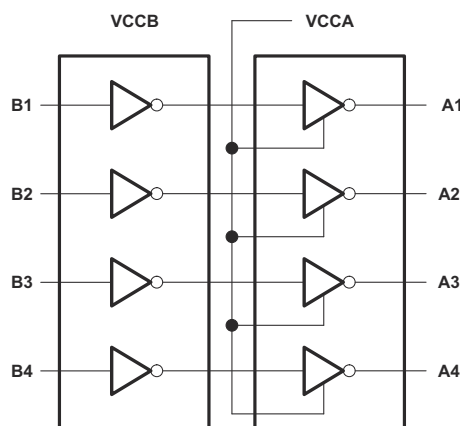
このデバイスは、 I_{off} を使用する部分的パワーダウン・アプリケーション用に完全に動作が規定されています。 I_{off} 回路が出力をディスエーブルにするため、電源切断時にデバイスに電流が逆流して損傷に至ることを回避できます。

V_{CC} 絶縁機能は、どちらかの V_{CC} 入力がある GND レベルになると、A 側ポートを確実に高インピーダンス状態にします。

製品情報

部品番号	パッケージ ⁽¹⁾	本体サイズ (公称)
SN74AVC4T234ZSU	uCSP (11)	2.00mm × 1.40mm
SN74AVC4T234ZWA	NFBGA (11)	2.00mm × 1.40mm

(1) 利用可能なすべての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。



論理図 (正論理)



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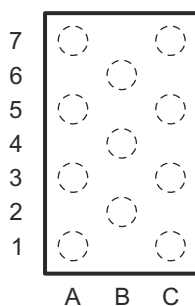
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4 Revision History

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 A (June 2011) to Revision B (July 2020)	Page
• 全体のフォーマットを、追加情報付きの新しい TI データシート標準に変更.....	1
• 「特長」の「入力ディスエーブル機能によりフローティング入力条件が可能」を削除.....	1
• 「特長」の「どちらかの V_{CC} が 0V になると出力を無効化」を追加.....	1
• 文書全体にわたって表、図、相互参照の採番方法を更新.....	1
• 「注文情報」表を削除.....	1
• 注文可能製品として ZWA パッケージを追加.....	1
• Added ESD Ratings table.....	4
• Added Thermal Information table.....	6
• Added Feature Description section.....	10
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• Added Application and Implementation section.....	11
• Added Power Supply Recommendations section.....	12
• Added Layout section.....	12
• Added Device and Documentation Support , and Mechanical, Packaging, and Orderable Information sections.....	13

5 Pin Configuration and Functions



5-1. ZSU/ZWA Package 11-Pin uCSP Transparent Top View

Pin Functions

PIN	NO.	TYPE	DESCRIPTION
NAME	ZSU, ZWA		
B1	C7	I	Channel 1 Data input port
B2	C5	I	Channel 2 Data input port
B3	C3	I	Channel 3 Data input port
B4	C1	I	Channel 4 Data input port
A1	A7	O	Channel 1 Data output port
A2	A5	O	Channel 2 Data output port
A3	A3	O	Channel 3 Data output port
A4	A1	O	Channel 4 Data output port
V _{CCA}	B6	—	A-side output port power supply voltage (0.9 V to 3.6 V)
V _{CCB}	B4	—	B-side input port power supply voltage (0.9 V to 3.6 V)
GND	B2	—	Ground

6 Specifications

6.1 Absolute Maximum Ratings

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

			MIN	MAX	UNIT
V_{CCA} V_{CCB}	Supply voltage		–0.5	4.6	V
V_I	Input voltage ⁽²⁾	Output ports (A port)	–0.5	4.6	V
		Input ports (B port)	–0.5	4.6	
V_O	Voltage applied to any output in the high-impedance or power-off state ⁽²⁾	A port	–0.5	4.6	V
V_O	Voltage applied to any output in the high or low state ^{(2) (3)}	A port	–0.5	$V_{CCA} + 0.5$	V
I_{IK}	Input clamp current	$V_I < 0$		–50	mA
I_{OK}	Output clamp current	$V_O < 0$		–50	mA
I_O	Continuous output current			±20	mA
	Continuous current through V_{CCA} , V_{CCB} , or GND			±50	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, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) The input voltage and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The output positive-voltage rating may be exceeded up to 4.6 V maximum if the output current rating is observed.

