SN74AXC1T45 Single-Bit Dual-Supply Bus Transceiver With Configurable Voltage Translation

1 Features

- Up and Down Translation Across 0.65 V to 3.6 V
- Operating Temperature: –40°C to +125°C
- Designed with glitch suppression circuitry to improve power sequencing performance
- Maximum Quiescent Current (I_{CCA} + I_{CCB}) of 6 µA (85°C Maximum) and 14 µA (125°C Maximum)
- Up to 500-Mbps Support When Translating from 1.8 to 3.3V
- V_{CC} Isolation Feature
  - If Either V_{CC} Input is Below 100 mV, All I/Os Outputs are Disabled and Become High-Impedance
- I_{off} Supports Partial-Power-Down Mode Operation
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 8000-V Human Body Model
  - 1000-V Charged-Device Model

2 Applications

- Enterprise and Communications
- Industrial
- Personal Electronics

3 Description

The SN74AXC1T45 is a single-bit noninverting bus transceiver that uses two separate configurable power-supply rails. The device is operational with both V_{CCA} and V_{CCB} supplies as low as 0.65 V. The A port is designed to track V_{CCA}, which accepts any supply voltage from 0.65 V to 3.6 V. The B port is designed to track V_{CCB}, which also accepts any supply voltage from 0.65 V to 3.6 V.

The DIR pin determines the direction of signal propagation. With the DIR pin configured HIGH, translation is from Port A to Port B. With DIR configured LOW, translation is from Port B to Port A. The DIR pin is referenced to V_{CCA}, meaning that its logic-high and logic-low thresholds track with V_{CCA}.

This device is fully specified for partial-power-down applications using the I_{off} current. The I_{off} protection circuitry ensures that no excessive current is drawn from or to an input, output, or combined I/O that is biased to a specific voltage while the device is powered down.

The V_{CC} isolation feature ensures that if either V_{CCA} or V_{CCB} is less than 100 mV, both I/O ports enter a high-impedance state by disabling their outputs.

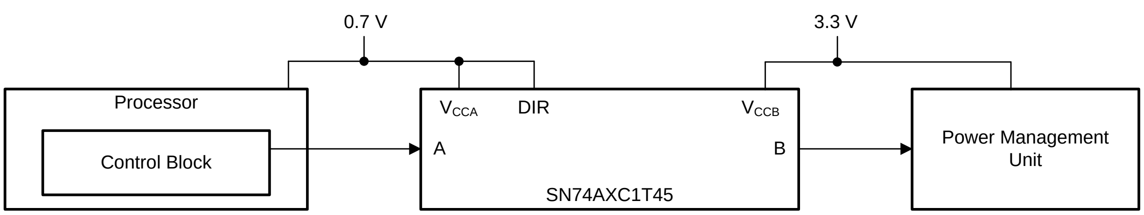
The glitch suppression circuitry enables either supply rail to be powered on or off in any order, providing robust power sequencing performance.

Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SN74AXC1T45DBV	SOT-23 (6)	2.90 mm × 1.60 mm
SN74AXC1T45DCK	SC70 (6)	2.00 mm × 1.25 mm
SN74AXC1T45DRL	SOT-5X3 (6)	1.60 mm × 1.20 mm
SN74AXC1T45DEA	X2SON (6)	1.00 mm x 1.00 mm
SN74AXC1T45DTQ	X2SON (6)	1.00 mm x 0.80 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Example Application



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4 Revision History

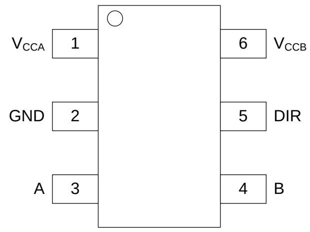
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (April 2018) to Revision B	Page
• Added DEA and DTQ as active package options	1
• Changed product status from Production Mix to Production Data	1

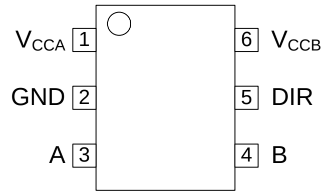
Changes from Original (December 2017) to Revision A	Page
• Added pinout drawing for DEA package	3
• Added pinout drawing for DTQ package	3

5 Pin Configuration and Functions

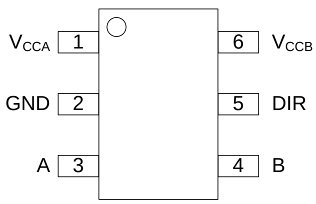
DBV Package
6-Pin SOT-23
Top View



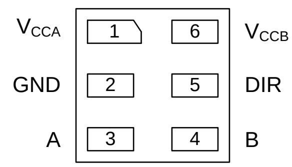
DRL Package
6-Pin SOT-5X3
Top View



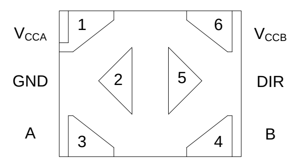
DCK Package
6-Pin SC70
Top View



DEA Package
6-Pin X2SON
Transparent Top View



DTQ Package
6-Pin X2SON
Transparent Top View



Pin Functions

PIN		TYPE	DESCRIPTION
NO.	NAME		
1	V_{CCA}	—	A-port supply voltage. 0.65V ≤ V_{CCA} ≤ 3.6 V
2	GND	—	Ground
3	A	I/O	Input/output A. This pin is referenced to V_{CCA}. When this pin is configured as an input, do not leave it floating.
4	B	I/O	Input/output B. This pin is referenced to V_{CCB}. When this pin is configured as an input, do not leave it floating.
5	DIR	I	Direction control signal. Set to Logic High for A-to-B level translation. Set to Logic Low for B-to-A level translation.
6	V_{CCB}	—	B-port supply voltage. 0.65V ≤ V_{CCB} ≤ 3.6 V.

6 Specifications

6.1 Absolute Maximum Ratings

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

			MIN	MAX	UNIT
V_{CCA}	Supply voltage, V_{CCA}		–0.5	4.2	V
V_{CCB}	Supply voltage, V_{CCB}		–0.5	4.2	V
V_I	Input voltage(2)	I/O ports (A port)	–0.5	4.2	V
		I/O ports (B port)	–0.5	4.2	
		DIR	–0.5	4.2	
V_O	Voltage applied to any output in the high-impedance or power-off state(2)	A port	–0.5	4.2	V
		B port	–0.5	4.2	
V_O	Voltage applied to any output in the high or low state(2)(3)	A port	–0.5	V_{CCA} + 0.2	V
		B port	–0.5	V_{CCB} + 0.2	
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	50	mA
	Continuous current through V_{CCA}, V_{CCB}, or GND		–100	100	mA
T_J	Operating junction temperature			150	°C
T_{stg}	Storage temperature		–65	150	°C

(1) Stresses beyond those listed under the *Absolute Maximum Ratings* table 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 negative-voltage and output 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 4.2 V maximum if the 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)	±8000	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)

			MIN	MAX	UNIT
V_{CCA}	Supply voltage, V_{CCA}		0.65	3.6	V
V_{CCB}	Supply voltage, V_{CCB}		0.65	3.6	V
V_I	Input voltage[(1)(2)]		0	3.6	V
V_O	Output voltage	Active state	0	V_{CCO}[(2)]	V
		Tri-state	0	3.6	
Δt/Δv	Input transition rise or fall rate			100	ns/V
T_A	Operating free-air temperature		–40	125	°C

(1) All unused data inputs of the device must be held at V_{CCI} or GND to assure proper device operation. For more information, refer to the *Implications of Slow or Floating CMOS Inputs* application report.
(2) V_{CCI} is the V_{CC} with the input port. V_{CCO} is the V_{CC} associated with the output port.

6.4 Thermal Information

THERMAL METRIC[(1)]		SN74AXC1T45					UNIT
		DBV (SOT-23)	DCK (SC70)	DRL (SOT-5X3)	DEA (X2SON)	DTQ (X2SON)	
		6 PINS	6 PINS	6 PINS	6 PINS	6 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	202.2	235.3	298.9	358.0	327.8	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	137.2	160.5	148.4	201.0	194.9	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	80.2	76.9	165.0	221.8	248.4	°C/W
ψ_{JT}	Junction-to-top characterization parameter	64.0	59.7	20.7	26.1	24.1	°C/W
ψ_{JB}	Junction-to-board characterization parameter	80.4	77.1	164.9	220.8	247.6	°C/W

