SN74AVCH2T45 具有可配置电平转换和三态输出的 2 位 2 电源总线收发器

1 特性

- 采用德州仪器 (TI) NanoFree™ 封装
- V_{CC} 隔离
- 2 轨设计
- I/O 可承受 4.6V 的电压
- 局部省电模式运行
- 总线保持数据输入
- 最大数据速率
  - 500Mbps（1.8V 至 3.3V）
  - 320Mbps（< 1.8V 至 3.3V）
  - 320Mbps（电平转换至 2.5V 或 1.8V）
  - 280Mbps（电平转换至 1.5V）
  - 240Mbps（电平转换至 1.2V）
- 闩锁性能超过 100mA，符合 JESD 78 II 类规范的要求
- ESD 保护性能超过 JESD 22 规范要求

2 应用

- 智能手机
- 服务器
- 台式计算机和笔记本电脑
- 其他便携式设备

3 说明

这款 2 位同相总线收发器使用两个独立的可配置电源轨。A 端口用于跟踪 V_{CCA}，可支持 1.2V 至 3.6V 范围内的任何电源电压。B 端口用于跟踪 V_{CCB}，可支持 1.2V 至 3.6V 范围内的任何电源电压。因此可在 1.2V、1.5V、1.8V、2.5V 和 3.3V 电压节点之间进行通用的低压双向转换和电平转换。

SN74AVCH2T45 旨在实现两条数据总线间的异步通信。方向控制（DIR 引脚）输入的逻辑电平会激活 B 端口或 A 端口输出。当 B 端口输出被激活时，此器件将数据从 A 总线发送到 B 总线，而当 A 端口输出被激活时，此器件将数据从 B 总线发送到 A 总线。SN74AVCH2T45 具备有源总线保持电路会将未使用或未驱动的输入保持在有效逻辑状态。TI 不建议在总线保持电路上使用上拉或下拉电阻。

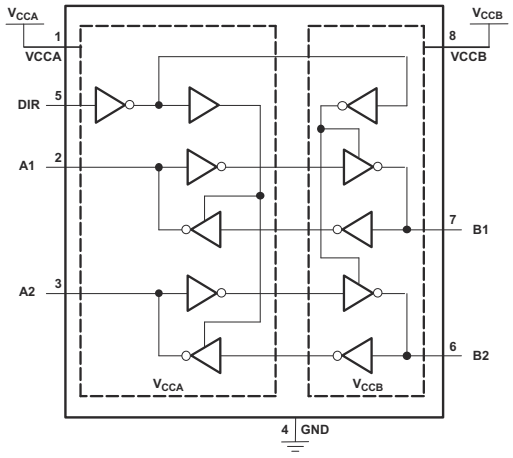
该器件专用于使用 I_{off} 的局部断电应用。I_{off} 电路可禁用输出，以防在器件断电时电流回流对器件造成损坏。V_{CC} 隔离特性可确保当任一 V_{CC} 输入接地时，两个输出都处于高阻抗状态。上电侧的总线保持电路始终保持有效状态。

有源总线保持电路会将未使用或未驱动的输入保持在有效逻辑状态。NanoFree 封装技术是 IC 封装概念的一项重大突破，它将硅晶片用作封装。

封装信息

器件型号	封装 (1)	封装尺寸 (2)
SN74AVCH2T45	DCT（SSOP，8）	2.95mm × 4.00mm
	DCU（VSSOP，8）	3.10mm × 2.00mm
	YZP（DSBGA，8）	1.89mm × 0.89mm

(1) 有关更多信息，请参阅节 11
(2) 封装尺寸（长 × 宽）为标称值并包括引脚（如适用）



逻辑图（正逻辑）

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4 Pin Configurations and Functions

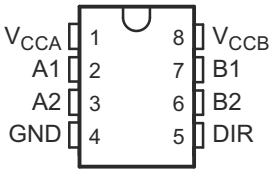


图 4-1. DCT and DCU Packages 8-Pin SSOP and VSSOP Top View

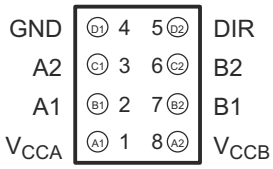


图 4-2. YZP Package 8-Pin DSBGA Bottom View

表 4-1. Pin Functions

PIN			DESCRIPTION
NAME	SSOP, VSSOP	DSBGA	
VCCA	1	A1	Supply Voltage A
VCCB	8	A2	Supply Voltage B
GND	4	D1	Ground
A1	2	B1	Output or input depending on state of DIR. Output level depends on V_{CCA}.
A2	3	C1	Output or input depending on state of DIR. Output level depends on V_{CCA}.
B1	7	B2	Output or input depending on state of DIR. Output level depends on V_{CCB}.
B2	6	C2	Output or input depending on state of DIR. Output level depends on V_{CCB}.
DIR	5	D2	Direction Pin, Connect to GND or to VCCA.

5 Specifications

5.1 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)	I/O ports (A port)	– 0.5	4.6	V
		I/O ports (B port)	– 0.5	4.6	
		Control inputs	– 0.5	4.6	
V_O	Voltage range applied to any output in the high-impedance or power-off state(2)	A port	– 0.5	4.6	V
		B port	– 0.5	4.6	
V_O	Voltage range applied to any output in the high or low state(2) (3)	A port	– 0.5	V_{CCA} + 0.5	V
		B port	– 0.5	V_{CCB} + 0.5	
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			±50	mA
	Continuous current through V_{CCA}, V_{CCB}, or GND			±100	mA
T_J	Junction temperature		– 40	150	°C
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 节 5.3. 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 4.6V maximum if the output current rating is observed.

5.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001(1)	±8000	V
		Charged-device model (CDM), per JEDEC specification JESD22-C101(2)	±1000	
		Machine Model (MM), Per JEDEC specification JESD22-A115-A	±200	

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

5.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)(3) (4) (5)

			V_{CCI} (1)	V_{CCO} (2)	MIN	NOM	MAX	UNIT
V_{CCA}	Supply voltage				1.2		3.6	V
V_{CCB}	Supply voltage				1.2		3.6	V
V_{IH}	High-level input voltage	Data inputs(4)	1.2V to 1.95V		V_{CCI} (1) × 0.65			V
			1.95V to 2.7V		1.6			
			2.7V to 3.6V		2			
V_{IL}	Low-level input voltage	Data inputs(4)	1.2V to 1.95V				V_{CCI} (1) × 0.35	V
			1.95V to 2.7V				0.7	
			2.7V to 3.6V				0.8	
V_{IH}	High-level input voltage	DIR (referenced to V_{CCA})(5)	1.2V to 1.95V		V_{CCA} × 0.65			V
			1.95 V to 2.7V		1.6			
			2.7V to 3.6V		2			
V_{IL}	Low-level input voltage	DIR (referenced to V_{CCA})(5)	1.2V to 1.95V				V_{CCA} × 0.35	V
			1.95V to 2.7V				0.7	
			2.7V to 3.6V				0.8	
V_I	Input voltage				0		3.6	V
V_O	Output voltage	Active state			0		V_{CCO} (2)	V
		3-state			0		3.6	
I_{OH}	High-level output current			1.2V			–3	mA
				1.4V to 1.6V			–6	
				1.65V to 1.95V			–8	
				2.3V to 2.7V			–9	
				3V to 3.6V			–12	
I_{OL}	Low-level output current			1.2V			3	mA
				1.4V to 1.6V			6	
				1.65V to 1.95V			8	
				2.3V to 2.7V			9	
				3V to 3.6V			12	
$\Delta t/\Delta v$	Input transition rise or fall rate						5	ns/V
T_A	Operating free-air temperature				–40		85	°C

(1) V_{CCI} is the voltage associated with the input port supply VCCA or VCCB.
(2) V_{CCO} is the voltage associated with the output port supply VCCA or VCCB.
(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.
(4) For V_{CCI} values not specified in the data sheet, V_{IH} min = V_{CCI} × 0.7V, V_{IL} max = V_{CCI} × 0.3V.
(5) For V_{CCI} values not specified in the data sheet, V_{IH} min = V_{CCA} × 0.7V, V_{IL} max = V_{CCA} × 0.3V.

5.4 Thermal Information

THERMAL METRIC (1)		SN74AVCH2T45			UNIT
		DCT (SSOP)	DCU (VSSOP)	YZP (DSBGA)	
		8 PINS	8 PINS	8 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	183.1	246.9	105.8	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	101.5	95.2	1.6	
$R_{\theta JB}$	Junction-to-board thermal resistance	111.0	158.4	10.8	
ψ_{JT}	Junction-to-top characterization parameter	27.6	34.1	3.1	
ψ_{JB}	Junction-to-board characterization parameter	109.2	157.5	10.8	

(1) For more information about traditional and new thermal metrics, see the IC Package Thermal Metrics application report.

5.5 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)(5) (6)

PARAMETER		TEST CONDITIONS		V_{CCA}	V_{CCB}	T_A = 25°C			–40°C to 85°C			UNIT
						MIN	TYP	MAX	MIN	TYP	MAX	
V_{OH} (7)		I_{OH} = –100 µA	$V_I = V_{IH}$	1.2V to 3.6V	1.2V to 3.6V				V_{CCO} – 0.2			V
		I_{OH} = –3mA		1.2V	1.2V		0.95					
		I_{OH} = –6mA		1.4V	1.4V				1.05			
		I_{OH} = –8mA		1.65V	1.65V				1.2			
		I_{OH} = –9mA		2.3V	2.3V				1.75			
		I_{OH} = –12mA		3V	3V				2.3			
V_{OL} (7)		I_{OL} = 100 µA	$V_I = V_{IL}$	1.2V to 3.6V	1.2V to 3.6V						0.2	V
		I_{OL} = 3mA		1.2V	1.2V		0.15					
		I_{OL} = 6mA		1.4V	1.4V						0.35	
		I_{OL} = 8mA		1.65V	1.65V						0.45	
		I_{OL} = 9mA		2.3V	2.3V						0.55	
		I_{OL} = 12mA		3V	3V						0.7	
I_I (7)	DIR input	$V_I = V_{CCA}$ or GND		1.2V to 3.6V	1.2V to 3.6V		±0.025	±0.25			±1	µA
I_{BHL} (1)		V_I = 0.42V		1.2V	1.2V		25					µA
		V_I = 0.49V		1.4V	1.4V				15			
		V_I = 0.58V		1.65V	1.65V				25			
		V_I = 0.7V		2.3V	2.3V				45			
		V_I = 0.8V		3.3V	3.3V				100			
I_{BHH} (2)		V_I = 0.78V		1.2V	1.2V		–25					µA
		V_I = 0.91V		1.4V	1.4V				–15			
		V_I = 1.07V		1.65V	1.65V				–25			
		V_I = 1.6V		2.3V	2.3V				–45			
		V_I = 2V		3.3V	3.3V				–100			
I_{BHLO} (3)		V_I = 0 to V_{CC}		1.2V	1.2V		50					µA
				1.6V	1.6V				125			
				1.95V	1.95V				200			
				2.7V	2.7V				300			
				3.6V	3.6V				500			
I_{BHHO} (4)		V_I = 0 to V_{CC}		1.2V	1.2V		–50					µA
				1.6V	1.6V				–125			
				1.95V	1.95V				–200			
				2.7V	2.7V				–300			
				3.6V	3.6V				–500			

over recommended operating free-air temperature range (unless otherwise noted)(5) (6)