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±2000	V
		Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾	±500	

- (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

			V _{CCI} ^{(1) (3)}	V _{CCO} ⁽²⁾	MIN	MAX	UNIT
V _{CCA}	Supply voltage				0.9	3.6	V
V _{CCB}	Supply voltage				0.9	3.6	V
V _{IH}	High-level input voltage	Data inputs ⁽⁴⁾	0.9 V to 1.1 V		V _{CCI} × 0.8	3.6	V
			1.1 V to 1.4 V		V _{CCI} × 0.8	3.6	
			1.4 V to 1.95 V		V _{CCI} × 0.65	3.6	
			2.3 V to 2.7 V		V _{CCI} × 0.65	3.6	
			3 V to 3.6 V		V _{CCI} × 0.65	3.6	
V _{IL}	Low-level input voltage	Data inputs ⁽⁴⁾	0.9 V to 1.1 V		0	V _{CCI} × 0.2	V
			1.1 V to 1.4 V		0	V _{CCI} × 0.2	
			1.1 V to 1.95 V		0	V _{CCI} × 0.35	
			2.3 V to 2.7 V		0	V _{CCI} × 0.35	
			3 V to 3.6 V		0	V _{CCI} × 0.35	
V _I	Input voltage				0	3.6	V
V _O	Output voltage	Active state			0	V _{CCO}	V
I _{OH}	High-level output current			0.9 V to 1.1 V		−0.1	mA
				1.1 V to 1.3 V		−1	
				1.4 V to 1.6 V		−2	
				1.65 V to 1.95 V		−3	
				2.3 V to 2.7 V		−6	
				3 V to 3.6 V		−12	
I _{OL}	Low-level output current			0.9 V to 1.1 V		0.1	mA
				1.1 V to 1.3 V		1	
				1.4 V to 1.6 V		2	
				1.65 V to 1.95 V		3	
				2.3 V to 2.7 V		6	
				3 V to 3.6 V		12	
Δt/Δv	Input transition rise or fall rate			3 V to 3.6 V		10	ns/V
				2.3 V to 2.7 V		20	
				1.65 V to 1.95 V		50	
				1.4 V to 1.6 V		100	
				1.1 V to 1.3 V		100	
T _A	Operating free-air temperature				−40	85	°C

(1) V_{CCI} is the V_{CCB} input port.

(2) V_{CCO} is the V_{CCA} output port.

(3) All unused data inputs of the device must be held at V_{CCI} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, [SCBA004](#).

(4) For V_{CCI} values not specified in the data sheet, $V_{IH} \text{ min} = V_{CCI} \times 0.7 \text{ V}$, $V_{IL} \text{ max} = V_{CCI} \times 0.3 \text{ V}$

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾		SN74AVC4T234	SN74AVC4T234	UNIT
		ZSU (uCSP)	ZWA (NFBGA)	
		11 PINS	11 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance ⁽²⁾	165.9	181.4	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	123.8	136.7	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	123.2	137.7	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	4.4	7.5	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	122.9	137.4	°C/W

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

(2) The package thermal impedance is calculated in accordance with JEDEC 51-5.

6.5 Electrical Characteristics

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

PARAMETER ^{(1) (2)}		TEST CONDITIONS	V_{CCA}	V_{CCB}	T_A	MIN	TYP	MAX	UNIT
V_{OH}		$I_{OH} = -100 \mu A$	0.9 V	0.9 V to 3.6 V	$T_A = -40^\circ C$ to $85^\circ C$	$V_{CCA} - 0.1$			V
		$I_{OH} = -1 \text{ mA}$	1.1 V		$T_A = -40^\circ C$ to $85^\circ C$	0.88			
		$I_{OH} = -2 \text{ mA}$	1.4 V		$T_A = -40^\circ C$ to $85^\circ C$	1.05			
		$I_{OH} = -3 \text{ mA}$	1.65 V		$T_A = -40^\circ C$ to $85^\circ C$	1.2			
		$I_{OH} = -6 \text{ mA}$	2.3V		$T_A = -40^\circ C$ to $85^\circ C$	1.75			
		$I_{OH} = -12 \text{ mA}$	3 V		$T_A = -40^\circ C$ to $85^\circ C$	2.3			
		$V_I = V_{IH}$							
V_{OL}		$I_{OL} = 100 \mu A$	0.9 V	0.9 V to 3.6 V	$T_A = -40^\circ C$ to $85^\circ C$			0.1	V
		$I_{OL} = 1 \text{ mA}$	1.1 V		$T_A = -40^\circ C$ to $85^\circ C$			0.2	
		$I_{OL} = 2 \text{ mA}$	1.4 V		$T_A = -40^\circ C$ to $85^\circ C$			0.2	
		$I_{OL} = 3 \text{ mA}$	1.65 V		$T_A = -40^\circ C$ to $85^\circ C$			0.25	
		$I_{OL} = 6 \text{ mA}$	2.3V		$T_A = -40^\circ C$ to $85^\circ C$			0.3	
		$I_{OL} = 12 \text{ mA}$	3 V		$T_A = -40^\circ C$ to $85^\circ C$			0.55	
		$V_I = V_{IL}$							
I_{off}	A or B port	V_I or $V_O = 0$ to 3.6 V	0 V	0 V to 3.6 V	$T_A = 25^\circ C$		± 0.1	± 1	μA
					$T_A = -40^\circ C$ to $85^\circ C$			± 5	
			0 V to 3.6 V	0 V	$T_A = 25^\circ C$		± 0.1	± 1	
					$T_A = -40^\circ C$ to $85^\circ C$			± 5	
I_{CCA}		V_{CCB} or GND, $I_O = 0$	0.8 V to 3.6 V	0.8 V to 3.6 V	$T_A = -40^\circ C$ to $85^\circ C$			8	μA
			0 V	0 V to 3.6 V	$T_A = -40^\circ C$ to $85^\circ C$			8	
			0 V to 3.6 V	0 V	$T_A = -40^\circ C$ to $85^\circ C$			8	
I_{CCB}		V_{CCB} or GND, $I_O = 0$	0.8 V to 3.6 V	0.8 V to 3.6 V	$T_A = -40^\circ C$ to $85^\circ C$			8	μA
			0 V	0 V to 3.6 V	$T_A = -40^\circ C$ to $85^\circ C$			8	
			0 V to 3.6 V	0 V	$T_A = -40^\circ C$ to $85^\circ C$			8	
$I_{CCA} + I_{CCB}$		V_{CCB} or GND, $I_O = 0$	0.8 V to 3.6 V	0.8 V to 3.6 V	$T_A = -40^\circ C$ to $85^\circ C$			16	μA
C_i	V_{CCB}	$V_{CCB} = 3.3 \text{ V}$ or GND	3.3 V	3.3 V	$T_A = 25^\circ C$		22		pF
C_{io}	A or B port	$V_{CCA} = 3.3 \text{ V}$ or GND	3.3 V	3.3 V	$T_A = 25^\circ C$		5		pF
					$T_A = -40^\circ C$ to $85^\circ C$			7	