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

6.5 Electrical Characteristics: –40°C ≤ T_A ≤ +85°C

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

PARAMETER		TEST CONDITIONS(2)(3)	MIN	MAX	UNIT
V_{IH}	High-level input voltage	V_{CCI} = 0.65 V – 0.75 V, V_{CCO} = 0.65 V – 3.60 V	V_{CCI} × 0.70		V
		V_{CCI} = 0.76 V – 1 V, V_{CCO}= 0.65 V – 3.60 V	V_{CCI} × 0.70		
		V_{CCI} = 1.1 V – 1.95 V, V_{CCO} = 0.65 V – 3.60 V	V_{CCI} × 0.65		
		V_{CCI} = 2.3 V – 2.7 V, V_{CCO}= 0.65 V – 3.60 V	1.6		
		V_{CCI} = 3 V – 3.6 V, V_{CCO}= 0.65 V – 3.60 V	2		
V_{IL}	Low-level input voltage	V_{CCI} = 0.65 V – 0.75 V, V_{CCO}= 0.65 V – 3.60 V		V_{CCI} x 0.30	V
		V_{CCI} = 0.76 V – 1 V, V_{CCO}= 0.65 V – 3.60 V		V_{CCI} x 0.30	
		V_{CCI} = 1.1 V – 1.95 V, V_{CCO}= 0.65 V – 3.60 V		V_{CCI} x 0.35	
		V_{CCI} = 2.3 V – 2.7 V, V_{CCO}= 0.65 V – 3.60 V		0.7	
		V_{CCI} = 3 V – 3.6 V, V_{CCO}= 0.65 V – 3.60 V		0.8	
V_{IH}	High-level input voltage DIR	V_{CCI} = 0.65 V – 0.75 V, V_{CCO}= 0.65 V – 3.60 V	V_{CCA} × 0.70		V
		V_{CCI} = 0.76 V – 1 V, V_{CCO}= 0.65 V – 3.60 V	V_{CCA} × 0.70		
		V_{CCI} = 1.1 V – 1.95 V, V_{CCO}= 0.65 V – 3.60 V	V_{CCA} × 0.65		
		V_{CCI} = 2.3 V – 2.7 V, V_{CCO}= 0.65 V – 3.60 V	1.6		
		V_{CCI} = 3 V – 3.6 V, V_{CCO}= 0.65 V – 3.60 V	2		
V_{IL}	Low-level input voltage DIR	V_{CCI} = 0.65 V – 0.75 V, V_{CCO}= 0.65 V – 3.60 V		V_{CCA} x 0.30	V
		V_{CCI} = 0.76 V – 1 V, V_{CCO}= 0.65 V – 3.60 V		V_{CCA} x 0.30	
		V_{CCI} = 1.1 V – 1.95 V, V_{CCO}= 0.65 V – 3.60 V		V_{CCA} x 0.35	
		V_{CCI} = 2.3 V – 2.7 V, V_{CCO}= 0.65 V – 3.60 V		0.7	
		V_{CCI} = 3 V – 3.6 V, V_{CCO}= 0.65 V – 3.60 V		0.8	
V_{OH}	High-level output voltage	V_I = V_{IH}, I_{OH} = –100 µA, V_{CCA} = V_{CCB} V_{CCI} = 0.7 V – 3.6 V, V_{CCO}= 0.7 V – 3.6 V	V_{CCO} – 0.1		V
		V_I = V_{IH}, I_{OH} = –50 µA V_{CCI} = 0.65 V, V_{CCO}= 0.65 V	0.55		
		V_I = V_{IH}, I_{OH} = –200 µA V_{CCI} = 0.76 V, V_{CCO}= 0.76 V	0.58		
		V_I = V_{IH}, I_{OH} = –500 µA V_{CCI} = 0.85 V, V_{CCO}= 0.85 V	0.65		
		V_I = V_{IH}, I_{OH} = –3 mA V_{CCI} = 1.1 V, V_{CCO}= 1.1 V	0.85		
		V_I = V_{IH}, I_{OH} = –6 mA V_{CCI} = 1.4 V, V_{CCO}= 1.4 V	1.05		
		V_I = V_{IH}, I_{OH} = –8 mA V_{CCI} = 1.65 V V_{CCO}= 1.65 V	1.2		
		V_I = V_{IH}, I_{OH} = –9 mA V_{CCI} = 2.3 V, V_{CCO}= 2.3 V	1.75		
		V_I = V_{IH}, I_{OH} = –12 mA V_{CCI} = 3 V, V_{CCO}= 3 V	2.3		
V_{OL}	Low-level output voltage	V_I = V_{IL}, I_{OL} = 100 µA, V_{CCA} = V_{CCB} V_{CCI} = 0.7 V – 3.6 V, V_{CCO}= 0.7 V – 3.6 V		0.1	V
		V_I = V_{IL}, I_{OL} = 50 µA V_{CCI} = 0.65 V, V_{CCO}= 0.65 V		0.1	
		V_I = V_{IL}, I_{OL} = 200 µA V_{CCI} = 0.76 V V_{CCO}= 0.76 V		0.18	
		V_I = V_{IL}, I_{OL} = 500 µA V_{CCI} = 0.85 V, V_{CCO}= 0.85 V		0.2	
		V_I = V_{IL}, I_{OL} = 3 mA V_{CCI} = 1.1 V, V_{CCO}= 1.1 V		0.25	
		V_I = V_{IL}, I_{OL} = 6 mA V_{CCI} = 1.4 V, V_{CCO}= 1.4 V		0.35	
		V_I = V_{IL}, I_{OL} = 8 mA V_{CCI} = 1.65 V, V_{CCO}= 1.65 V		0.45	
		V_I = V_{IL}, I_{OL} = 9 mA V_{CCI} = 2.3 V, V_{CCO}= 2.3 V		0.55	
		V_I = V_{IL}, I_{OL} = 12 mA V_{CCI} = 3 V, V_{CCO}= 3 V		0.7	
I_I	Input leakage current DIR	V_I = V_{CCA} or GND V_{CCI} = 0.65 V – 3.6 V, V_{CCO}= 0.65 V – 3.6 V	–1	1	µA

(1) All unused data inputs of the device must be held at V_{CCI} or GND to assure proper device operation. For more information, see the *Implications of Slow or Floating CMOS Inputs* application report.
(2) V_{CCI} is the V_{CC} associated with the input port.
(3) V_{CCO} is the V_{CC} associated with the output port.

Electrical Characteristics: –40°C ≤ T_A ≤ +85°C (continued)

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

PARAMETER		TEST CONDITIONS(2)(3)	MIN	MAX	UNIT
I_{off}	Off-state current	A port: V_I or V_O = 0 to 3.6 V V_{CCI} = 0 V, V_{CCO}= 0 – 3.6 V	–5	5	µA
		B port: V_I or V_O = 0 to 3.6 V V_{CCI} = 0 – 3.6 V, V_{CCO}= 0 V	–5	5	
I_{OZ}	High-impedance-state output current	B port: V_O = V_{CCO} or GND, V_I = V_{CCI} or GND V_{CCI} = 0 V, V_{CCO}= 3.6 V	–5	5	µA
		A port: V_O = V_{CCO} or GND, V_I = V_{CCI} or GND V_{CCI} = 3.6 V, V_{CCO}= 0 V	–5	5	
I_{CCA}	V_{CCA} supply current	V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 0.65 V – 3.6 V, V_{CCO}= 0.65 V – 3.6 V		6	µA
		V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 0 V, V_{CCO}= 3.6 V	-2		
		V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 3.6 V, V_{CCO}= 0 V		2	
I_{CCB}	V_{CCB} supply current	V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 0.65 V – 3.6 V, V_{CCO}= 0.65 V – 3.6 V		6	µA
		V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 0 V, V_{CCO}= 3.6 V		2	
		V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 3.6 V, V_{CCO}= 0 V	-2		
I_{CCA} + I_{CCB}	Combined supply current	V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 0.65 V – 3.6 V, V_{CCO}= 0.65 V – 3.6 V		6	µA
C_I	Input capacitance DIR	V_I = 0V, 3.30 V V_{CCI} = 3.3 V, V_{CCO}= 3.3 V		4.4	pF
$C_{I/O}$	Input-to-output internal capacitance	A Port: V_O = 1.65V DC + 1 MHz, –16-dBm sine wave V_{CCI} = 3.3 V, V_{CCO}= 0 V		5	pF
$C_{I/O}$	Input-to-output internal capacitance	B Port: V_O = 1.65V DC + 1 MHz, –16-dBm sine wave V_{CCI} = 0 V, V_{CCO}= 3.3 V		5	pF