PARAMETER		TEST CONDITIONS	V_{CCA}	V_{CCB}	T_A = 25°C			–40°C to 85°C			UNIT
					MIN	TYP	MAX	MIN	TYP	MAX	
I_{off} (8)	A port	V_I or V_O = 0 to 3.6V	0V	0V to 3.6V		±0.1	±1			±5	μA
	B port		0V to 3.6V	0V		±0.1	±1			±5	
I_{OZ} (8)	B port	V_O = V_{CCO} or GND, V_I = V_{CCI} or GND	0V	3.6V		±0.5	±2.5			±5	
	A port		3.6V	0V		±0.5	±2.5			±5	μA
I_{CCA} (8)		V_I = V_{CCI} or GND, I_O = 0	1.2V to 3.6V	1.2V to 3.6V						10	μA
			0V	3.6V						–2	
			3.6V	0V						10	
I_{CCB} (8)		V_I = V_{CCI} or GND, I_O = 0	1.2V to 3.6V	1.2V to 3.6V						10	μA
			0V	3.6V						10	
			3.6V	0V						–2	
I_{CCA} + I_{CCB}		V_I = V_{CCI} or GND, I_O = 0	1.2V to 3.6V	1.2V to 3.6V						20	μA
C_i	Control inputs	V_I = 3.3V or GND	3.3V	3.3V		2.5					pF
C_{io}	A or B port	V_I = 3.3 V or GND	3.3V	3.3V		6					pF

(1) The bus-hold circuit can sink at least the minimum low sustaining current at V_{IL} maximum. I_{BHL} should be measured after lowering V_{IN} to GND and then raising it to V_{IL} maximum.
(2) The bus-hold circuit can source at least the minimum high sustaining current at V_{IH} mininum. I_{BHH} should be measured after raising V_{IN} to V_{CC} and then lowering it to V_{IH} minimum.
(3) An external driver must source at least I_{BHLO} to switch this node from low to high.
(4) An external driver must sink at least I_{BHHO} to switch this node from high to low.
(5) V_{CCO} is the voltage associated with the output port supply VCCA or VCCB.
(6) V_{CCI} is the voltage associated with the input port supply VCCA or VCCB.
(7) V_{OH}: Output High Voltage; V_{OL}: Output Low Voltage; I_I: Control Input Current.
(8) I_{off}: Partial Power Down Output current; I_{OZ}: Hi-Z Output Current; I_{CCA}: Supply A Current; I_{CCB}: Supply B Current.

5.6 Switching Characteristics: V_{CCA} = 1.2V

over recommended operating free-air temperature range, V_{CCA} = 1.2V (see 图 6-1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CCB} = 1.2V	V_{CCB} = 1.5V	V_{CCB} = 1.8V	V_{CCB} = 2.5V	V_{CCB} = 3.3V	UNIT
			TYP	TYP	TYP	TYP	TYP	
t_{PLH} (2)	A	B	3.1	2.6	2.4	2.2	2.2	ns
t_{PHL} (2)			3.1	2.6	2.4	2.2	2.2	
t_{PLH} (2)	B	A	3.4	3.1	3	2.9	2.9	ns
t_{PHL} (2)			3.4	3.1	3	2.9	2.9	
t_{PHZ} (2)	DIR	A	5.2	5.2	5.1	5	4.8	ns
t_{PLZ} (2)			5.2	5.2	5.1	5	4.8	
t_{PHZ} (2)	DIR	B	5	4	3.8	2.8	3.2	ns
t_{PLZ} (2)			5	4	3.8	2.8	3.2	
t_{PZH} (2) (1)	DIR	A	8.4	7.1	6.8	5.7	6.1	ns
t_{PZL} (2) (1)			8.4	7.1	6.8	5.7	6.1	
t_{PZH} (2) (1)	DIR	B	8.3	7.8	7.5	7.2	7	ns
t_{PZL} (2) (1)			8.3	7.8	7.5	7.2	7	

(1) The enable time is a calculated value derived using the formula shown in the *节 8.2.2.2.1* section.
(2) t_{PLH}: Low-to-high Propagation Delay; t_{PHL}: High-to-Low Propagation Delay; t_{PHZ}: High-to-Hi-Z Propagation Delay; t_{PLZ}: Low-to-Hi-Z Propagation Delay; t_{PZH}: Hi-Z-to-High Propagation Delay; t_{PZL}: Hi-Z-to-Low Propagation Delay

5.7 Switching Characteristics: V_{CCA} = 1.5V

over recommended operating free-air temperature range, V_{CCA} = 1.5V ± 0.1V (see 图 6-1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CCB} = 1.2V	V_{CCB} = 1.5V ± 0.1V		V_{CCB} = 1.8V ± 0.15V		V_{CCB} = 2.5V ± 0.2V		V_{CCB} = 3.3V ± 0.3V		UNIT
			TYP	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t_{PLH} (2)	A	B	2.8	0.7	5.4	0.5	4.6	0.4	3.7	0.3	3.5	ns
t_{PHL} (2)			2.8	0.7	5.4	0.5	4.6	0.4	3.7	0.3	3.5	
t_{PLH} (2)	B	A	2.7	0.8	5.4	0.7	5.2	0.6	4.9	0.5	4.7	ns
t_{PHL} (2)			2.7	0.8	5.4	0.7	5.2	0.6	4.9	0.5	4.7	
t_{PHZ} (2)	DIR	A	3.9	1.3	8.5	1.3	7.8	1.1	7.7	1.4	7.6	ns
t_{PLZ} (2)			3.9	1.3	8.5	1.3	7.8	1.1	7.7	1.4	7.6	
t_{PHZ} (2)	DIR	B	4.7	1.1	7	1.4	6.9	1.2	6.9	1.7	7.1	ns
t_{PLZ} (2)			4.7	1.1	7	1.4	6.9	1.2	6.9	1.7	7.1	
t_{PZH} (2) (1)	DIR	A	7.4		12.4		12.1		11.8		11.8	ns
t_{PZL} (2) (1)			7.4		12.4		12.1		11.8		11.8	
t_{PZH} (2) (1)	DIR	B	6.7		13.9		12.4		11.4		11.1	ns
t_{PZL} (2) (1)			6.7		13.9		12.4		11.4		11.1	

(1) The enable time is a calculated value derived using the formula shown in the *节 8.2.2.2.1* section.
(2) t_{PLH}: Low-to-high Propagation Delay; t_{PHL}: High-to-Low Propagation Delay; t_{PHZ}: High-to-Hi-Z Propagation Delay; t_{PLZ}: Low-to-Hi-Z Propagation Delay; t_{PZH}: Hi-Z-to-High Propagation Delay; t_{PZL}: Hi-Z-to-Low Propagation Delay

5.8 Switching Characteristics: V_{CCA} = 1.8V

over recommended operating free-air temperature range, V_{CCA} = 1.8V ± 0.15V (see 图 6-1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CCB} = 1.2V	V_{CCB} = 1.5V ± 0.1V		V_{CCB} = 1.8V ± 0.15V		V_{CCB} = 2.5V ± 0.2V		V_{CCB} = 3.3V ± 0.3V		UNIT
			TYP	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t_{PLH} (2)	A	B	2.7	0.5	5.2	0.4	4.3	0.2	3.4	0.2	3.1	ns
t_{PHL} (2)			2.7	0.5	5.2	0.4	4.3	0.2	3.4	0.2	3.1	
t_{PLH} (2)	B	A	2.4	0.7	4.7	0.5	4.4	0.5	4	0.4	3.8	ns
t_{PHL} (2)			2.4	0.7	4.7	0.5	4.4	0.5	4	0.4	3.8	
t_{PHZ} (2)	DIR	A	3.7	1.3	8.1	0.7	6.9	1.4	5.3	1.1	5.2	ns
t_{PLZ} (2)			3.7	1.3	8.1	0.7	6.9	1.4	5.3	1.1	5.2	
t_{PHZ} (2)	DIR	B	4.4	1.3	5.8	1.3	5.9	0.8	5.7	1.5	5.9	ns
t_{PLZ} (2)			4.4	1.3	5.8	1.3	5.9	0.8	5.7	1.5	5.9	
t_{PZH} (2) (1)	DIR	A	6.8		10.5		10.3		9.7		9.7	ns
t_{PZL} (2) (1)			6.8		10.5		10.3		9.7		9.7	
t_{PZH} (2) (1)	DIR	B	6.4		13.3		11.2		8.7		8.3	ns
t_{PZL} (2) (1)			6.4		13.3		11.2		8.7		8.3	

(1) The enable time is a calculated value derived using the formula shown in the *节 8.2.2.2.1* section.
(2) t_{PLH}: Low-to-high Propagation Delay; t_{PHL}: High-to-Low Propagation Delay; t_{PHZ}: High-to-Hi-Z Propagation Delay; t_{PLZ}: Low-to-Hi-Z Propagation Delay; t_{PZH}: Hi-Z-to-High Propagation Delay; t_{PZL}: Hi-Z-to-Low Propagation Delay