(1) V_{CCI} is the V_{CCB} input port.

(2) V_{CCO} is the V_{CCA} output port.

6.6 Switching Characteristics, $V_{CCB} = 1.1\text{ V}$

over recommended operating free-air temperature range, $V_{CCB} = 1.1\text{ V}$ (unless otherwise noted) (see [7-1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CCA}	TYP	UNIT
t_{PLH}	B	A	$V_{CCA} = 1.1\text{ V}$	5.5	ns
			$V_{CCA} = 1.4\text{ V}$	4.6	
			$V_{CCA} = 1.65\text{ V}$	4.2	
			$V_{CCA} = 2.3\text{ V}$	3.7	
			$V_{CCA} = 3\text{ V}$	3.9	
t_{PHL}	B	A	$V_{CCA} = 1.1\text{ V}$	4.7	ns
			$V_{CCA} = 1.4\text{ V}$	3.9	
			$V_{CCA} = 1.65\text{ V}$	3.4	
			$V_{CCA} = 2.3\text{ V}$	3	
			$V_{CCA} = 3\text{ V}$	3.1	

6.7 Switching Characteristics, $V_{CCB} = 1.4\text{ V}$

over recommended operating free-air temperature range, $V_{CCB} = 1.4\text{ V}$ (see [7-1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CCA}	MIN	TYP	MAX	UNIT
t_{PLH}	B	A	$V_{CCA} = 1.1\text{ V}$		4.7		ns
			$V_{CCA} = 1.4\text{ V}$	2		5	
			$V_{CCA} = 1.65\text{ V}$	1.5		3.8	
			$V_{CCA} = 2.3\text{ V}$	1.2		3.8	
			$V_{CCA} = 3\text{ V}$	1		3.8	
t_{PHL}	B	A	$V_{CCA} = 1.1\text{ V}$		4.2		ns
			$V_{CCA} = 1.4\text{ V}$	2		5	
			$V_{CCA} = 1.65\text{ V}$	1.5		3.9	
			$V_{CCA} = 2.3\text{ V}$	1.2		3	
			$V_{CCA} = 3\text{ V}$	1		3	

6.8 Switching Characteristics, $V_{CCB} = 1.65\text{ V}$

over recommended operating free-air temperature range, $V_{CCB} = 1.65\text{ V}$ (see [7-1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CCA}	MIN	TYP	MAX	UNIT
t_{PLH}	B	A	$V_{CCA} = 1.1\text{ V}$		4.3		ns
			$V_{CCA} = 1.4\text{ V}$	2		4.2	
			$V_{CCA} = 1.65\text{ V}$	1.5		4.1	
			$V_{CCA} = 2.3\text{ V}$	1.2		3.8	
			$V_{CCA} = 3\text{ V}$	1		3.7	
t_{PHL}	B	A	$V_{CCA} = 1.1\text{ V}$		2.6		ns
			$V_{CCA} = 1.4\text{ V}$	2		4.2	
			$V_{CCA} = 1.65\text{ V}$	1.5		4.1	
			$V_{CCA} = 2.3\text{ V}$	1.2		3.8	
			$V_{CCA} = 3\text{ V}$	1		3.7	