6.6 Electrical Characteristics: –40°C ≤ T_A ≤ +125°C

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

PARAMETER		TEST CONDITIONS(2) (3)	MIN	MAX	UNIT
V_{IH}	High-level input voltage	V_{CCI} = 0.65 V – 0.75 V, V_{CCO} = 0.65 V – 3.60 V	V_{CCI} × 0.70		V
		V_{CCI} = 0.76 V – 1 V, V_{CCO} = 0.65 V – 3.60 V	V_{CCI} × 0.70		
		V_{CCI} = 1.1 V – 1.95 V, V_{CCO} = 0.65 V – 3.60 V	V_{CCI} × 0.65		
		V_{CCI} = 2.3 V – 2.7 V, V_{CCO} = 0.65 V – 3.60 V	1.6		
		V_{CCI} = 3 V – 3.6 V, V_{CCO} = 0.65 V – 3.60 V	2		
V_{IL}	Low-level input voltage	V_{CCI} = 0.65 V – 0.75 V, V_{CCO} = 0.65 V – 3.60 V		V_{CCI} x 0.30	V
		V_{CCI} = 0.76 V – 1 V, V_{CCO} = 0.65 V – 3.60 V		V_{CCI} x 0.30	
		V_{CCI} = 1.1 V – 1.95 V, V_{CCO} = 0.65 V – 3.60 V		V_{CCI} x 0.35	
		V_{CCI} = 2.3 V – 2.7 V, V_{CCO} = 0.65 V – 3.60 V		0.7	
		V_{CCI} = 3 V – 3.6 V, V_{CCO} = 0.65 V – 3.60 V		0.8	
V_{IH}	High-level input voltage DIR	V_{CCI} = 0.65 V – 0.75 V, V_{CCO} = 0.65 V – 3.60 V	V_{CCA} × 0.70		V
		V_{CCI} = 0.76 V – 1 V, V_{CCO} = 0.65 V – 3.60 V	V_{CCA} × 0.70		
		V_{CCI} = 1.1 V – 1.95 V, V_{CCO} = 0.65 V – 3.60 V	V_{CCA} × 0.65		
		V_{CCI} = 2.3 V – 2.7 V, V_{CCO} = 0.65 V – 3.60 V	1.6		
		V_{CCI} = 3 V – 3.6 V, V_{CCO} = 0.65 V – 3.60 V	2		
V_{IL}	Low-level input voltage DIR	V_{CCI} = 0.65 V – 0.75 V, V_{CCO} = 0.65 V – 3.60 V		V_{CCA} x 0.30	V
		V_{CCI} = 0.76 V – 1 V, V_{CCO} = 0.65 V – 3.60 V		V_{CCA} x 0.30	
		V_{CCI} = 1.1 V – 1.95 V, V_{CCO} = 0.65 V – 3.60 V		V_{CCA} x 0.35	
		V_{CCI} = 2.3 V – 2.7 V, V_{CCO} = 0.65 V – 3.60 V		0.7	
		V_{CCI} = 3 V – 3.6 V, V_{CCO} = 0.65 V – 3.60 V		0.8	
V_{OH}	High-level output voltage	V_I = V_{IH}, I_{OH} = –100 µA , V_{CCA} = V_{CCB} V_{CCI} = 0.7 V – 3.6 V, V_{CCO} = 0.7 V – 3.6 V	V_{CCO} – 0.1		V
		V_I = V_{IH}, I_{OH} = –50 µA V_{CCI} = 0.65 V, V_{CCO} = 0.65 V	0.55		
		V_I = V_{IH}, I_{OH} = –200 µA V_{CCI} = 0.76 V, V_{CCO} = 0.76 V	0.58		
		V_I = V_{IH}, I_{OH} = –500 µA V_{CCI} = 0.85 V, V_{CCO} = 0.85 V	0.65		
		V_I = V_{IH} I_{OH} = –3 mA V_{CCI} = 1.1 V, V_{CCO} = 1.1 V	0.85		
		V_I = V_{IH}, I_{OH} = –6 mA V_{CCI} = 1.4 V, V_{CCO} = 1.4 V	1.05		
		V_I = V_{IH}, I_{OH} = –8 mA V_{CCI} = 1.65 V, V_{CCO} = 1.65 V	1.2		
		V_I = V_{IH}, I_{OH} = –9 mA V_{CCI} = 2.3 V, V_{CCO} = 2.3 V	1.75		
		V_I = V_{IH}, I_{OH} = –12 mA V_{CCI} = 3 V, V_{CCO} = 3 V	2.3		
V_{OL}	Low-level output voltage	V_I = V_{IL}, I_{OL} = 100 µA , V_{CCA} = V_{CCB} V_{CCI} = 0.7 V – 3.6 V, V_{CCO} = 0.7 V – 3.6 V		0.1	V
		V_I = V_{IL}, I_{OL} = 50 µA V_{CCI} = 0.65 V, V_{CCO} = 0.65 V		0.1	
		V_I = V_{IL}, I_{OL} = 200 µA V_{CCI} = 0.76 V, V_{CCO} = 0.76 V		0.18	
		V_I = V_{IL}, I_{OL} = 500 µA V_{CCI} = 0.85 V, V_{CCO} = 0.85 V		0.2	
		V_I = V_{IL}, I_{OL} = 3 mA V_{CCI} = 1.1 V, V_{CCO} = 1.1 V		0.25	
		V_I = V_{IL}, I_{OL} = 6 mA V_{CCI} = 1.4 V, V_{CCO} = 1.4 V		0.35	
		V_I = V_{IL}, I_{OL} = 8 mA V_{CCI} = 1.65 V, V_{CCO} = 1.65 V		0.45	
		V_I = V_{IL}, I_{OL} = 9 mA V_{CCI} = 2.3 V, V_{CCO} = 2.3 V		0.55	
		V_I = V_{IL}, I_{OL} = 12 mA V_{CCI} = 3 V, V_{CCO} = 3 V		0.7	
I_I	Input leakage current DIR	V_I = V_{CCA} or GND V_{CCI} = 0.65 V – 3.6 V, V_{CCO} = 0.65 V – 3.6 V	-1.5	1.5	µA

(1) All unused data inputs of the device must be held at V_{CCI} or GND to assure proper device operation. For more information, see the *Implications of Slow or Floating CMOS Inputs* application report.
(2) V_{CCI} is the V_{CC} associated with the input port.
(3) V_{CCO} is the V_{CC} associated with the output port.

Electrical Characteristics: –40°C ≤ T_A ≤ +125°C (continued)

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

PARAMETER		TEST CONDITIONS(2) (3)	MIN	MAX	UNIT
I_{off}	Off-state current	A port: V_I or V_O = 0 to 3.6 V V_{CCI} = 0 V, V_{CCO} = 0 – 3.6 V	-7.5	7.5	µA
		B port: V_I or V_O = 0 to 3.6 V V_{CCI} = 0 – 3.6 V, V_{CCO} = 0 V	-7.5	7.5	
I_{OZ}	High-impedance-state output current	B port: V_O = V_{CCO} or GND, V_I = V_{CCI} or GND V_{CCI} = 0 V, V_{CCO} = 3.6 V	-7.5	7.5	µA
		A port: V_O = V_{CCO} or GND, V_I = V_{CCI} or GND V_{CCI} = 3.6 V, V_{CCO} = 0 V	-7.5	7.5	
I_{CCA}	V_{CCA} supply current	V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 0.65 V – 3.6 V, V_{CCO} = 0.65 V – 3.6 V		8	µA
		V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 0 V, V_{CCO} = 3.6 V	-8		
		V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 3.6 V, V_{CCO} = 0 V		8	
I_{CCB}	V_{CCB} supply current	V_I = V_{CCI} or GND, I_O V_{CCI} = 0.65 V – 3.6 V, V_{CCO} = 0.65 V – 3.6 V		8.5	µA
		V_I = V_{CCI} or GND, I_O V_{CCI} = 0 V, V_{CCO} = 3.6 V		8	
		V_I = V_{CCI} or GND, I_O V_{CCI} = 3.6 V, V_{CCO} = 0 V	-8		
I_{CCA} + I_{CCB}	Combined supply current	V_I = V_{CCI} or GND, I_O = 0 V_{CCI} = 0.65 V – 3.6 V, V_{CCO} = 0.65 V – 3.6 V		14	µA
C_I	Input capacitance DIR	V_I = 0V, 3.30V V_{CCI} = 3.3 V, V_{CCO} = 3.3 V		4.4	pF
$C_{I/O}$	Input-to-output internal capacitance	A Port: V_O = 1.65V DC + 1 MHz, –16-dBm sine wave V_{CCI} = 3.3 V, V_{CCO} = 0 V		5	pF
$C_{I/O}$	Input-to-output internal capacitance	B Port: V_O = 1.65V DC + 1 MHz, –16-dBm sine wave V_{CCI} = 0 V, V_{CCO} = 3.3 V		5	pF

6.7 Switching Characteristics: V_{CCA} = 0.7 V, T_A = –40°C to +85°C

over recommended operating free-air temperature range, V_{CCA} = 0.7 V (see Figure 1)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	173	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	117	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	85	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	51	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	50	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	53	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	65	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	143	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	173	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	154	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	127	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	88	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	83	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	82	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	80	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	80	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	143	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	143	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	143	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	143	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	143	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	143	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	143	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	143	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	163	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	123	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	100	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	50	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	45	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	49	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	61	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	109	

Switching Characteristics: V_{CCA} = 0.7 V, T_A = –40°C to +85°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 0.7 V (see Figure 1)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		389	ns
			V_{CCB} = 0.8 V ± 0.04 V		331	
			V_{CCB} = 0.9 V ± 0.045 V		287	
			V_{CCB} = 1.2 V ± 0.1 V		143	
			V_{CCB} = 1.5 V ± 0.1 V		134	
			V_{CCB} = 1.8 V ± 0.15 V		137	
			V_{CCB} = 2.5 V ± 0.2 V		147	
			V_{CCB} = 3.3 V ± 0.3 V		200	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		369	ns
			V_{CCB} = 0.8 V ± 0.04 V		313	
			V_{CCB} = 0.9 V ± 0.045 V		281	
			V_{CCB} = 1.2 V ± 0.1 V		247	
			V_{CCB} = 1.5 V ± 0.1 V		246	
			V_{CCB} = 1.8 V ± 0.15 V		249	
			V_{CCB} = 2.5 V ± 0.2 V		261	
			V_{CCB} = 3.3 V ± 0.3 V		339	

6.8 Switching Characteristics: V_{CCA} = 0.7 V, T_A = –40°C to +125°C

over recommended operating free-air temperature range, V_{CCA} = 0.7 V (see Figure 9)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	173	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	117	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	85	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	51	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	50	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	53	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	65	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	143	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	173	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	154	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	127	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	88	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	83	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	82	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	80	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	80	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	143	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	143	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	143	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	143	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	143	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	143	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	143	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	143	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	163	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	123	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	100	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	50	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	45	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	49	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	161	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	109	

Switching Characteristics: V_{CCA} = 0.7 V, T_A = –40°C to +125°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 0.7 V (see Figure 9)

PARAMETER	TEST CONDITIONS		MIN	MAX	UNIT
t_{en} Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		406	ns
		V_{CCB} = 0.8 V ± 0.04 V		333	
		V_{CCB} = 0.9 V ± 0.045 V		287	
		V_{CCB} = 1.2 V ± 0.1 V		143	
		V_{CCB} = 1.5 V ± 0.1 V		134	
		V_{CCB} = 1.8 V ± 0.15 V		137	
		V_{CCB} = 2.5 V ± 0.2 V		147	
		V_{CCB} = 3.3 V ± 0.3 V		200	
	Port B	V_{CCB} = 0.7 V ± 0.05 V		395	ns
		V_{CCB} = 0.8 V ± 0.04 V		339	
		V_{CCB} = 0.9 V ± 0.045 V		307	
		V_{CCB} = 1.2 V ± 0.1 V		273	
		V_{CCB} = 1.5 V ± 0.1 V		272	
		V_{CCB} = 1.8 V ± 0.15 V		275	
		V_{CCB} = 2.5 V ± 0.2 V		287	
		V_{CCB} = 3.3 V ± 0.3 V		365	