5.9 Switching Characteristics: V_{CCA} = 2.5V

over recommended operating free-air temperature range, V_{CCA} = 2.5V ± 0.2V (see 图 6-1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CCB} = 1.2V	V_{CCB} = 1.5V ± 0.1V		V_{CCB} = 1.8V ± 0.15V		V_{CCB} = 2.5V ± 0.2V		V_{CCB} = 3.3V ± 0.3V		UNIT
			TYP	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t_{PLH} (2)	A	B	2.6	0.4	4.9	0.2	4	0.2	3	0.2	2.6	ns
t_{PHL} (2)			2.6	0.4	4.9	0.2	4	0.2	3	0.2	2.6	
t_{PLH} (2)	B	A	2.1	0.6	3.8	0.5	3.4	0.4	3	0.3	2.8	ns
t_{PHL} (2)			2.1	0.6	3.8	0.5	3.4	0.4	3	0.3	2.8	
t_{PHZ} (2)	DIR	A	2.4	0.7	7.9	0.8	6.4	0.8	5	0.5	4.3	ns
t_{PLZ} (2)			2.4	0.7	7.9	0.8	6.4	0.8	5	0.5	4.3	
t_{PHZ} (2)	DIR	B	3.8	1	4.3	0.6	4.3	0.5	4.2	1.1	4.1	ns
t_{PLZ} (2)			3.8	1	4.3	0.6	4.3	0.5	4.2	1.1	4.1	
t_{PZH} (2) (1)	DIR	A	5.9		8.5		7.7		7.2		6.9	ns
t_{PZL} (2) (1)			5.9		8.5		7.7		7.2		6.9	
t_{PZH} (2) (1)	DIR	B	5		12.8		10.4		8		6.9	ns
t_{PZL} (2) (1)			5		12.8		10.4		8		6.9	

(1) The enable time is a calculated value derived using the formula shown in the *节 8.2.2.2.1* section.
(2) t_{PLH}: Low-to-high Propagation Delay; t_{PHL}: High-to-Low Propagation Delay; t_{PHZ}: High-to-Hi-Z Propagation Delay; t_{PLZ}: Low-to-Hi-Z Propagation Delay; t_{PZH}: Hi-Z-to-High Propagation Delay; t_{PZL}: Hi-Z-to-Low Propagation Delay

5.10 Switching Characteristics: V_{CCA} = 3.3V

over recommended operating free-air temperature range, V_{CCA} = 3.3V ± 0.3V (see 图 6-1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CCB} = 1.2V	V_{CCB} = 1.5V ± 0.1V		V_{CCB} = 1.8V ± 0.15V		V_{CCB} = 2.5V ± 0.2V		V_{CCB} = 3.3V ± 0.3V		UNIT
			TYP	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t_{PLH} (2)	A	B	2.5	0.3	4.7	0.2	3.8	0.2	2.8	0.2	2.4	ns
t_{PHL} (2)			2.5	0.3	4.7	0.2	3.8	0.2	2.8	0.2	2.4	
t_{PLH} (2)	B	A	2.1	0.6	3.6	0.4	3.1	0.3	2.6	0.3	2.4	ns
t_{PHL} (2)			2.1	0.6	3.6	0.4	3.1	0.3	2.6	0.3	2.4	
t_{PHZ} (2)	DIR	A	2.9	1.1	8	1	6.5	1.3	4.7	1.2	4	ns
t_{PLZ} (2)			2.9	1.1	8	1	6.5	1.3	4.7	1.2	4	
t_{PHZ} (2)	DIR	B	3.4	0.5	6.6	0.3	5.6	0.3	4.6	1.1	4.2	ns
t_{PLZ} (2)			3.4	0.5	6.6	0.3	5.6	0.3	4.6	1.1	4.2	
t_{PZH} (2) (1)	DIR	A	5.5		10.2		8.7		7.2		6.6	ns
t_{PZL} (2) (1)			5.5		10.2		8.7		7.2		6.6	
t_{PZH} (2) (1)	DIR	B	5.4		12.7		10.3		7.5		6.4	ns
t_{PZL} (2) (1)			5.4		12.7		10.3		7.5		6.4	

(1) The enable time is a calculated value derived using the formula shown in the *节 8.2.2.2.1* section.
(2) t_{PLH}: Low-to-high Propagation Delay; t_{PHL}: High-to-Low Propagation Delay; t_{PHZ}: High-to-Hi-Z Propagation Delay; t_{PLZ}: Low-to-Hi-Z Propagation Delay; t_{PZH}: Hi-Z-to-High Propagation Delay; t_{PZL}: Hi-Z-to-Low Propagation Delay

5.11 Operating Characteristics

T_A = 25°C

PARAMETER		TEST CONDITIONS	V_{CCA} = V_{CCB} = 1.2V	V_{CCA} = V_{CCB} = 1.5V	V_{CCA} = V_{CCB} = 1.8V	V_{CCA} = V_{CCB} = 2.5V	V_{CCA} = V_{CCB} = 3.3V	UNIT
			TYP	TYP	TYP	TYP	TYP	
C_{pdA} (1)	A-port input, B-port output	C_L = 0, f = 10MHz, t_r (2) = t_f (2) = 1ns	3	3	3	3	4	pF
	B-port input, A-port output		13	13	14	15	15	
C_{pdB} (1)	A-port input, B-port output	C_L = 0, f = 10MHz, t_r (2) = t_f (2) = 1ns	13	13	14	15	15	pF
	B-port input, A-port output		3	3	3	3	4	

(1) Power dissipation capacitance per transceiver
(2) t_r: Rise time; t_f: Fall time

5.12 Typical Characteristics

5.12.1 Typical Propagation Delay (A to B) vs Load Capacitance, T_A = 25°C, V_{CCA} = 1.8V

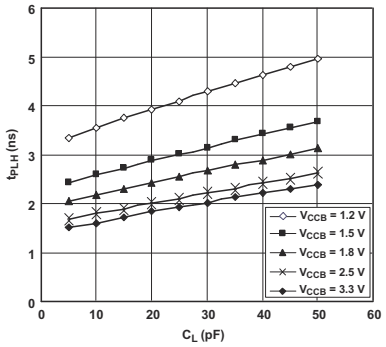


图 5-1. Typical A-to-B Propagation Delay, Low to High

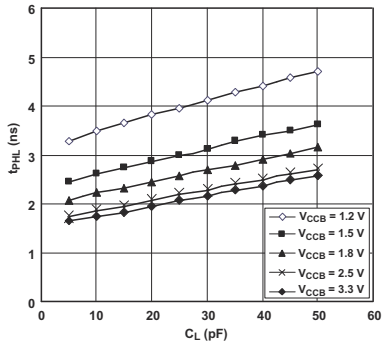


图 5-2. Typical A-to-B Propagation Delay, High to Low

5.12.2 Typical Propagation Delay (A to B) vs Load Capacitance, T_A = 25°C, V_{CCA} = 2.5V

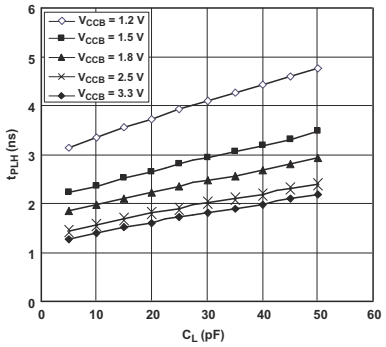


图 5-3. Typical A-to-B Propagation Delay, Low to High

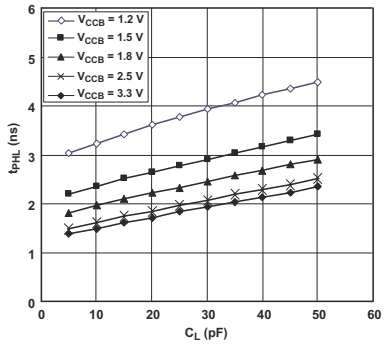


图 5-4. Typical A-to-B Propagation Delay, High to Low

5.12.3 Typical Propagation Delay (A to B) vs Load Capacitance, T_A = 25°C, V_{CCA} = 3.3V

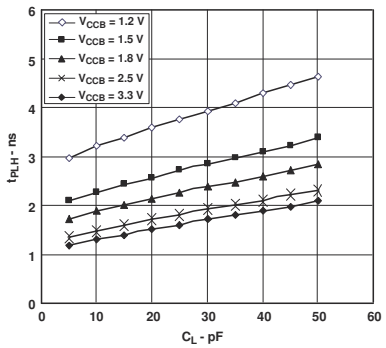


图 5-5. Typical A-to-B Propagation Delay, Low to High

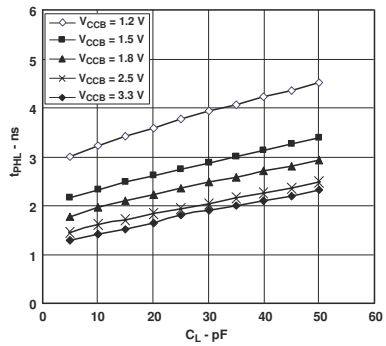
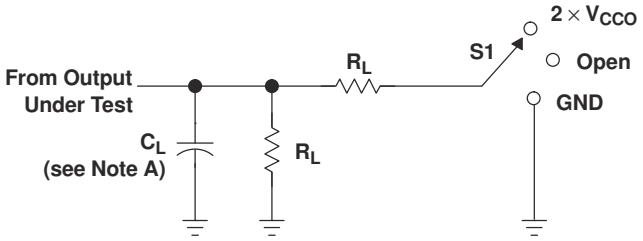


图 5-6. Typical A-to-B Propagation Delay, High to Low

6 Parameter Measurement Information

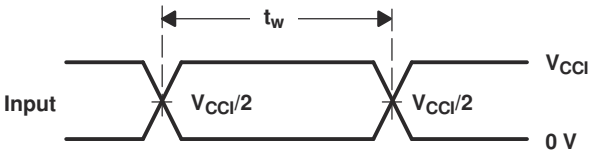
6.1



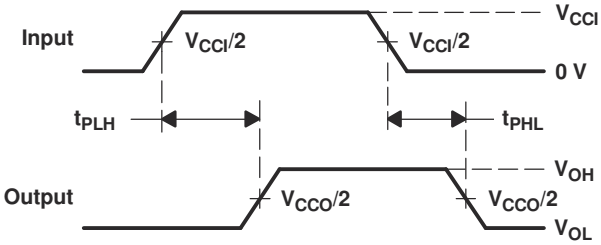
LOAD CIRCUIT

TEST	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	$2 \times V_{CCO}$
t_{PHZ}/t_{PZH}	GND