6.9 Switching Characteristics, $V_{CCB} = 2.3\text{ V}$

over recommended operating free-air temperature range, $V_{CCB} = 2.3\text{ V}$ (see [Figure 7-1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CCA}	MIN	TYP	MAX	UNIT
t_{PLH}	B	A	$V_{CCA} = 1.1\text{ V}$		2.7		ns
			$V_{CCA} = 1.4\text{ V}$	2		3.5	
			$V_{CCA} = 1.65\text{ V}$	1.5		3.1	
			$V_{CCA} = 2.3\text{ V}$	1.2		2.8	
			$V_{CCA} = 3\text{ V}$	0.2		4.1	
t_{PHL}	B	A	$V_{CCA} = 1.1\text{ V}$		2.4		ns
			$V_{CCA} = 1.4\text{ V}$	2		3.7	
			$V_{CCA} = 1.65\text{ V}$	1.5		3.7	
			$V_{CCA} = 2.3\text{ V}$	1.2		2.8	
			$V_{CCA} = 3\text{ V}$	0.2		3.5	

6.10 Switching Characteristics, $V_{CCB} = 3\text{ V}$

over recommended operating free-air temperature range, $V_{CCB} = 3\text{ V}$ (see [Figure 7-1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CCA}	MIN	TYP	MAX	UNIT
t_{PLH}	B	A	$V_{CCA} = 1.1\text{ V}$		3.9		ns
			$V_{CCA} = 1.4\text{ V}$	2		3.8	
			$V_{CCA} = 1.65\text{ V}$	1.5		3.6	
			$V_{CCA} = 2.3\text{ V}$	0.5		3.6	
			$V_{CCA} = 3\text{ V}$	0.2		3.6	
t_{PHL}	B	A	$V_{CCA} = 1.1\text{ V}$		3.9		ns
			$V_{CCA} = 1.4\text{ V}$	2		3.7	
			$V_{CCA} = 1.65\text{ V}$	1.5		3.1	
			$V_{CCA} = 2.3\text{ V}$	0.5		3.5	
			$V_{CCA} = 3\text{ V}$	0.2		3	

6.11 Operating Characteristics

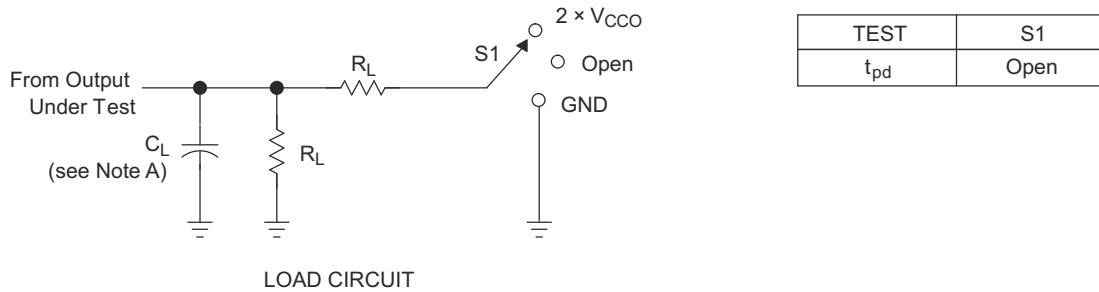
$T_A = 25^\circ\text{C}$

PARAMETER			TEST CONDITIONS	V_{CCA}, V_{CCB}	TYP	UNIT
C_{pdA} ⁽¹⁾	B to A	Outputs enabled	$C_L = 0$, $f = 10\text{ MHz}$, $t_r = t_f = 1\text{ ns}$	$V_{CCA} = V_{CCB} = 1.1\text{ V}$	18.5	pF
				$V_{CCA} = V_{CCB} = 1.4\text{ V}$		
				$V_{CCA} = V_{CCB} = 1.65\text{ V}$		
				$V_{CCA} = V_{CCB} = 2.3\text{ V}$		
				$V_{CCA} = V_{CCB} = 3\text{ V}$		

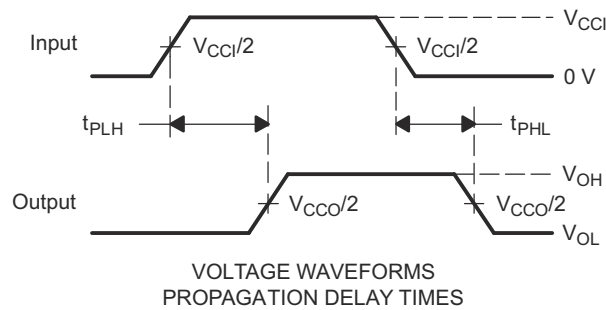
(1) Power dissipation capacitance per transceiver

7 Parameter Measurement Information

7.1 Load Circuit and Voltage Waveforms



V_{CCO}	C_L	R_L	V_{TP}
1.2 V	30 pF	0.5 k Ω	0.1 V
1.5 V $\pm$ 0.1 V	30 pF	0.5 k Ω	0.1 V
1.8 V $\pm$ 0.15 V	30 pF	0.5 k Ω	0.15 V
2.5 V $\pm$ 0.2 V	30 pF	0.5 k Ω	0.15 V
3.3 V $\pm$ 0.3 V	30 pF	0.5 k Ω	0.3 V



- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10$ MHz, $Z_O = 50 \Omega$, $dv/dt \geq 1$ V/ns.
 - C. The outputs are measured one at a time, with one transition per measurement.
 - D. t_{PLH} and t_{PHL} are the same as t_{pd} .
 - E. V_{CCI} is V_{CCB} .
 - F. V_{CCO} is V_{CCA} .