6.9 Switching Characteristics: V_{CCA} = 0.8 V, T_A = –40°C to +85°C

over recommended operating free-air temperature range, V_{CCA} = 0.8 V (see Figure 2)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	153	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	95	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	64	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	33	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	27	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	26	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	27	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	36	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	117	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	96	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	78	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	52	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	42	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	41	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	40	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	39	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	100	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	100	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	100	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	100	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	100	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	100	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	100	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	100	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	151	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	111	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	88	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	38	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	32	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	30	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	30	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	38	

Switching Characteristics: V_{CCA} = 0.8 V, T_A = –40°C to +85°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 0.8 V (see Figure 2)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		321	ns
			V_{CCB} = 0.8 V ± 0.04 V		261	
			V_{CCB} = 0.9 V ± 0.045 V		226	
			V_{CCB} = 1.2 V ± 0.1 V		96	
			V_{CCB} = 1.5 V ± 0.1 V		80	
			V_{CCB} = 1.8 V ± 0.15 V		78	
			V_{CCB} = 2.5 V ± 0.2 V		76	
			V_{CCB} = 3.3 V ± 0.3 V		87	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		309	ns
			V_{CCB} = 0.8 V ± 0.04 V		251	
			V_{CCB} = 0.9 V ± 0.045 V		220	
			V_{CCB} = 1.2 V ± 0.1 V		189	
			V_{CCB} = 1.5 V ± 0.1 V		183	
			V_{CCB} = 1.8 V ± 0.15 V		182	
			V_{CCB} = 2.5 V ± 0.2 V		183	
			V_{CCB} = 3.3 V ± 0.3 V		192	

6.10 Switching Characteristics: V_{CCA} = 0.8 V, T_A = –40°C to +125°C

over recommended operating free-air temperature range, V_{CCA} = 0.8 V (see Figure 10)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	153	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	95	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	64	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	33	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	27	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	26	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	27	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	36	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	117	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	96	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	78	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	52	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	42	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	41	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	40	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	39	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	100	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	100	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	100	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	100	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	100	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	100	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	100	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	100	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	151	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	111	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	88	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	40	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	33	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	30	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	30	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	38	

Switching Characteristics: V_{CCA} = 0.8 V, T_A = –40°C to +125°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 0.8 V (see Figure 10)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		341	ns
			V_{CCB} = 0.8 V ± 0.04 V		266	
			V_{CCB} = 0.9 V ± 0.045 V		229	
			V_{CCB} = 1.2 V ± 0.1 V		97	
			V_{CCB} = 1.5 V ± 0.1 V		80	
			V_{CCB} = 1.8 V ± 0.15 V		78	
			V_{CCB} = 2.5 V ± 0.2 V		76	
			V_{CCB} = 3.3 V ± 0.3 V		87	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		317	ns
			V_{CCB} = 0.8 V ± 0.04 V		259	
			V_{CCB} = 0.9 V ± 0.045 V		228	
			V_{CCB} = 1.2 V ± 0.1 V		197	
			V_{CCB} = 1.5 V ± 0.1 V		191	
			V_{CCB} = 1.8 V ± 0.15 V		190	
			V_{CCB} = 2.5 V ± 0.2 V		191	
			V_{CCB} = 3.3 V ± 0.3 V		200	

6.11 Switching Characteristics: V_{CCA} = 0.9 V, T_A = –40°C to +85°C

over recommended operating free-air temperature range, V_{CCA} = 0.9 V (see Figure 3)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	126	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	78	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	52	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	23	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	18	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	16	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	15	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	18	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	85	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	64	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	53	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	40	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	28	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	24	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	22	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	21	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	75	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	75	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	75	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	75	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	75	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	75	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	75	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	75	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	144	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	105	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	82	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	32	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	25	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	24	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	21	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	23	

Switching Characteristics: V_{CCA} = 0.9 V, T_A = –40°C to +85°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 0.9 V (see Figure 3)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		282	ns
			V_{CCB} = 0.8 V ± 0.04 V		223	
			V_{CCB} = 0.9 V ± 0.045 V		195	
			V_{CCB} = 1.2 V ± 0.1 V		77	
			V_{CCB} = 1.5 V ± 0.1 V		59	
			V_{CCB} = 1.8 V ± 0.15 V		54	
			V_{CCB} = 2.5 V ± 0.2 V		48	
			V_{CCB} = 3.3 V ± 0.3 V		54	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		262	ns
			V_{CCB} = 0.8 V ± 0.04 V		214	
			V_{CCB} = 0.9 V ± 0.045 V		188	
			V_{CCB} = 1.2 V ± 0.1 V		159	
			V_{CCB} = 1.5 V ± 0.1 V		154	
			V_{CCB} = 1.8 V ± 0.15 V		152	
			V_{CCB} = 2.5 V ± 0.2 V		151	
			V_{CCB} = 3.3 V ± 0.3 V		154	

6.12 Switching Characteristics: V_{CCA} = 0.9 V, T_A = –40°C to +125°C

over recommended operating free-air temperature range, V_{CCA} = 0.9 V (see Figure 11)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	126	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	78	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	52	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	23	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	18	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	16	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	15	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	18	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	85	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	64	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	53	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	40	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	28	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	24	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	22	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	21	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	79	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	79	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	79	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	79	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	79	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	79	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	79	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	79	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	144	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	105	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	83	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	36	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	28	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	26	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	21	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	23	

Switching Characteristics: V_{CCA} = 0.9 V, T_A = –40°C to +125°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 0.9 V (see Figure 11)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		304	ns
			V_{CCB} = 0.8 V ± 0.04 V		229	
			V_{CCB} = 0.9 V ± 0.045 V		199	
			V_{CCB} = 1.2 V ± 0.1 V		81	
			V_{CCB} = 1.5 V ± 0.1 V		62	
			V_{CCB} = 1.8 V ± 0.15 V		56	
			V_{CCB} = 2.5 V ± 0.2 V		49	
			V_{CCB} = 3.3 V ± 0.3 V		54	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		269	ns
			V_{CCB} = 0.8 V ± 0.04 V		221	
			V_{CCB} = 0.9 V ± 0.045 V		195	
			V_{CCB} = 1.2 V ± 0.1 V		166	
			V_{CCB} = 1.5 V ± 0.1 V		161	
			V_{CCB} = 1.8 V ± 0.15 V		159	
			V_{CCB} = 2.5 V ± 0.2 V		158	
			V_{CCB} = 3.3 V ± 0.3 V		161	

6.13 Switching Characteristics: V_{CCA} = 1.2 V, T_A = –40°C to +85°C

over recommended operating free-air temperature range, V_{CCA} = 1.2 V (see Figure 4)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	87	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	52	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	39	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	15	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	9	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	8	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	7	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	7	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	51	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	33	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	23	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	15	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	12	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	10	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	7	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	7	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	22	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	22	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	22	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	22	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	22	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	22	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	22	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	22	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	137	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	98	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	74	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	24	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	18	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	16	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	13	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	13	

Switching Characteristics: V_{CCA} = 1.2 V, T_A = –40°C to +85°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 1.2 V (see Figure 4)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		240	ns
			V_{CCB} = 0.8 V ± 0.04 V		185	
			V_{CCB} = 0.9 V ± 0.045 V		157	
			V_{CCB} = 1.2 V ± 0.1 V		45	
			V_{CCB} = 1.5 V ± 0.1 V		36	
			V_{CCB} = 1.8 V ± 0.15 V		33	
			V_{CCB} = 2.5 V ± 0.2 V		26	
			V_{CCB} = 3.3 V ± 0.3 V		29	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		115	ns
			V_{CCB} = 0.8 V ± 0.04 V		80	
			V_{CCB} = 0.9 V ± 0.045 V		67	
			V_{CCB} = 1.2 V ± 0.1 V		43	
			V_{CCB} = 1.5 V ± 0.1 V		37	
			V_{CCB} = 1.8 V ± 0.15 V		36	
			V_{CCB} = 2.5 V ± 0.2 V		35	
			V_{CCB} = 3.3 V ± 0.3 V		35	

6.14 Switching Characteristics: V_{CCA} = 1.2 V, T_A = –40°C to +125°C

over recommended operating free-air temperature range, V_{CCA} = 1.2 V (see *Figure 12*)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	87	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	52	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	39	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	15	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	10	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	9	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	7	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	8	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	51	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	33	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	23	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	15	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	12	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	10	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	8	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	7	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	29	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	29	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	29	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	29	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	29	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	29	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	29	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	29	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	137	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	98	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	78	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	30	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	23	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	21	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	17	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	16	

Switching Characteristics: V_{CCA} = 1.2 V, T_A = –40°C to +125°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 1.2 V (see *Figure 12*)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		265	ns
			V_{CCB} = 0.8 V ± 0.04 V		193	
			V_{CCB} = 0.9 V ± 0.045 V		164	
			V_{CCB} = 1.2 V ± 0.1 V		51	
			V_{CCB} = 1.5 V ± 0.1 V		41	
			V_{CCB} = 1.8 V ± 0.15 V		37	
			V_{CCB} = 2.5 V ± 0.2 V		30	
			V_{CCB} = 3.3 V ± 0.3 V		32	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		121	ns
			V_{CCB} = 0.8 V ± 0.04 V		86	
			V_{CCB} = 0.9 V ± 0.045 V		73	
			V_{CCB} = 1.2 V ± 0.1 V		49	
			V_{CCB} = 1.5 V ± 0.1 V		44	
			V_{CCB} = 1.8 V ± 0.15 V		43	
			V_{CCB} = 2.5 V ± 0.2 V		41	
			V_{CCB} = 3.3 V ± 0.3 V		42	

6.15 Switching Characteristics: V_{CCA} = 1.5 V, T_A = –40°C to +85°C

over recommended operating free-air temperature range, V_{CCA} = 1.5 V (see Figure 5)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	83	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	42	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	28	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	12	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	8	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	7	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	5	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	5	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	50	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	28	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	18	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	10	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	8	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	7	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	5	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	4	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	15	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	15	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	15	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	15	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	15	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	15	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	15	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	15	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	136	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	96	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	72	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	22	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	16	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	14	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	11	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	11	