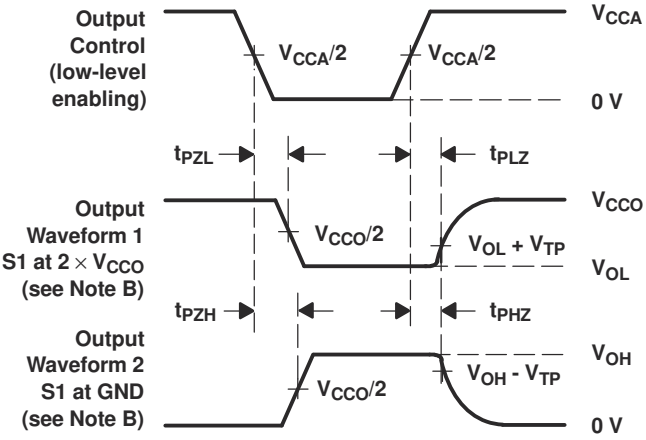
V_{CCO}	C_L	R_L	V_{TP}
1.2 V	15 pF	2 kΩ	0.1 V
1.5 V ± 0.1 V	15 pF	2 kΩ	0.1 V
1.8 V ± 0.15 V	15 pF	2 kΩ	0.15 V
2.5 V ± 0.2 V	15 pF	2 kΩ	0.15 V
3.3 V ± 0.3 V	15 pF	2 kΩ	0.3 V



VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES

NOTES: A. C_L includes probe and jig 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. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, dv/dt ≥ 1 V/ns.
D. The outputs are measured one at a time, with one 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}.
H. V_{CCI} is the V_{CC} associated with the input port.
I. V_{CCO} is the V_{CC} associated with the output port.

图 6-1. Load Circuit and Voltage Waveforms

7 Detailed Description

7.1 Overview

This dual-bit non-inverting bus transceiver uses two separate configurable power-supply rails. The A port is designed to track V_{CCA} and accepts any supply voltage from 1.2 V to 3.6 V. The B port is designed to track V_{CCB} and accepts any supply voltage from 1.2 V to 3.6 V. This allows for universal low-voltage bidirectional translation and level-shifting between any of the 1.2 V, 1.5 V, 1.8 V, 2.5 V, and 3.3 V voltage nodes.

The SN74AVCH2T45 is designed for asynchronous communication between two data buses. The logic levels of the direction-control (DIR pin) input activate either the B-port outputs or the A-port outputs. The device transmits data from the A bus to the B bus when the B-port outputs are activated and from the B bus to the A bus when the A-port outputs are activated.

The SN74AVCH2T45 features active bus-hold circuitry.

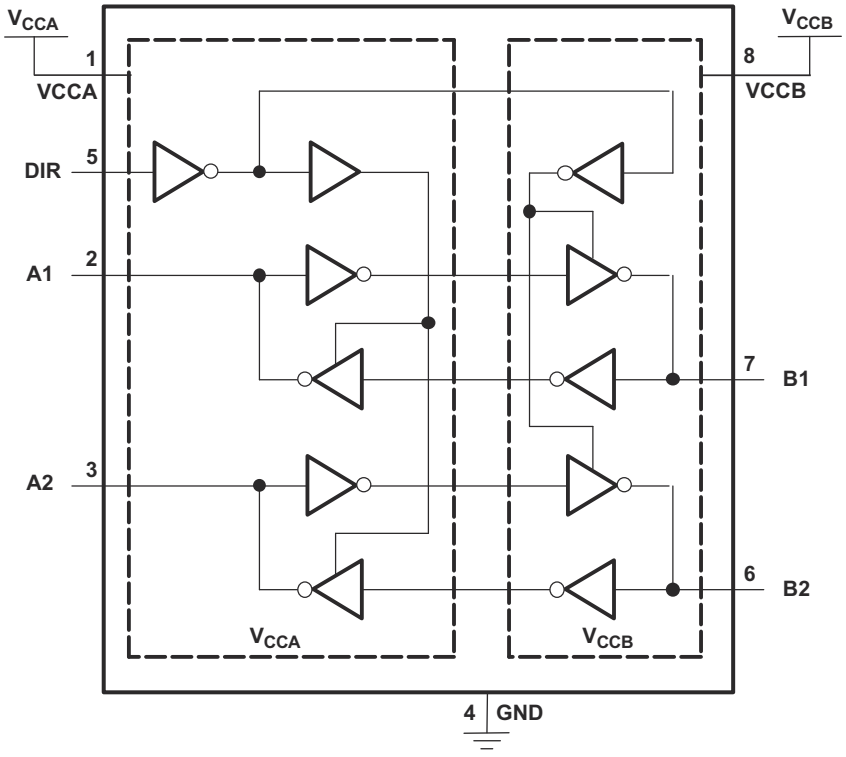
The DIR input is powered by supply voltage from VCCA.

This device is fully specified for partial-power-down applications using off output current (I_{off}). The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

The V_{CC} isolation feature ensures that if either VCC input is at GND, both ports are put in a high-impedance state. This will prevent a false high or low logic being presented at the output.

NanoFree package technology is a major breakthrough in IC packaging concepts, using the die as the package.

7.2 Functional Block Diagram



7.3 Feature Description

7.3.1 VCC Isolation

The V_{CC} isolation feature ensures that if either V_{CCA} or V_{CCB} are at GND, both ports will be in a high-impedance state (I_{OZ} shown in the 节 7.2). This prevents false logic levels from being presented to either bus.

7.3.2 2-Rail Design

Fully configurable 2-rail design allows each port to operate over the full 1.2 V to 3.6 V power-supply range.

7.3.3 IO Ports are 4.6 V Tolerant

The IO ports are up to 4.6 V tolerant

7.3.4 Partial Power Down Mode

This device is fully specified for partial-power-down applications using off output current (I_{off}). The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

7.3.5 Bus Hold on Data Inputs

Active bus-hold circuitry holds unused or un-driven inputs at a valid logic state. TI does not recommend using pull-up or pull-down resistors with the bus-hold circuitry.

7.4 Device Functional Modes

表 7-1. Function Table (Each Transceiver)

INPUT DIR	OPERATION
L	B data to A bus
H	A data to B bus

8 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。

8.1 Application Information

The SN74AVCH2T45 is used to shift IO voltage levels from one voltage domain to another. Each bus (bus A and bus B) have independent power supplies, and a direction pin is used to control the direction of data flow.

8.2 Typical Applications

8.2.1 Unidirectional Logic Level-Shifting Application

图 8-1 is an example of the SN74AVCH2T45 circuit used in a unidirectional logic level-shifting application.

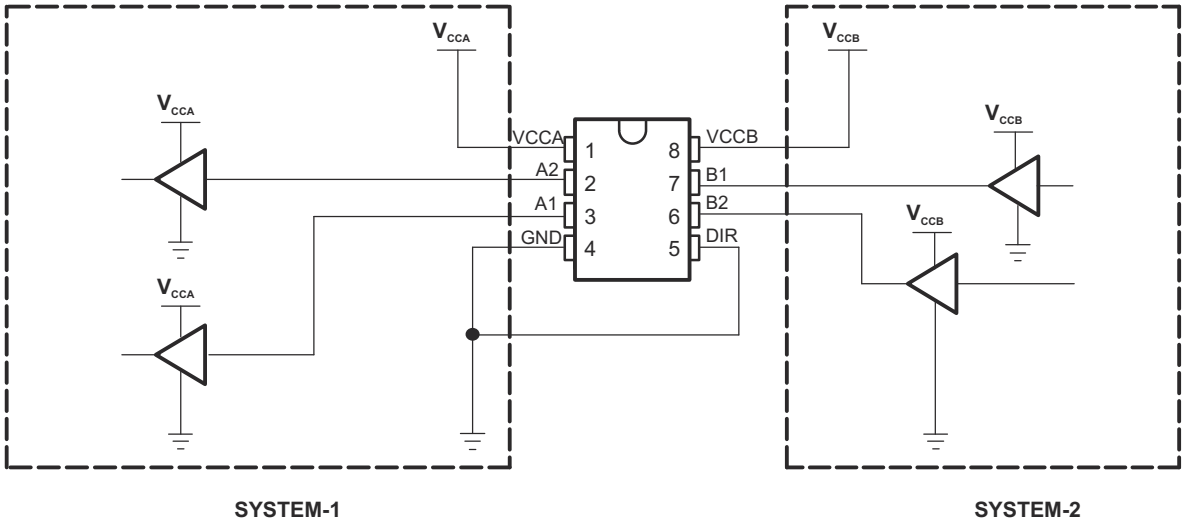


图 8-1. Unidirectional Logic Level-Shifting Application

8.2.1.1 Design Requirements

This device uses drivers which are enabled depending on the state of the DIR pin. The designer must know the intended flow of data and take care not to violate any of the high or low logic levels. Active bus-hold circuitry holds unused or un-driven inputs at a valid logic state. TI does not recommend using pull-up or pull-down resistors with the bus-hold circuitry.

8.2.1.2 Detailed Design Procedure

表 8-1 lists the pins and pin descriptions of the SN74AVCH2T45 connections with SYSTEM-1 and SYSTEM-2.