7-1. Load and Circuit and Voltage Waveforms

8 Detailed Description

8.1 Overview

The SN74AVC4T234 is a 4-bit, dual-supply noninverting voltage level translation device. The B input port pins are referenced to the V_{CCB} supply, and the A output port pins are referenced to the V_{CCA} . The B port is able to accept I/O voltages ranging from 0.9 V to 3.6 V.

8.2 Functional Block Diagram

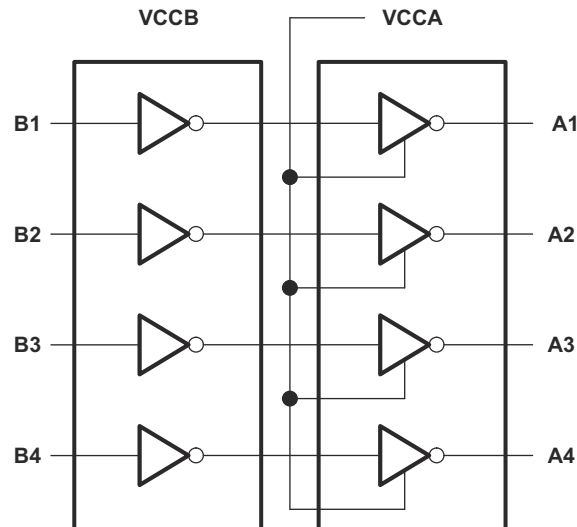


图 8-1. Logic Diagram (Positive Logic)

8.3 Feature Description

8.3.1 Fully Configurable Dual-Rail Design Allows Each Port to Operate Over the Full 0.9-V to 3.6-V Power-Supply Range

Both V_{CCA} and V_{CCB} can be supplied at any voltage between 0.9 V and 3.6 V; thus, making the device suitable for translating between any of the low voltage nodes (0.9, 1.05 V, 1.2 V, 1.8 V, 2.5 V, and 3.3 V).

8.3.2 Supports High Speed Translation

The SN74AVC4T234 device can support high data rate applications. The translated signal data rate can be up to 380 Mbps when the signal is translated from 1.8 V to 3.3 V.

8.3.3 I_{off} Supports Partial-Power-Down Mode Operation

I_{off} will prevent backflow current by disabling I/O output circuits when device is in partial-power-down mode.

8.4 Device Functional Modes

表 8-1. Function Table

INPUTS	OUTPUTS
Bx	Ax
L	L
H (referenced to V_{CCB})	H (referenced to V_{CCA})

9 Application and Implementation

Note

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9.1 Application Information

The SN74AVC4T234 device can be used in level-translation applications for interfacing devices or systems operating at different interface voltages with one another. The SN74AVC4T234 device is ideal for use in applications where a push-pull driver is connected to the data I/Os. The max data rate can be up to 380 Mbps when device translates a signal from 1.8 V to 3.3 V.

9.2 Typical Application

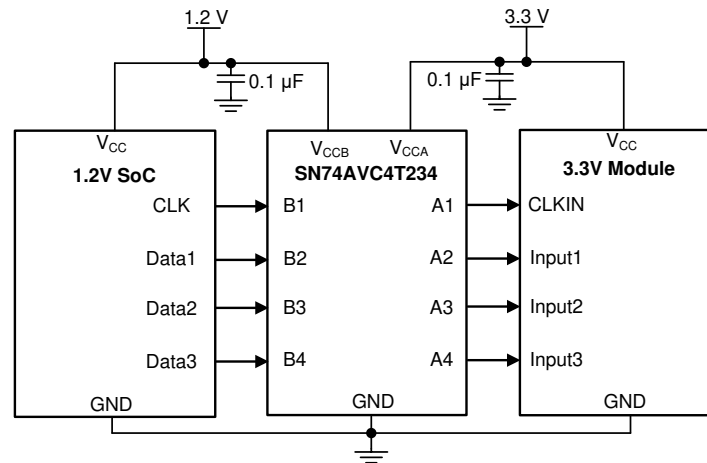


図 9-1. Typical Application Diagram

9.2.1 Design Requirements

For the design example shown in [Typical Application](#), use the parameters listed in [表 9-1](#).