Switching Characteristics: V_{CCA} = 1.5 V, T_A = –40°C to +85°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 1.5 V (see *Figure 5*)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		238	ns
			V_{CCB} = 0.8 V ± 0.04 V		178	
			V_{CCB} = 0.9 V ± 0.045 V		151	
			V_{CCB} = 1.2 V ± 0.1 V		38	
			V_{CCB} = 1.5 V ± 0.1 V		30	
			V_{CCB} = 1.8 V ± 0.15 V		28	
			V_{CCB} = 2.5 V ± 0.2 V		22	
			V_{CCB} = 3.3 V ± 0.3 V		24	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		104	
			V_{CCB} = 0.8 V ± 0.04 V		63	
			V_{CCB} = 0.9 V ± 0.045 V		49	
			V_{CCB} = 1.2 V ± 0.1 V		33	
			V_{CCB} = 1.5 V ± 0.1 V		29	
			V_{CCB} = 1.8 V ± 0.15 V		28	
			V_{CCB} = 2.5 V ± 0.2 V		26	
			V_{CCB} = 3.3 V ± 0.3 V		26	

6.16 Switching Characteristics: V_{CCA} = 1.5 V, T_A = –40°C to +125°C

over recommended operating free-air temperature range, V_{CCA} = 1.5 V (see Figure 13)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	83	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	42	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	28	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	12	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	9	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	8	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	6	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	6	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	50	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	28	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	18	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	10	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	9	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	8	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	6	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	5	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	20	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	20	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	20	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	20	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	20	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	20	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	20	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	20	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	136	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	96	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	76	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	29	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	21	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	19	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	15	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	14	

Switching Characteristics: V_{CCA} = 1.5 V, T_A = –40°C to +125°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 1.5 V (see Figure 13)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		263	ns
			V_{CCB} = 0.8 V ± 0.04 V		186	
			V_{CCB} = 0.9 V ± 0.045 V		157	
			V_{CCB} = 1.2 V ± 0.1 V		44	
			V_{CCB} = 1.5 V ± 0.1 V		36	
			V_{CCB} = 1.8 V ± 0.15 V		33	
			V_{CCB} = 2.5 V ± 0.2 V		26	
			V_{CCB} = 3.3 V ± 0.3 V		27	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		109	
			V_{CCB} = 0.8 V ± 0.04 V		68	
			V_{CCB} = 0.9 V ± 0.045 V		54	
			V_{CCB} = 1.2 V ± 0.1 V		38	
			V_{CCB} = 1.5 V ± 0.1 V		35	
			V_{CCB} = 1.8 V ± 0.15 V		34	
			V_{CCB} = 2.5 V ± 0.2 V		32	
			V_{CCB} = 3.3 V ± 0.3 V		32	

6.17 Switching Characteristics: V_{CCA} = 1.8 V, T_A = –40°C to +85°C

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

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	81	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	41	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	24	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	10	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	7	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	6	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	5	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	4	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	53	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	26	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	16	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	8	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	7	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	6	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	5	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	4	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	13	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	13	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	13	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	13	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	13	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	13	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	13	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	13	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	136	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	96	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	72	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	22	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	15	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	14	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	11	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	11	

Switching Characteristics: V_{CCA} = 1.8 V, T_A = –40°C to +85°C (continued)

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

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		241	ns
			V_{CCB} = 0.8 V ± 0.04 V		176	
			V_{CCB} = 0.9 V ± 0.045 V		148	
			V_{CCB} = 1.2 V ± 0.1 V		35	
			V_{CCB} = 1.5 V ± 0.1 V		28	
			V_{CCB} = 1.8 V ± 0.15 V		26	
			V_{CCB} = 2.5 V ± 0.2 V		21	
			V_{CCB} = 3.3 V ± 0.3 V		24	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		101	
			V_{CCB} = 0.8 V ± 0.04 V		61	
			V_{CCB} = 0.9 V ± 0.045 V		44	
			V_{CCB} = 1.2 V ± 0.1 V		30	
			V_{CCB} = 1.5 V ± 0.1 V		27	
			V_{CCB} = 1.8 V ± 0.15 V		26	
			V_{CCB} = 2.5 V ± 0.2 V		25	
			V_{CCB} = 3.3 V ± 0.3 V		24	

6.18 Switching Characteristics: V_{CCA} = 1.8 V, T_A = –40°C to +125°C

over recommended operating free-air temperature range, V_{CCA} = 1.8 V (see Figure 14)

PARAMETER	TEST CONDITIONS		MIN	MAX	UNIT
t_{pd} Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	81	ns
		V_{CCB} = 0.8 V ± 0.04 V	0.5	41	
		V_{CCB} = 0.9 V ± 0.045 V	0.5	24	
		V_{CCB} = 1.2 V ± 0.1 V	0.5	10	
		V_{CCB} = 1.5 V ± 0.1 V	0.5	8	
		V_{CCB} = 1.8 V ± 0.15 V	0.5	7	
		V_{CCB} = 2.5 V ± 0.2 V	0.5	5	
		V_{CCB} = 3.3 V ± 0.3 V	0.5	5	
	B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	53	
		V_{CCB} = 0.8 V ± 0.04 V	0.5	26	
		V_{CCB} = 0.9 V ± 0.045 V	0.5	16	
		V_{CCB} = 1.2 V ± 0.1 V	0.5	9	
		V_{CCB} = 1.5 V ± 0.1 V	0.5	7	
		V_{CCB} = 1.8 V ± 0.15 V	0.5	7	
		V_{CCB} = 2.5 V ± 0.2 V	0.5	5	
		V_{CCB} = 3.3 V ± 0.3 V	0.5	4	
t_{dis} Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	18	ns
		V_{CCB} = 0.8 V ± 0.04 V	0.5	18	
		V_{CCB} = 0.9 V ± 0.045 V	0.5	18	
		V_{CCB} = 1.2 V ± 0.1 V	0.5	18	
		V_{CCB} = 1.5 V ± 0.1 V	0.5	18	
		V_{CCB} = 1.8 V ± 0.15 V	0.5	18	
		V_{CCB} = 2.5 V ± 0.2 V	0.5	18	
		V_{CCB} = 3.3 V ± 0.3 V	0.5	18	
	Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	136	
		V_{CCB} = 0.8 V ± 0.04 V	0.5	96	
		V_{CCB} = 0.9 V ± 0.045 V	0.5	75	
		V_{CCB} = 1.2 V ± 0.1 V	0.5	28	
		V_{CCB} = 1.5 V ± 0.1 V	0.5	20	
		V_{CCB} = 1.8 V ± 0.15 V	0.5	18	
		V_{CCB} = 2.5 V ± 0.2 V	0.5	14	
		V_{CCB} = 3.3 V ± 0.3 V	0.5	13	

Switching Characteristics: V_{CCA} = 1.8 V, T_A = –40°C to +125°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 1.8 V (see Figure 14)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		266	ns
			V_{CCB} = 0.8 V ± 0.04 V		184	
			V_{CCB} = 0.9 V ± 0.045 V		155	
			V_{CCB} = 1.2 V ± 0.1 V		42	
			V_{CCB} = 1.5 V ± 0.1 V		33	
			V_{CCB} = 1.8 V ± 0.15 V		32	
			V_{CCB} = 2.5 V ± 0.2 V		24	
			V_{CCB} = 3.3 V ± 0.3 V		26	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		105	
			V_{CCB} = 0.8 V ± 0.04 V		65	
			V_{CCB} = 0.9 V ± 0.045 V		48	
			V_{CCB} = 1.2 V ± 0.1 V		34	
			V_{CCB} = 1.5 V ± 0.1 V		32	
			V_{CCB} = 1.8 V ± 0.15 V		31	
			V_{CCB} = 2.5 V ± 0.2 V		29	
			V_{CCB} = 3.3 V ± 0.3 V		29	

6.19 Switching Characteristics: V_{CCA} = 2.5 V, T_A = –40°C to +85°C

over recommended operating free-air temperature range, V_{CCA} = 2.5 V (see Figure 8)

PARAMETER		TEST CONDITIONS	MIN	MAX	UNIT
t_{pd} Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	80	ns
		V_{CCB} = 0.8 V ± 0.04 V	0.5	40	
		V_{CCB} = 0.9 V ± 0.045 V	0.5	22	
		V_{CCB} = 1.2 V ± 0.1 V	0.5	7	
		V_{CCB} = 1.5 V ± 0.1 V	0.5	5	
		V_{CCB} = 1.8 V ± 0.15 V	0.5	5	
		V_{CCB} = 2.5 V ± 0.2 V	0.5	4	
		V_{CCB} = 3.3 V ± 0.3 V	0.5	4	
	B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	66	
		V_{CCB} = 0.8 V ± 0.04 V	0.5	27	
		V_{CCB} = 0.9 V ± 0.045 V	0.5	15	
		V_{CCB} = 1.2 V ± 0.1 V	0.5	7	
		V_{CCB} = 1.5 V ± 0.1 V	0.5	5	
		V_{CCB} = 1.8 V ± 0.15 V	0.5	5	
		V_{CCB} = 2.5 V ± 0.2 V	0.5	4	
		V_{CCB} = 3.3 V ± 0.3 V	0.5	3	
t_{dis} Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	10	ns
		V_{CCB} = 0.8 V ± 0.04 V	0.5	10	
		V_{CCB} = 0.9 V ± 0.045 V	0.5	10	
		V_{CCB} = 1.2 V ± 0.1 V	0.5	10	
		V_{CCB} = 1.5 V ± 0.1 V	0.5	10	
		V_{CCB} = 1.8 V ± 0.15 V	0.5	10	
		V_{CCB} = 2.5 V ± 0.2 V	0.5	10	
		V_{CCB} = 3.3 V ± 0.3 V	0.5	10	
	Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	136	
		V_{CCB} = 0.8 V ± 0.04 V	0.5	95	
		V_{CCB} = 0.9 V ± 0.045 V	0.5	71	
		V_{CCB} = 1.2 V ± 0.1 V	0.5	21	
		V_{CCB} = 1.5 V ± 0.1 V	0.5	14	
		V_{CCB} = 1.8 V ± 0.15 V	0.5	13	
		V_{CCB} = 2.5 V ± 0.2 V	0.5	10	
		V_{CCB} = 3.3 V ± 0.3 V	0.5	10	