表 8-1. SN74AVCH2T45 Pin Connections With SYSTEM-1 and SYSTEM-2

PIN	NAME	DESCRIPTION
1	VCCA	SYSTEM-1 supply voltage (1.2V to 3.6V)
2	A1	Output level depends on V_{CCA}.
3	A2	Output level depends on V_{CCA}.
4	GND	Device GND
5	DIR	The GND (low-level) determines B-port to A-port direction.
6	B2	Input threshold value depends on V_{CCB}.
7	B1	Input threshold value depends on V_{CCB}.
8	VCCB	SYSTEM-2 supply voltage (1.2V to 3.6V)

8.2.1.3 Application Curve

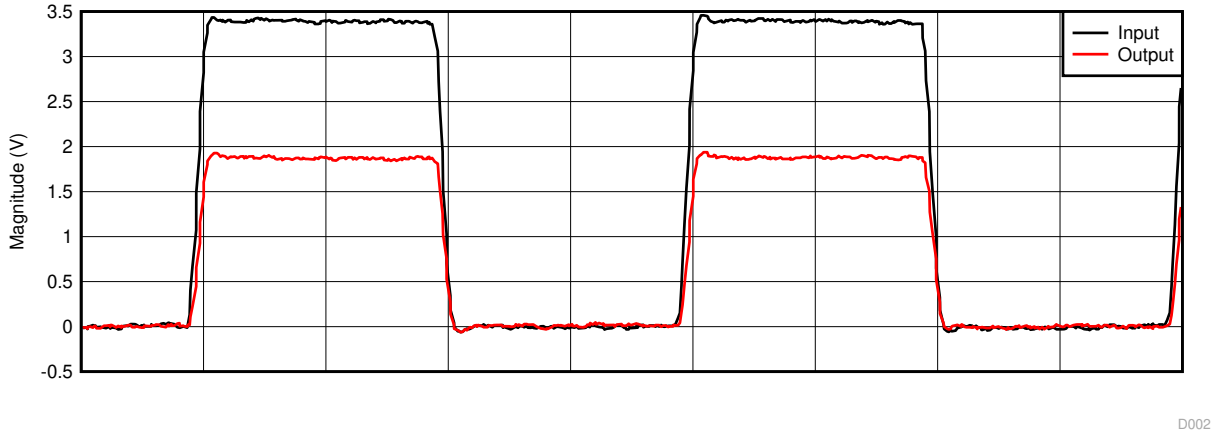


图 8-2. 3.3- to 1.8-V Level-Shifting With 1MHz Square Wave

8.2.2 Bidirectional Logic Level-Shifting Application

图 8-3 shows the SN74AVCH2T45 used in a bidirectional logic level-shifting application. Because the SN74AVCH2T45 does not have an output-enable (OE) pin, system designers should take precautions to avoid bus contention between SYSTEM-1 and SYSTEM-2 when changing directions.

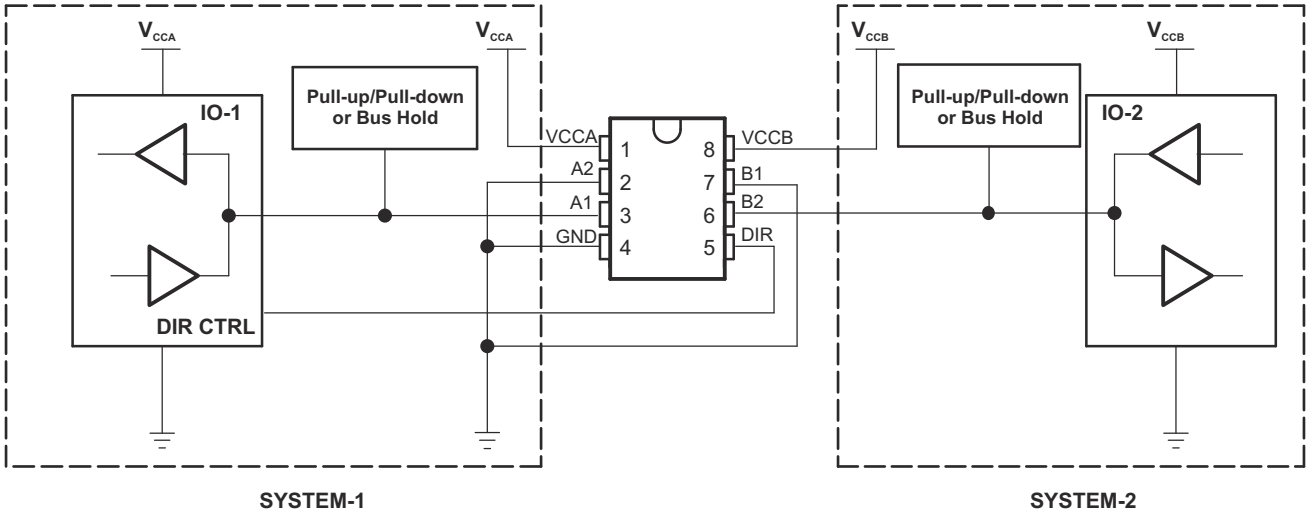


图 8-3. Bidirectional Logic Level-Shifting Application

8.2.2.1 Design Requirements

This device uses drivers which are enabled depending on the state of the DIR pin. The designer must know the intended flow of data and take care not to violate any of the high or low logic levels. Active bus-hold circuitry holds unused or un-driven inputs at a valid logic state. TI does not recommend using pull-up or pull-down resistors with the bus-hold circuitry.

8.2.2.2 Detailed Design Procedure

表 8-2 lists a sequence that shows data transmission from SYSTEM-1 to SYSTEM-2 and then from SYSTEM-2 to SYSTEM-1.

表 8-2. Data Transmission Sequence

STATE	DIR CTRL	IO-1	IO-2	DESCRIPTION
1	H	Output	Input	SYSTEM-1 data to SYSTEM-2
2	H	Hi-Z	Hi-Z	SYSTEM-2 is getting ready to send data to SYSTEM-1. IO-1 and IO-2 are disabled. The bus-line state depends on pull-up or pull-down.(1)
3	L	Hi-Z	Hi-Z	DIR bit is flipped. IO-1 and IO-2 still are disabled. The bus-line state depends on pull-up or pull-down.(1)
4	L	Input	Output	SYSTEM-2 data to SYSTEM-1

(1) SYSTEM-1 and SYSTEM-2 must use the same conditions, i.e., both pullup or both pulldown.

8.2.2.2.1 Enable Times

Calculate the enable times for the SN74AVCH2T45 using the following formulas:

$$t_{PZH}\text{ (DIR to A)} = t_{PLZ}\text{ (DIR to B)} + t_{PLH}\text{ (B to A)} \quad (1)$$

$$t_{PZL}\text{ (DIR to A)} = t_{PHZ}\text{ (DIR to B)} + t_{PHL}\text{ (B to A)} \quad (2)$$

$$t_{PZH}\text{ (DIR to B)} = t_{PLZ}\text{ (DIR to A)} + t_{PLH}\text{ (A to B)} \quad (3)$$

$$t_{PZL}\text{ (DIR to B)} = t_{PHZ}\text{ (DIR to A)} + t_{PHL}\text{ (A to B)} \quad (4)$$

In a bidirectional application, these enable times provide the maximum delay from the time the DIR bit is switched until an output is expected. For example, if the SN74AVCH2T45 initially is transmitting from A to B, the DIR bit is switched; the B port of the device must be disabled before presenting it with an input. After the B port has been disabled, an input signal applied to it appears on the corresponding A port after the specified propagation delay.

8.2.2.3 Application Curve

Refer to *图 8-2*.

8.3 Power Supply Recommendations

A proper power-up sequence always should be followed to avoid excessive supply current, bus contention, oscillations, or other anomalies. To guard against such power-up problems, take the following precautions:

1. Connect ground before any supply voltage is applied.
2. Power up V_{CCA}.
3. V_{CCB} can be ramped up along with or after V_{CCA}.

表 8-3. Typical Total Static Power Consumption (I_{CCA} + I_{CCB})

V_{CCB}	V_{CCA}						UNIT
	0V	1.2V	1.5V	1.8V	2.5V	3.3V	
0V	0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	μA
1.2V	< 0.5	< 1	< 1	< 1	< 1	1	
1.5V	< 0.5	< 1	< 1	< 1	< 1	1	
1.8V	< 0.5	< 1	< 1	< 1	< 1	< 1	
2.5V	< 0.5	1	< 1	< 1	< 1	< 1	
3.3V	< 0.5	1	< 1	< 1	< 1	< 1	

8.4 Layout

8.4.1 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. Place the capacitors as close as possible to the VCCA, VCCB pin and GND pin.
- Short trace lengths should be used to avoid excessive loading.

8.4.2 Layout Example

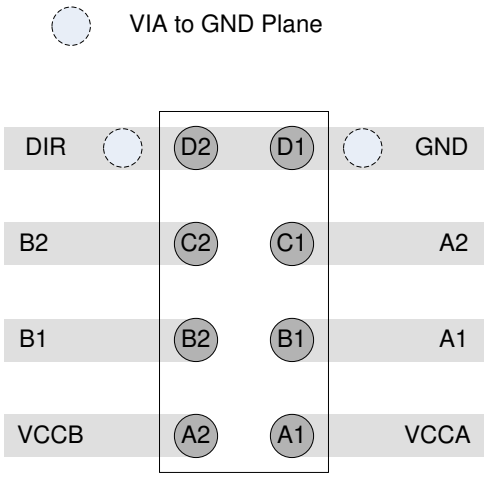


图 8-4. Layout Example for YZP Package

9 Device and Documentation Support

9.1 Documentation Support

9.1.1 Related Documentation

For related documentation see the following:

- *Implications of Slow or Floating CMOS Inputs*, SCBA004

9.2 接收文档更新通知

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9.4 Trademarks

NanoFree™ and TI E2E™ are trademarks of Texas Instruments.
所有商标均为其各自所有者的财产。

9.5 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。

9.6 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。

10 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 H (April 2015) to Revision I (February 2025)	Page
• 更新了整个文档中的表格、图和交叉参考的编号格式	1
• Updated DCT and DCU *Thermal Information*	6
• Added the *Receiving Notifications of Documentation Updates*, *Support Resources*, *Electrostatic Discharge Caution*, and *Glossary* sections	20

Changes from Revision G (April 2015) to Revision H (April 2015)	Page
• 添加了其他应用	1
• Updated Overview section.	13
• Updated Layout Guidelines section.	18

Changes from Revision F (November 2007) to Revision G (February 2015)	Page
• 添加了 *ESD 等级* 表、*特性说明* 部分、*器件功能模式*、*应用和实现* 部分、*电源相关建议* 部分、*布局* 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

11 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)
74AVCH2T45DCTTE4	Active	Production	SSOP (DCT) | 8	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2 Z
SN74AVCH2T45DCTR	Active	Production	SSOP (DCT) | 8	3000 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	ET2 Z
SN74AVCH2T45DCTR.A	Active	Production	SSOP (DCT) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2 Z
SN74AVCH2T45DCTR.B	Active	Production	SSOP (DCT) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2 Z
SN74AVCH2T45DCTRG4	Active	Production	SSOP (DCT) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2 Z
SN74AVCH2T45DCTRG4.A	Active	Production	SSOP (DCT) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2 Z
SN74AVCH2T45DCTRG4.B	Active	Production	SSOP (DCT) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2 Z
SN74AVCH2T45DCTT	Active	Production	SSOP (DCT) | 8	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2 Z
SN74AVCH2T45DCTT.B	Active	Production	SSOP (DCT) | 8	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2 Z
SN74AVCH2T45DCUR	Active	Production	VSSOP (DCU) | 8	3000 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	(ET2R, T2) EZ
SN74AVCH2T45DCUR.A	Active	Production	VSSOP (DCU) | 8	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(ET2R, T2) EZ
SN74AVCH2T45DCUR.B	Active	Production	VSSOP (DCU) | 8	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(ET2R, T2) EZ
SN74AVCH2T45DCURG4	Active	Production	VSSOP (DCU) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2R
SN74AVCH2T45DCURG4.A	Active	Production	VSSOP (DCU) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2R
SN74AVCH2T45DCURG4.B	Active	Production	VSSOP (DCU) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ET2R
SN74AVCH2T45DCUT	Active	Production	VSSOP (DCU) | 8	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(ET2R, T2) EZ
SN74AVCH2T45DCUT.B	Active	Production	VSSOP (DCU) | 8	250 | SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(ET2R, T2) EZ
SN74AVCH2T45YZPR	Active	Production	DSBGA (YZP) | 8	3000 | LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TFN
SN74AVCH2T45YZPR.B	Active	Production	DSBGA (YZP) | 8	3000 | LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TFN

(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.