表 9-1. Design Parameters

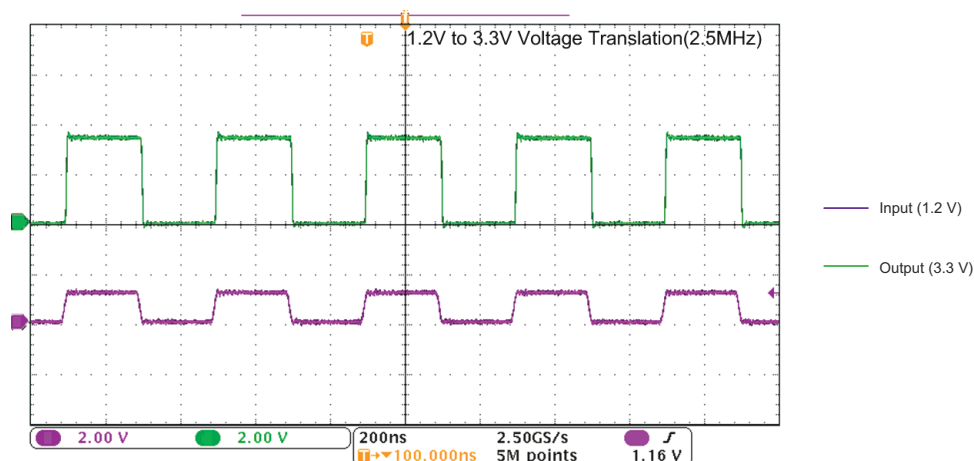
DESIGN PARAMETER	EXAMPLE VALUE
Input voltage range	0.9 V to 3.6 V
Output voltage range	0.9 V to 3.6 V

9.2.2 Detailed Design Procedure

To begin the design process, determine the following:

- Input voltage range
 - Use the supply voltage of the device that is driving the SN74AVC4T234 device to determine the input voltage range. For a valid logic high, the value must exceed the V_{IH} of the input port. For a valid logic low, the value must be less than the V_{IL} of the input port.
- Output voltage range
 - Use the supply voltage of the device that the SN74AVC4T234 device is driving to determine the output voltage range.

9.2.3 Application Curves



9-2. Translation Up (1.2 V to 3.3 V) at 2.5 MHz

10 Power Supply Recommendations

The SN74AVC4T234 device uses two separate configurable power-supply rails, V_{CCA} and V_{CCB} . V_{CCA} accepts any supply voltage from 0.9 V to 3.6 V and V_{CCB} accepts any supply voltage from 0.9 V to 3.6 V. The A port and B port are designed to track V_{CCA} and V_{CCB} respectively allowing for low-voltage bidirectional translation between any of the 0.9-V, 1.05-V, 1.2-V, 1.5-V, 1.8-V, 2.5-V and 3.3-V voltage nodes.

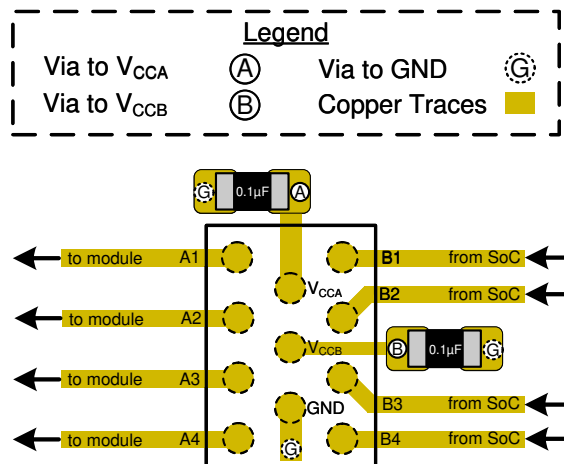
11 Layout

11.1 Layout Guidelines

To ensure reliability of the device, following common printed-circuit board layout guidelines is recommended.

- Bypass capacitors should be used on power supplies.
- Short trace lengths should be used to avoid excessive loading.
- Place pads on the signal paths for loading capacitors or pullup resistors to help adjust rise and fall times of signals, depending on the system requirements.

11.2 Layout Example



12 Device and Documentation Support

12.1 サポート・リソース

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12.4 用語集

[TI 用語集](#) この用語集には、用語や略語の一覧および定義が記載されています。

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 part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
SN74AVC4T234ZWAR	Active	Production	NFBGA (ZWA) 11	2500 LARGE T&R	Yes	SNAGCU	Level-2-260C-1 YEAR	-40 to 85	1G2
SN74AVC4T234ZWAR.B	Active	Production	NFBGA (ZWA) 11	2500 LARGE T&R	Yes	SNAGCU	Level-2-260C-1 YEAR	-40 to 85	1G2

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts 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.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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TAPE AND REEL INFORMATION