Switching Characteristics: V_{CCA} = 2.5 V, T_A = –40°C to +85°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 2.5 V (see Figure 8)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		254	ns
			V_{CCB} = 0.8 V ± 0.04 V		176	
			V_{CCB} = 0.9 V ± 0.045 V		147	
			V_{CCB} = 1.2 V ± 0.1 V		33	
			V_{CCB} = 1.5 V ± 0.1 V		25	
			V_{CCB} = 1.8 V ± 0.15 V		24	
			V_{CCB} = 2.5 V ± 0.2 V		19	
			V_{CCB} = 3.3 V ± 0.3 V		22	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		99	
			V_{CCB} = 0.8 V ± 0.04 V		55	
			V_{CCB} = 0.9 V ± 0.045 V		41	
			V_{CCB} = 1.2 V ± 0.1 V		22	
			V_{CCB} = 1.5 V ± 0.1 V		24	
			V_{CCB} = 1.8 V ± 0.15 V		20	
			V_{CCB} = 2.5 V ± 0.2 V		23	
			V_{CCB} = 3.3 V ± 0.3 V		19	

6.20 Switching Characteristics: V_{CCA} = 2.5 V, T_A = –40°C to +125°C

over recommended operating free-air temperature range, V_{CCA} = 2.5 V (see Figure 15)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	80	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	40	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	22	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	8	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	6	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	5	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	5	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	4	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	66	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	27	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	15	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	7	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	6	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	5	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	5	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	4	
t_{dis}	Disable time	Port A disable time	V_{CCB} = 0.7 V ± 0.05 V	0.5	13	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	13	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	13	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	13	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	13	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	13	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	13	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	13	
		Port B disable time	V_{CCB} = 0.7 V ± 0.05 V	0.5	136	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	95	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	75	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	27	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	20	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	17	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	13	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	12	

Switching Characteristics: V_{CCA} = 2.5 V, T_A = –40°C to +125°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 2.5 V (see Figure 15)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A enable time	V_{CCB} = 0.7 V ± 0.05 V		278	ns
			V_{CCB} = 0.8 V ± 0.04 V		185	
			V_{CCB} = 0.9 V ± 0.045 V		153	
			V_{CCB} = 1.2 V ± 0.1 V		39	
			V_{CCB} = 1.5 V ± 0.1 V		31	
			V_{CCB} = 1.8 V ± 0.15 V		29	
			V_{CCB} = 2.5 V ± 0.2 V		23	
			V_{CCB} = 3.3 V ± 0.3 V		25	
		Port B enable time	V_{CCB} = 0.7 V ± 0.05 V		98	
			V_{CCB} = 0.8 V ± 0.04 V		58	
			V_{CCB} = 0.9 V ± 0.045 V		40	
			V_{CCB} = 1.2 V ± 0.1 V		26	
			V_{CCB} = 1.5 V ± 0.1 V		24	
			V_{CCB} = 1.8 V ± 0.15 V		23	
			V_{CCB} = 2.5 V ± 0.2 V		23	
			V_{CCB} = 3.3 V ± 0.3 V		22	

6.21 Switching Characteristics: V_{CCA} = 3.3 V ± 0.3 V, T_A = –40°C to +85°C

over recommended operating free-air temperature range, V_{CCA} = 3.3 V ± 0.3 V (see Figure 7)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	79	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	39	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	22	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	7	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	4	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	4	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	3	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	3	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	144	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	36	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	18	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	7	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	5	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	4	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	4	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	3	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	9	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	9	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	9	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	9	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	9	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	9	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	9	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	9	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	136	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	95	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	71	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	21	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	14	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	12	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	10	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	10	

Switching Characteristics: V_{CCA} = 3.3 V ± 0.3 V, T_A = –40°C to +85°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 3.3 V ± 0.3 V (see Figure 7)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		331	ns
			V_{CCB} = 0.8 V ± 0.04 V		185	
			V_{CCB} = 0.9 V ± 0.045 V		149	
			V_{CCB} = 1.2 V ± 0.1 V		33	
			V_{CCB} = 1.5 V ± 0.1 V		25	
			V_{CCB} = 1.8 V ± 0.15 V		23	
			V_{CCB} = 2.5 V ± 0.2 V		19	
			V_{CCB} = 3.3 V ± 0.3 V		22	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		98	
			V_{CCB} = 0.8 V ± 0.04 V		58	
			V_{CCB} = 0.9 V ± 0.045 V		41	
			V_{CCB} = 1.2 V ± 0.1 V		26	
			V_{CCB} = 1.5 V ± 0.1 V		23	
			V_{CCB} = 1.8 V ± 0.15 V		23	
			V_{CCB} = 2.5 V ± 0.2 V		22	
			V_{CCB} = 3.3 V ± 0.3 V		22	

6.22 Switching Characteristics: V_{CCA} = 3.3 V ± 0.3 V, T_A = –40°C to +125°C

over recommended operating free-air temperature range, V_{CCA} = 3.3 V ± 0.3 V (see Figure 16)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{pd}	Propagation delay	A-to-B	V_{CCB} = 0.7 V ± 0.05 V	0.5	79	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	39	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	22	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	7	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	5	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	4	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	4	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	4	
		B-to-A	V_{CCB} = 0.7 V ± 0.05 V	0.5	144	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	36	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	18	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	8	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	6	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	5	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	4	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	4	
t_{dis}	Disable time	Port A	V_{CCB} = 0.7 V ± 0.05 V	0.5	12	ns
			V_{CCB} = 0.8 V ± 0.04 V	0.5	12	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	12	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	12	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	12	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	12	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	12	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	12	
		Port B	V_{CCB} = 0.7 V ± 0.05 V	0.5	136	
			V_{CCB} = 0.8 V ± 0.04 V	0.5	95	
			V_{CCB} = 0.9 V ± 0.045 V	0.5	75	
			V_{CCB} = 1.2 V ± 0.1 V	0.5	27	
			V_{CCB} = 1.5 V ± 0.1 V	0.5	19	
			V_{CCB} = 1.8 V ± 0.15 V	0.5	17	
			V_{CCB} = 2.5 V ± 0.2 V	0.5	13	
			V_{CCB} = 3.3 V ± 0.3 V	0.5	12	

Switching Characteristics: V_{CCA} = 3.3 V ± 0.3 V, T_A = –40°C to +125°C (continued)

over recommended operating free-air temperature range, V_{CCA} = 3.3 V ± 0.3 V (see Figure 16)

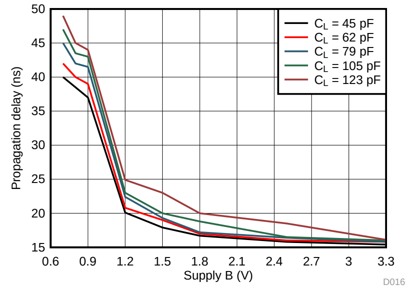
PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{en}	Enable time	Port A	V_{CCB} = 0.7 V ± 0.05 V		356	ns
			V_{CCB} = 0.8 V ± 0.04 V		93	
			V_{CCB} = 0.9 V ± 0.045 V		156	
			V_{CCB} = 1.2 V ± 0.1 V		40	
			V_{CCB} = 1.5 V ± 0.1 V		31	
			V_{CCB} = 1.8 V ± 0.15 V		29	
			V_{CCB} = 2.5 V ± 0.2 V		22	
			V_{CCB} = 3.3 V ± 0.3 V		24	
		Port B	V_{CCB} = 0.7 V ± 0.05 V		99	
			V_{CCB} = 0.8 V ± 0.04 V		59	
			V_{CCB} = 0.9 V ± 0.045 V		42	
			V_{CCB} = 1.2 V ± 0.1 V		27	
			V_{CCB} = 1.5 V ± 0.1 V		25	
			V_{CCB} = 1.8 V ± 0.15 V		24	
			V_{CCB} = 2.5 V ± 0.2 V		24	
			V_{CCB} = 3.3 V ± 0.3 V		24	