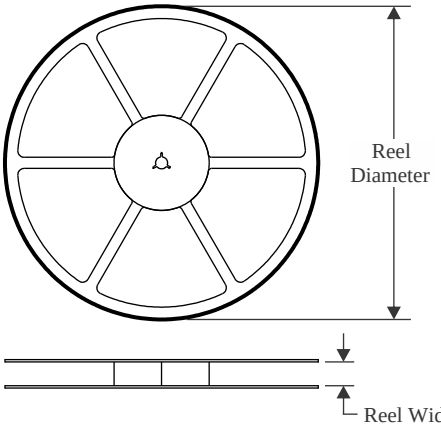
(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will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

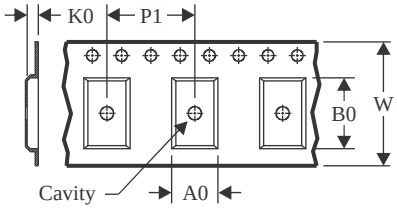
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

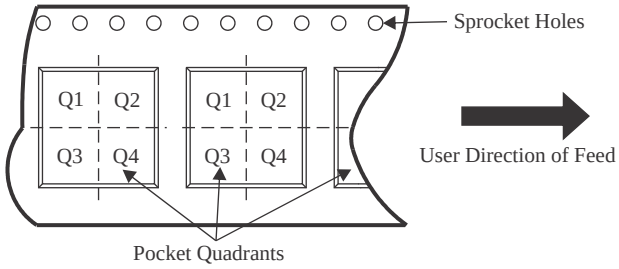


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

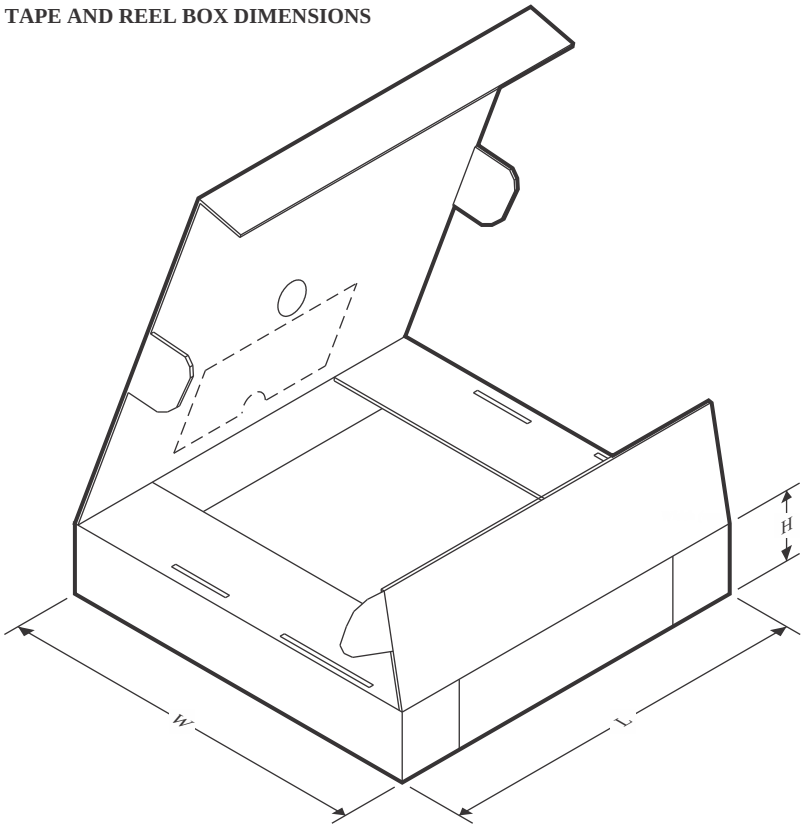
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74AVCH2T45DCTR	SSOP	DCT	8	3000	180.0	13.0	3.35	4.5	1.55	4.0	12.0	Q3
SN74AVCH2T45DCTR	SSOP	DCT	8	3000	180.0	12.4	3.15	4.35	1.55	4.0	12.0	Q3
SN74AVCH2T45DCTRG4	SSOP	DCT	8	3000	180.0	13.0	3.35	4.5	1.55	4.0	12.0	Q3
SN74AVCH2T45DCTT	SSOP	DCT	8	250	180.0	13.0	3.35	4.5	1.55	4.0	12.0	Q3
SN74AVCH2T45DCUR	VSSOP	DCU	8	3000	180.0	9.0	2.25	3.4	1.0	4.0	8.0	Q3
SN74AVCH2T45DCUR	VSSOP	DCU	8	3000	178.0	9.0	2.25	3.35	1.05	4.0	8.0	Q3
SN74AVCH2T45DCURG4	VSSOP	DCU	8	3000	178.0	9.0	2.25	3.35	1.05	4.0	8.0	Q3
SN74AVCH2T45DCURG4	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74AVCH2T45YZPR	DSBGA	YZP	8	3000	178.0	9.2	1.02	2.02	0.63	4.0	8.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

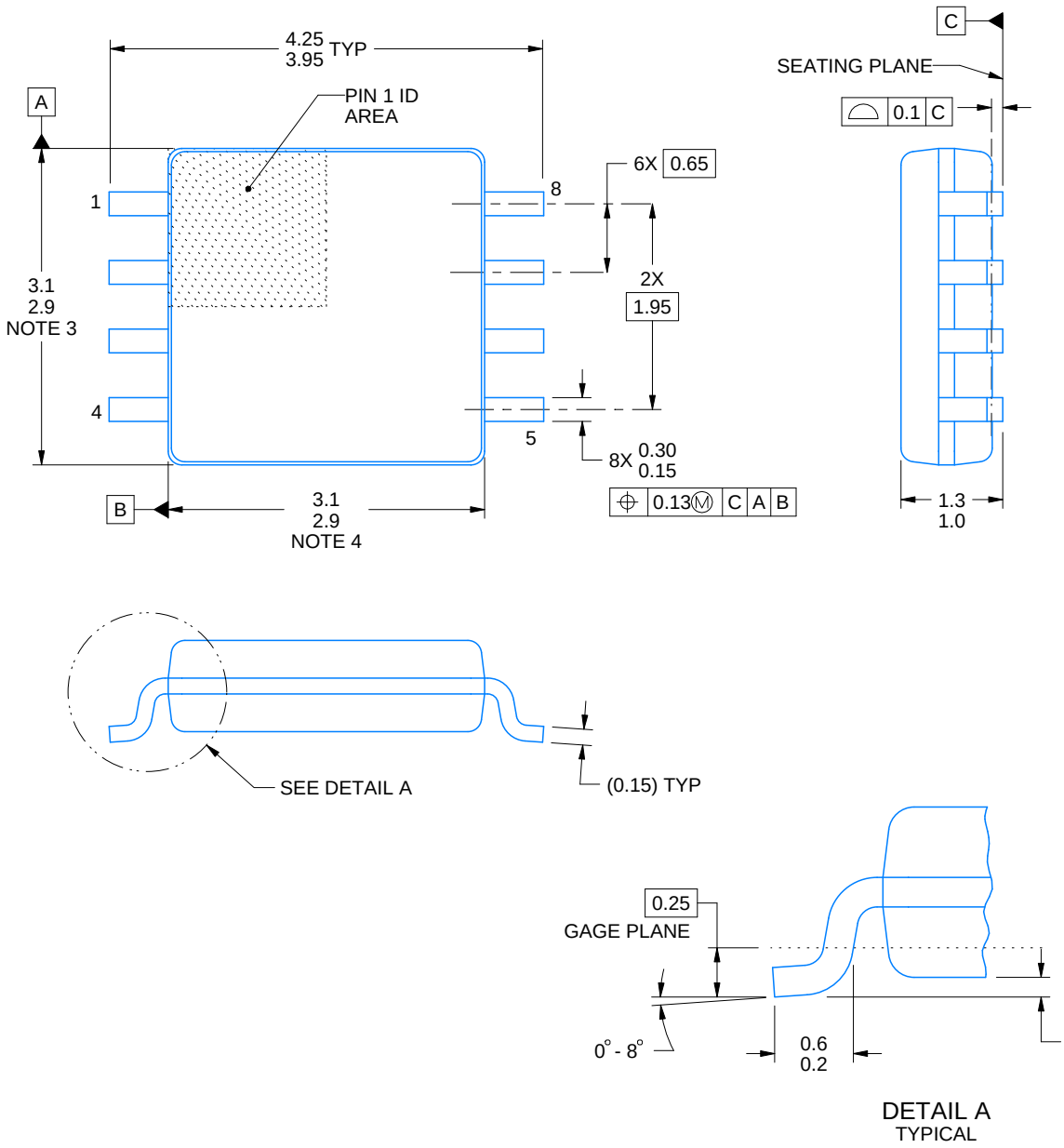
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AVCH2T45DCTR	SSOP	DCT	8	3000	182.0	182.0	20.0
SN74AVCH2T45DCTR	SSOP	DCT	8	3000	190.0	190.0	30.0
SN74AVCH2T45DCTRG4	SSOP	DCT	8	3000	182.0	182.0	20.0
SN74AVCH2T45DCTT	SSOP	DCT	8	250	182.0	182.0	20.0
SN74AVCH2T45DCUR	VSSOP	DCU	8	3000	182.0	182.0	20.0
SN74AVCH2T45DCUR	VSSOP	DCU	8	3000	180.0	180.0	18.0
SN74AVCH2T45DCURG4	VSSOP	DCU	8	3000	180.0	180.0	18.0
SN74AVCH2T45DCURG4	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74AVCH2T45YZPR	DSBGA	YZP	8	3000	220.0	220.0	35.0