*All dimensions are nominal

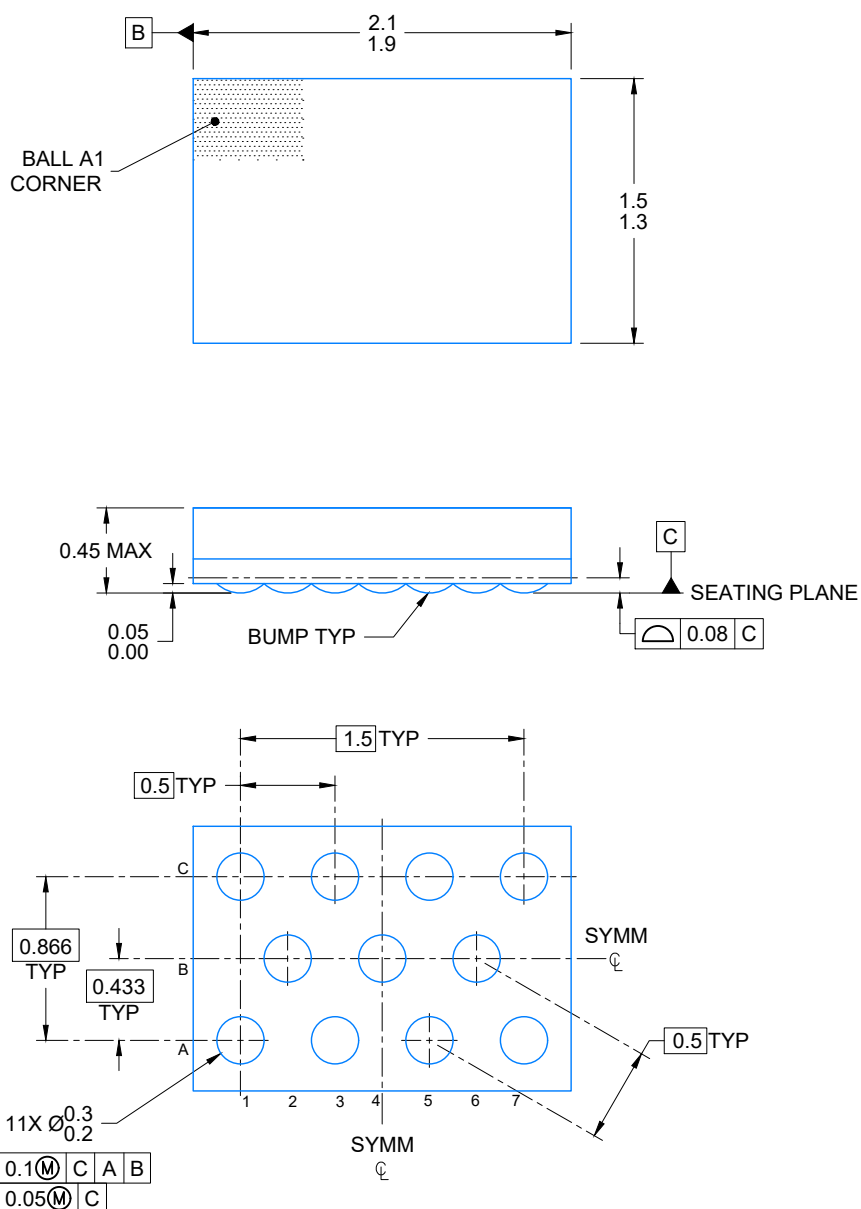
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AVC4T234ZWAR	NFBGA	ZWA	11	2500	330.0	8.4	1.6	2.2	0.55	4.0	8.0	Q2

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AVC4T234ZWAR	NFBGA	ZWA	11	2500	338.1	338.1	20.6