6.23 Operating Characteristics

T_A = 25°C

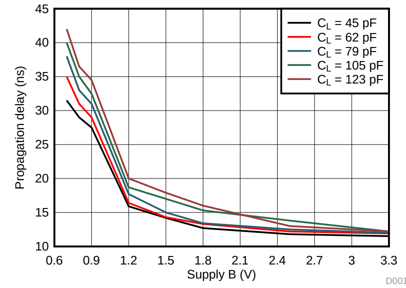
PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
C_{pdA}	Power dissipation capacitance per transceiver	C_L = 0 pF, f = 1 MHz, t_r = t_f = 1 ns	A-port input, B-port output	V_{CCA} = V_{CCB} = 0.7 V		1.3		pF
				V_{CCA} = V_{CCB} = 0.8 V		1.3		
				V_{CCA} = V_{CCB} = 0.9 V		1.3		
				V_{CCA} = V_{CCB} = 1.2 V		1.3		
				V_{CCA} = V_{CCB} = 1.5 V		1.3		
				V_{CCA} = V_{CCB} = 1.8 V		1.4		
				V_{CCA} = V_{CCB} = 2.5 V		1.7		
				V_{CCA} = V_{CCB} = 3.3 V		2.1		
			B-port input, A-port output	V_{CCA} = V_{CCB} = 0.7 V		9.2		
				V_{CCA} = V_{CCB} = 0.8 V		9.4		
				V_{CCA} = V_{CCB} = 0.9 V		9.4		
				V_{CCA} = V_{CCB} = 1.2 V		9.8		
				V_{CCA} = V_{CCB} = 1.5 V		10.1		
				V_{CCA} = V_{CCB} = 1.8 V		11.0		
				V_{CCA} = V_{CCB} = 2.5 V		14.4		
				V_{CCA} = V_{CCB} = 3.3 V		18.6		
C_{pdB}	Power dissipation capacitance per transceiver	C_L = 0 pF, f = 1 MHz, t_r = t_f = 1 ns	A-port input, B-port output	V_{CCA} = V_{CCB} = 0.7 V		9.2		pF
				V_{CCA} = V_{CCB} = 0.8 V		9.3		
				V_{CCA} = V_{CCB} = 0.9 V		9.4		
				V_{CCA} = V_{CCB} = 1.2 V		9.7		
				V_{CCA} = V_{CCB} = 1.5 V		10.1		
				V_{CCA} = V_{CCB} = 1.8 V		11.0		
				V_{CCA} = V_{CCB} = 2.5 V		14.4		
				V_{CCA} = V_{CCB} = 3.3 V		18.3		
			B-port input, A-port output	V_{CCA} = V_{CCB} = 0.7 V		1.3		
				V_{CCA} = V_{CCB} = 0.8 V		1.3		
				V_{CCA} = V_{CCB} = 0.9 V		1.3		
				V_{CCA} = V_{CCB} = 1.2 V		1.3		
				V_{CCA} = V_{CCB} = 1.5 V		1.3		
				V_{CCA} = V_{CCB} = 1.8 V		1.4		
				V_{CCA} = V_{CCB} = 2.5 V		1.7		
				V_{CCA} = V_{CCB} = 3.3 V		2.1		

6.24 Typical Characteristics



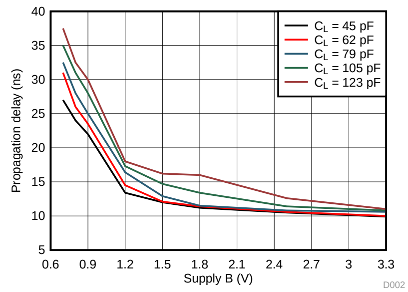
T_A = 25°C V_{CCA} = 0.7 V

Figure 1. Typical Propagation Delay of Low-to-High (A to B) vs Load Capacitance



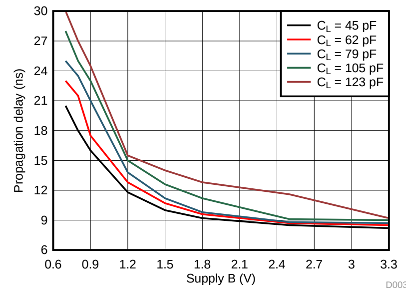
T_A = 25°C V_{CCA} = 0.8 V

Figure 2. Typical Propagation Delay of Low-to-High (A to B) vs Load Capacitance



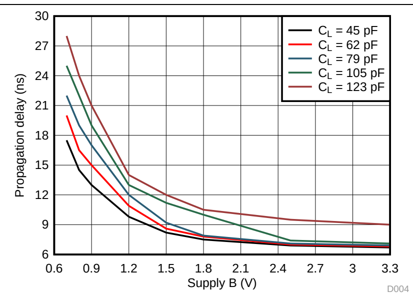
T_A = 25°C V_{CCA} = 0.9 V

Figure 3. Typical Propagation Delay of Low-to-High (A to B) vs Load Capacitance



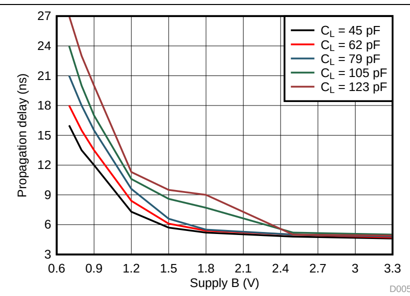
T_A = 25°C V_{CCA} = 1.2 V

Figure 4. Typical Propagation Delay of Low-to-High (A to B) vs Load Capacitance



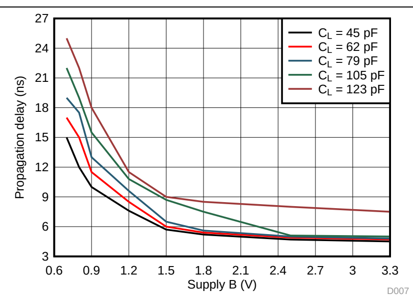
T_A = 25°C V_{CCA} = 1.5 V

Figure 5. Typical Propagation Delay of Low-to-High (A to B) vs Load Capacitance



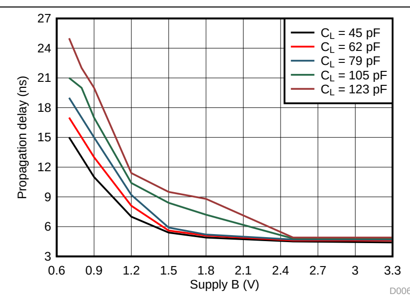
T_A = 25°C V_{CCA} = 1.8 V

Figure 6. Typical Propagation Delay of Low-to-High (A to B) vs Load Capacitance



T_A = 25°C V_{CCA} = 3.3 V

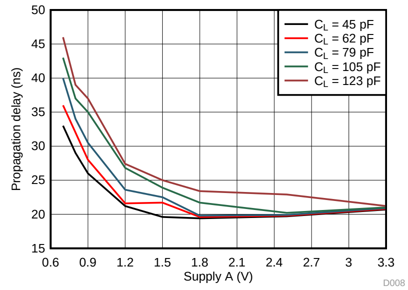
Figure 7. Typical Propagation Delay of Low-to-High (A to B) vs Load Capacitance



T_A = 25°C V_{CCA} = 2.5 V

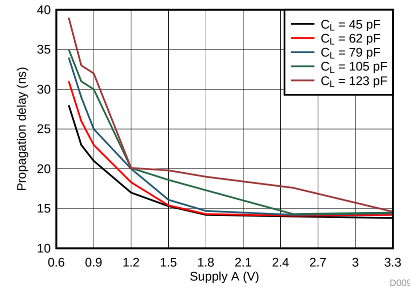
Figure 8. Typical Propagation Delay of Low-to-High (A to B) vs Load Capacitance

Typical Characteristics (continued)



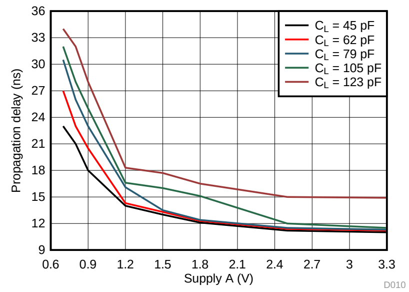
T_A = 25°C V_{CCA} = 0.7 V

Figure 9. Typical Propagation Delay of Low-to-High (B to A) vs Load Capacitance



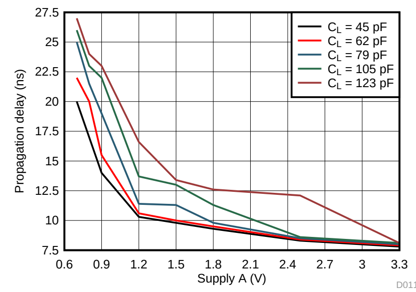
T_A = 25°C V_{CCA} = 0.8 V

Figure 10. Typical Propagation Delay of Low-to-High (B to A) vs Load Capacitance



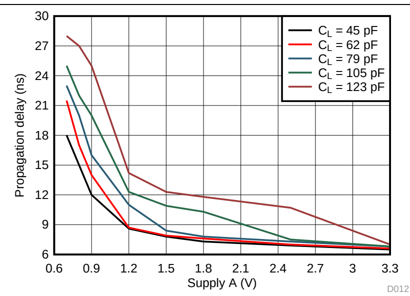
T_A = 25°C V_{CCA} = 0.9 V

Figure 11. Typical Propagation Delay of Low-to-High (B to A) vs Load Capacitance



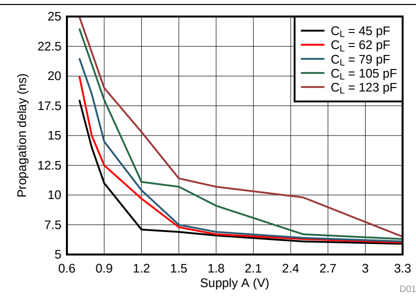
T_A = 25°C V_{CCA} = 1.2 V

Figure 12. Typical Propagation Delay of Low-to-High (B to A) vs Load Capacitance



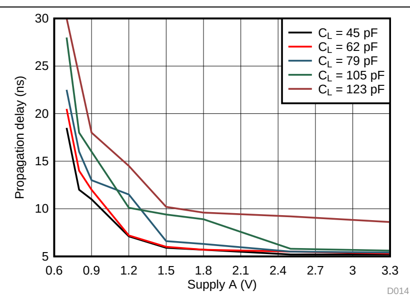
T_A = 25°C V_{CCA} = 1.5 V

Figure 13. Typical Propagation Delay of Low-to-High (B to A) vs Load Capacitance



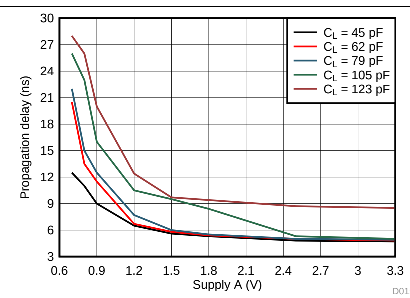
T_A = 25°C V_{CCA} = 1.8 V

Figure 14. Typical Propagation Delay of Low-to-High (B to A) vs Load Capacitance



T_A = 25°C V_{CCA} = 2.5 V

Figure 15. Typical Propagation Delay of Low-to-High (B to A) vs Load Capacitance



T_A = 25°C V_{CCA} = 3.3 V

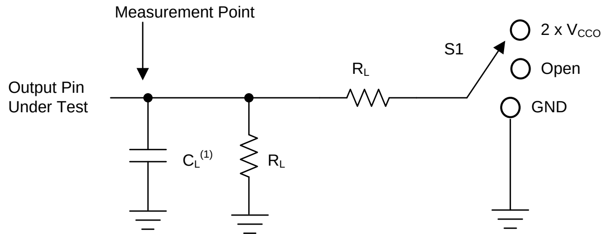
Figure 16. Typical Propagation Delay of Low-to-High (B to A) vs Load Capacitance