PACKAGE OUTLINE

DCT0008A

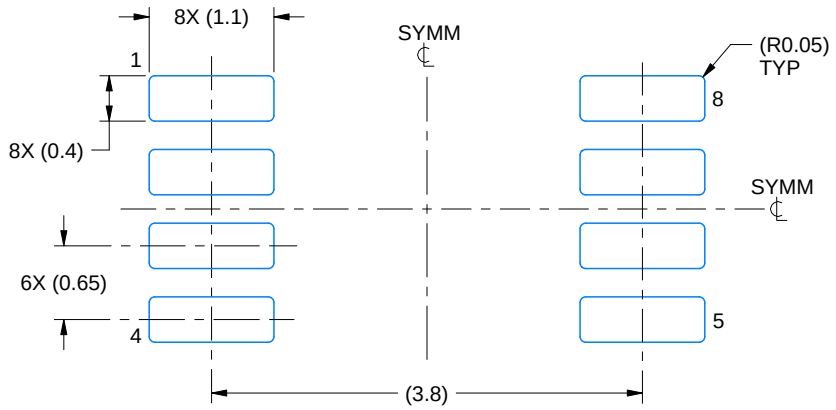
SSOP - 1.3 mm max height

SMALL OUTLINE PACKAGE

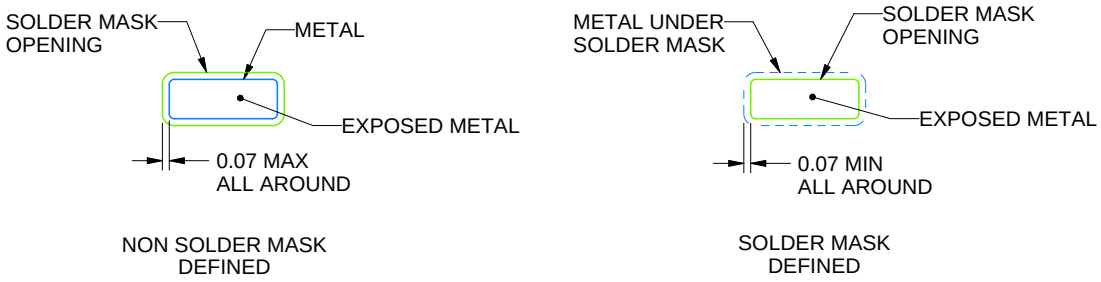


NOTES:

1. All linear dimensions are in millimeters. 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.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:15X

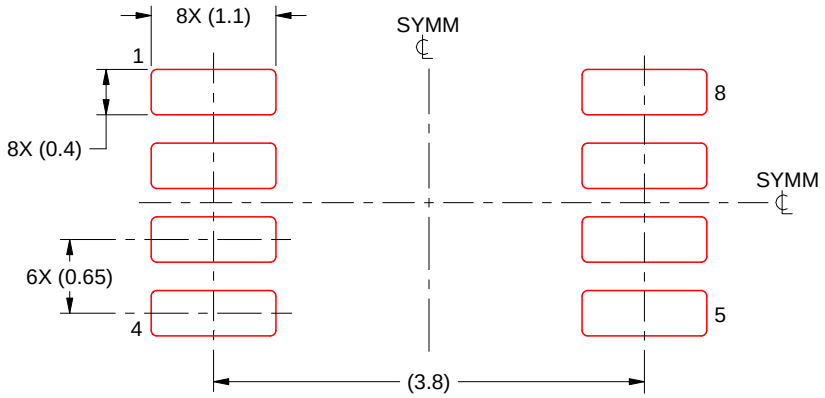


SOLDER MASK DETAILS

4220784/D 10/2025

NOTES: (continued)

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



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:15X

4220784/D 10/2025

NOTES: (continued)

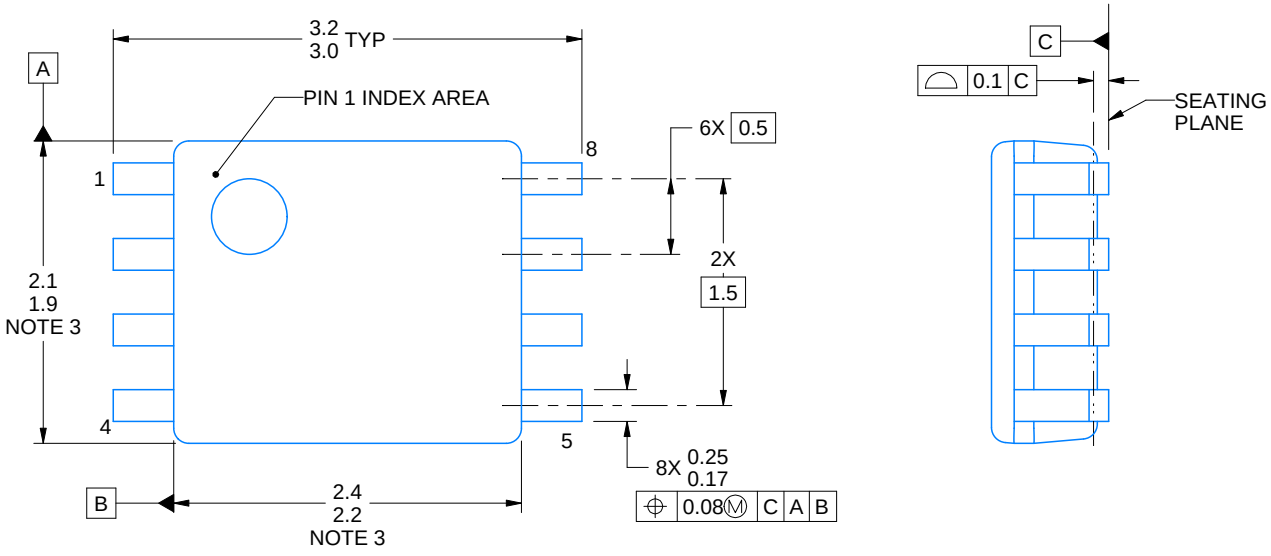
7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

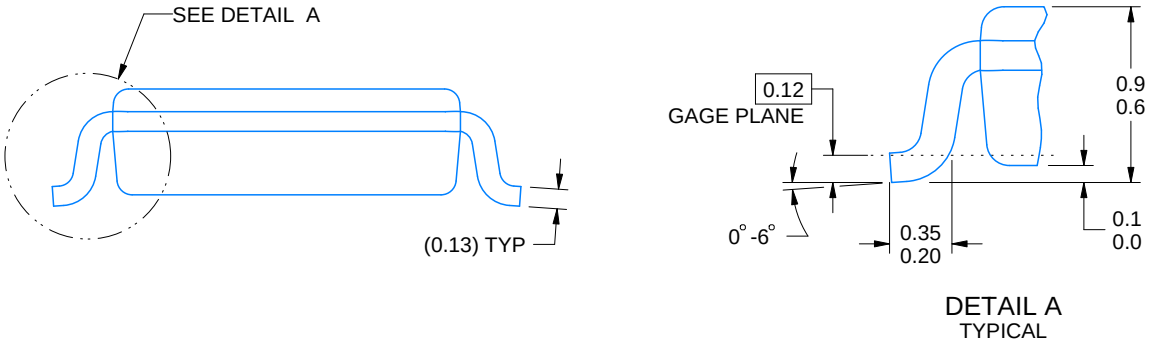
DCU0008A

PACKAGE OUTLINE

VSSOP - 0.9 mm max height

SMALL OUTLINE PACKAGE

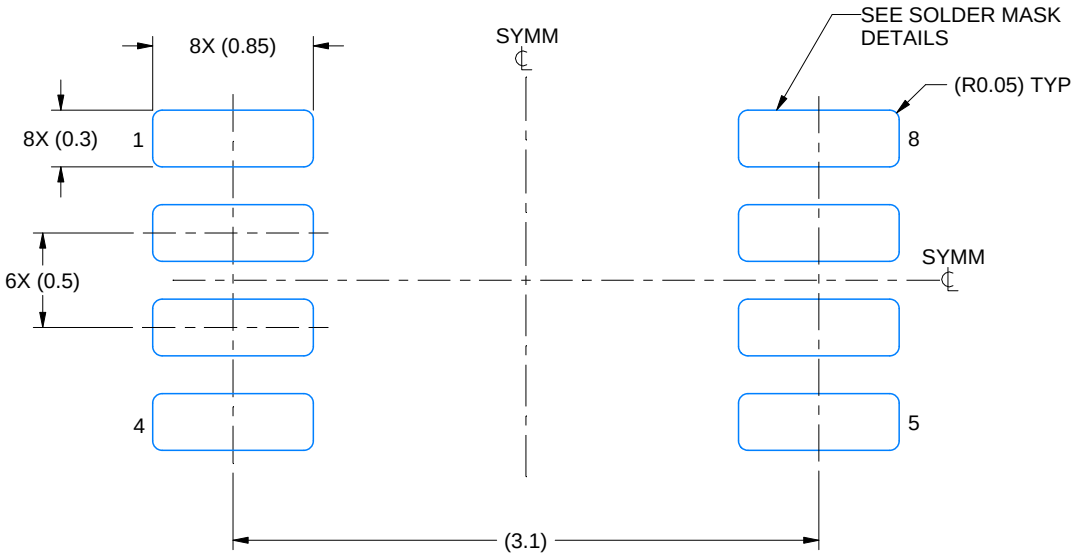




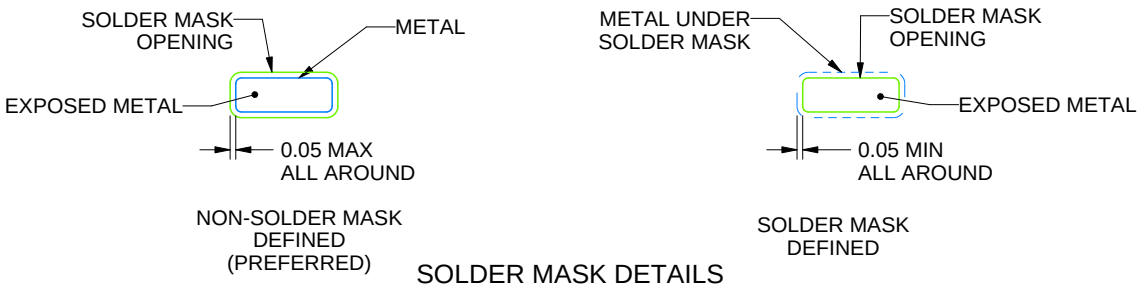
4225266/A 09/2014

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. Reference JEDEC registration MO-187 variation CA.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 25X