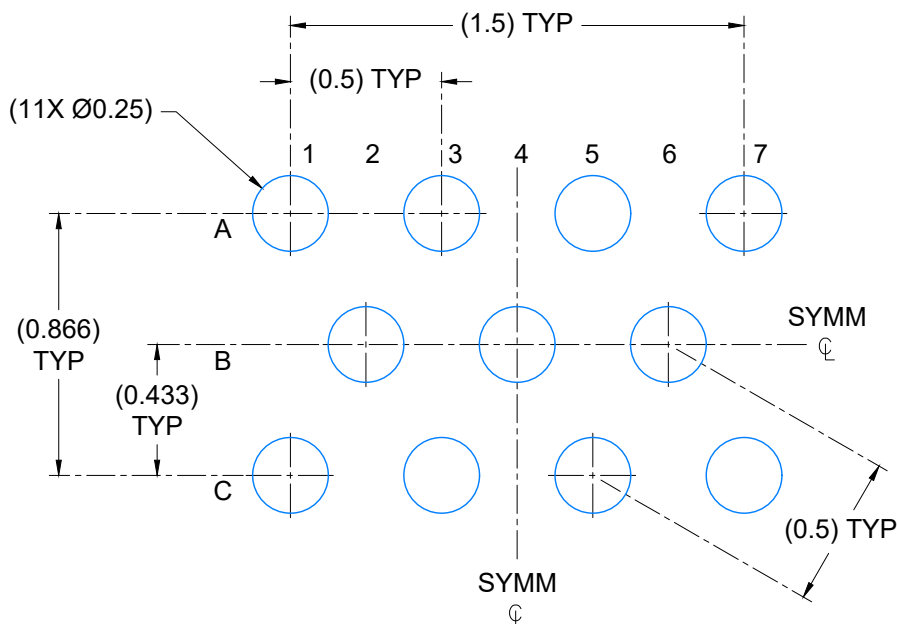


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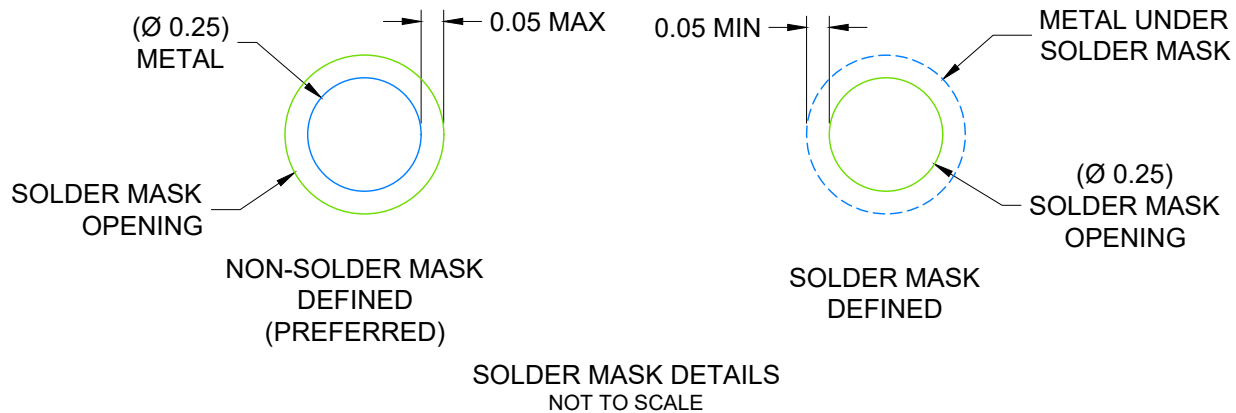
NOTES:

NanoFree is a trademark of Texas Instruments.

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.



LAND PATTERN EXAMPLE
SCALE: 40X

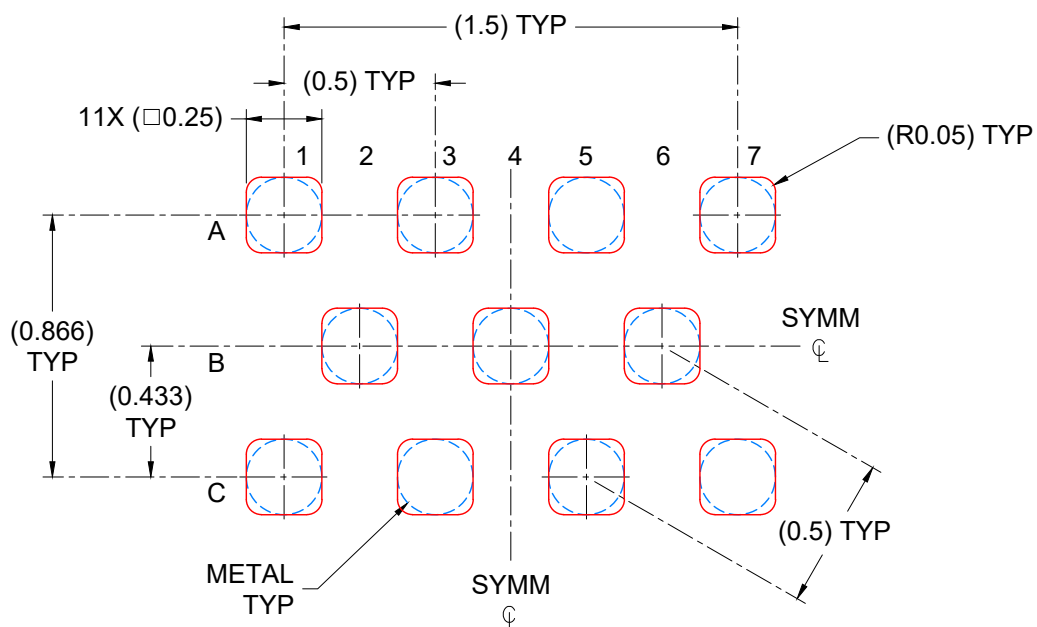


SOLDER MASK DETAILS
NOT TO SCALE

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NOTES: (continued)

- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. Refer to Texas Instruments Literature number SNVA009 (www.ti.com/lit/snva009).



SOLDER PASTE EXAMPLE
 BASED ON 0.1 mm THICK STENCIL
 SCALE: 40X

4224717/A 12/2018

NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

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