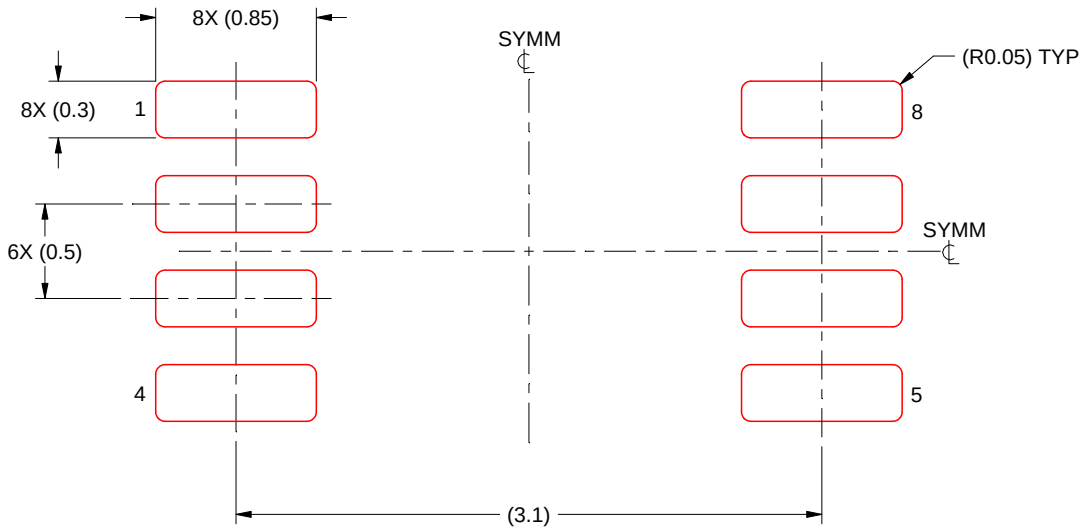


SOLDER MASK DETAILS

4225266/A 09/2014

NOTES: (continued)

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



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 25X

4225266/A 09/2014

NOTES: (continued)

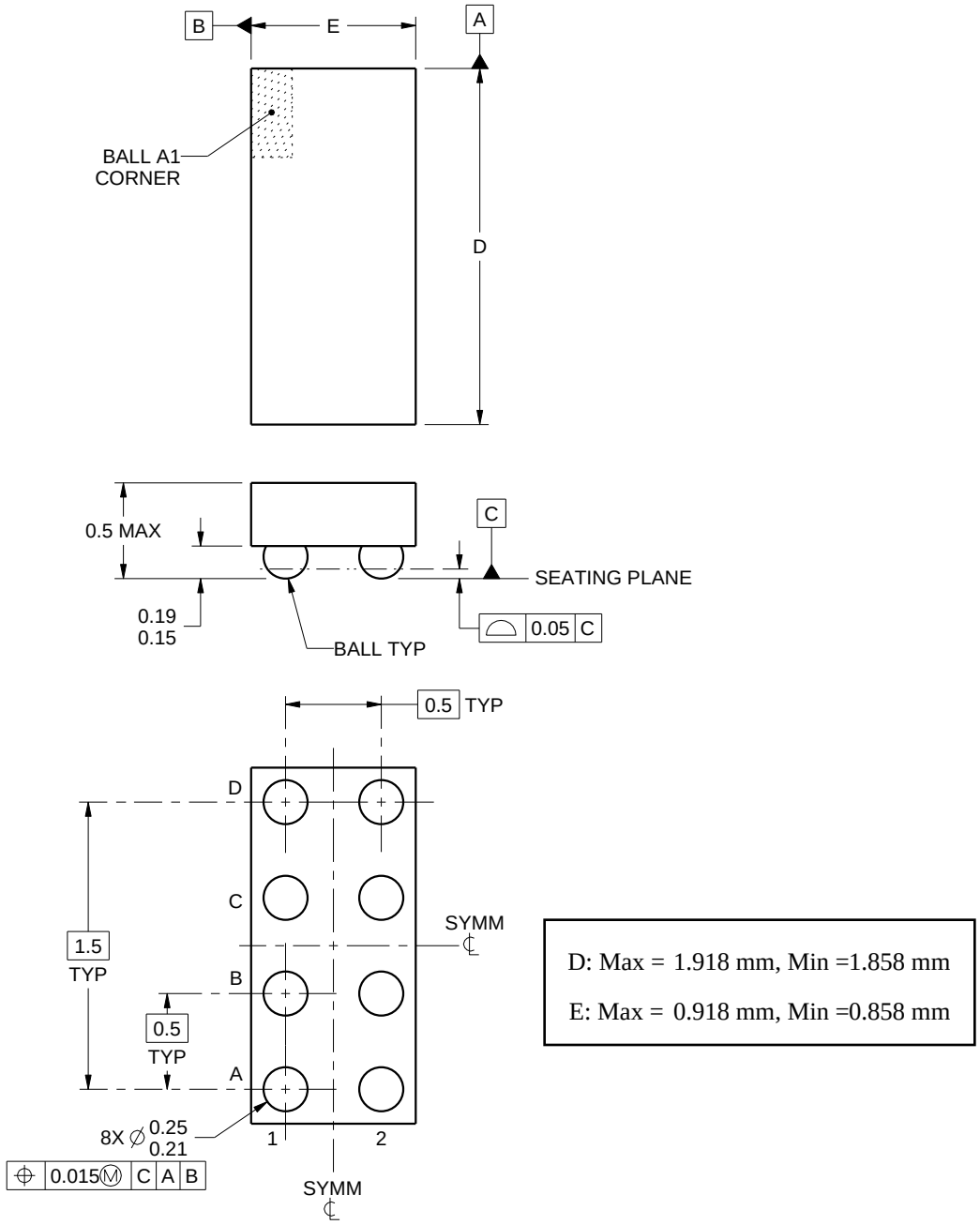
7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

PACKAGE OUTLINE

YZP0008

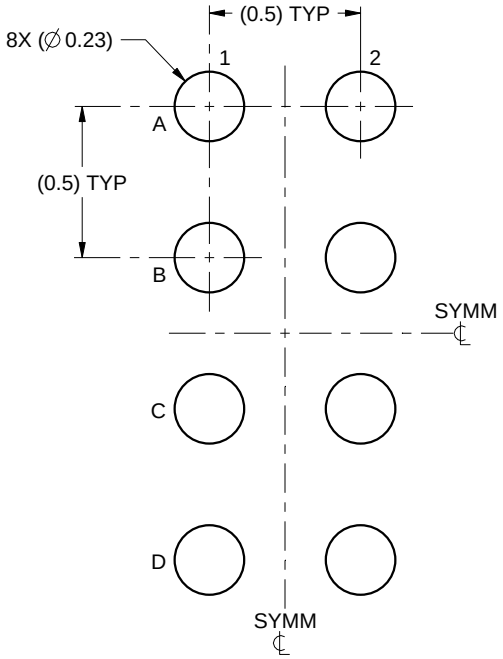
DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY

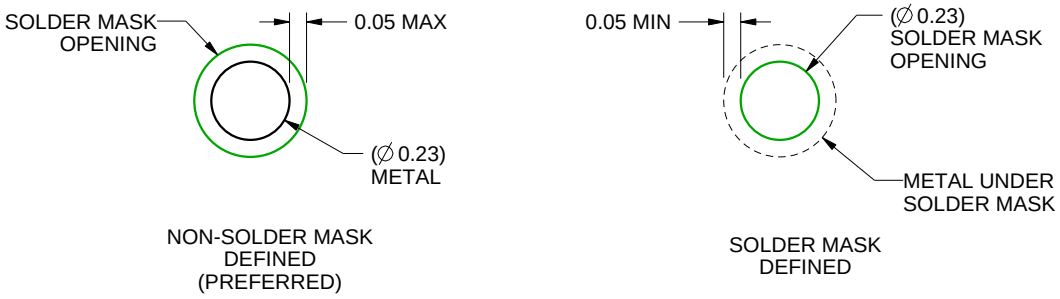


NOTES:

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.



LAND PATTERN EXAMPLE
SCALE:40X

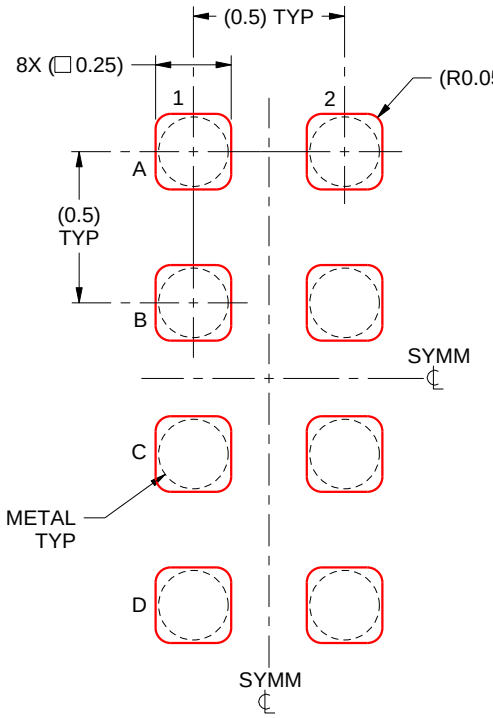


SOLDER MASK DETAILS
NOT TO SCALE

4223082/A 07/2016

NOTES: (continued)

3. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For more information, see Texas Instruments literature number SNVA009 (www.ti.com/lit/snva009).



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

4223082/A 07/2016

NOTES: (continued)

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

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最后更新日期：2025 年 10 月