7 Parameter Measurement Information

7.1 Load Circuit and Voltage Waveforms

Unless otherwise noted, all input pulses are supplied by generators having the following characteristics:

- f = 1 MHz
- Z_O = 50 Ω
- dv/dt ≤ 1 ns/V

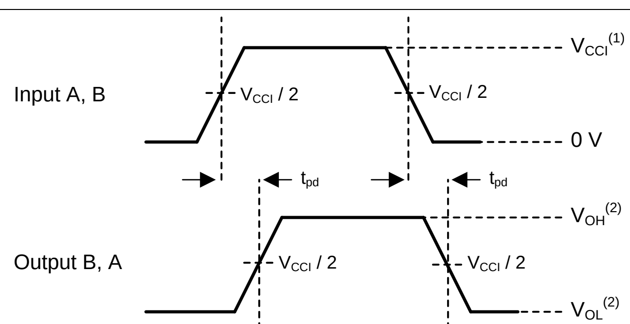


(1) C_L includes probe and jig capacitance.

Figure 17. Load Circuit

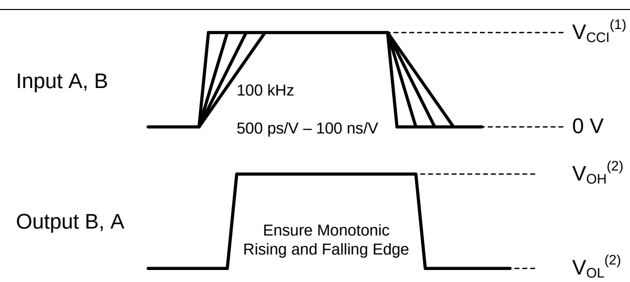
Table 1. Load Circuit Conditions

Parameter		V_{CCO}	R_L	C_L	S_1	V_{TP}
Δt/Δv	Input transition rise or fall rate	0.65 V – 3.6 V	1 MΩ	15 pF	Open	N/A
t_{pd}	Propagation (delay) time	1.1 V – 3.6 V	2 kΩ	15 pF	Open	N/A
		0.65 V – 0.95 V	20 kΩ	15 pF	Open	N/A
t_{en}, t_{dis}	Enable time, disable time	3 V – 3.6 V	2 kΩ	15 pF	2 × V_{CCO}	0.3 V
		1.65 V – 2.7 V	2 kΩ	15 pF	2 × V_{CCO}	0.15 V
		1.1 V – 1.6 V	2 kΩ	15 pF	2 × V_{CCO}	0.1 V
		0.65 V – 0.95 V	20 kΩ	15 pF	2 × V_{CCO}	0.1 V
t_{en}, t_{dis}	Enable time, disable time	3 V – 3.6 V	2 kΩ	15 pF	GND	0.3 V
		1.65 V – 2.7 V	2 kΩ	15 pF	GND	0.15 V
		1.1 V – 1.6 V	2 kΩ	15 pF	GND	0.1 V
		0.65 V – 0.95 V	20 kΩ	15 pF	GND	0.1 V



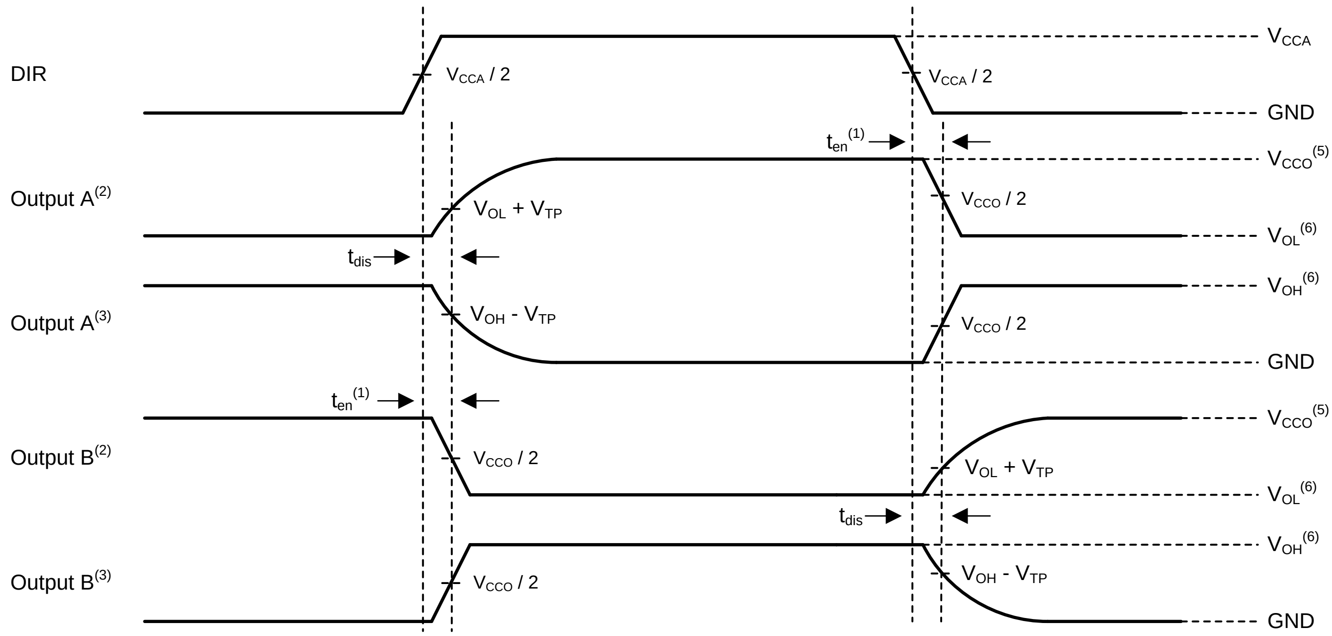
1. V_{CCI} is the supply pin associated with the input port.
2. V_{OH} and V_{OL} are typical output voltage levels that occur with specified R_L, C_L, and S_1

Figure 18. Propagation Delay



1. V_{CCI} is the supply pin associated with the input port.
2. V_{OH} and V_{OL} are typical output voltage levels that occur with specified R_L, C_L, and S_1

Figure 19. Input Transition Rise or Fall Rate



1. Illustrative purposes only. Enable Time is a calculation as described in the data sheet.
2. Output waveform on the condition that input is driven to a valid Logic Low.
3. Output waveform on the condition that input is driven to a valid Logic High.
4. V_{CCI} is the supply pin associated with the input port
5. V_{CCO} is the supply pin associated with the output port.
6. V_{OH} and V_{OL} are typical output voltage levels that occur with specified R_L, C_L, and S_1

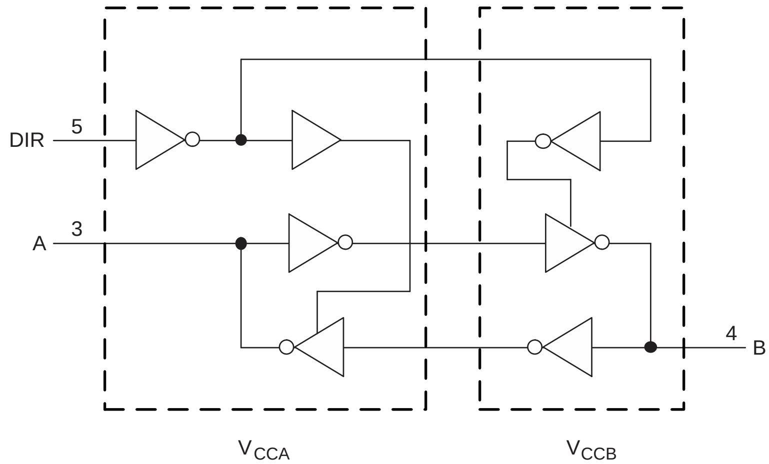
Figure 20. Disable and Enable Time

8 Detailed Description

8.1 Overview

The SN74AXC1T45 is single-bit, dual-supply, noninverting voltage level translation. Pin A and the direction control pin are support by V_{CCA} and pin B is support by V_{CCB}. The A port can accept I/O voltages ranging from 0.65 V to 3.6 V, and the B port can accept I/O voltages from 0.65 V to 3.6 V. A high logic on the DIR pin allows data transmission from A to B and a logic low on the DIR pin allows data transmission from B to A.

8.2 Functional Block Diagram



8.3 Feature Description

8.3.1 Fully Configurable Dual-Rail Design Allows Each Port to Operate Over the Full 0.65-V to 3.6-V Power-Supply Range

Both the V_{CCA} and V_{CCB} pins can be supplied at any voltage from 0.65 V to 3.6 V, making the device suitable for translating between any of the voltage nodes (0.7 V, 0.8 V, 0.9 V, 1.2 V, 1.8 V, 2.5 V and 3.3 V).

8.3.2 Support High-Speed Translation

The SN74AXC1T45 device can support high data-rate applications. The translated signal data rate can be up to 500 Mbps when signal is translated from 1.8 V to 3.3 V.

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

The I_{off} circuit prevents backflow current by disabling the I/O output circuits when the device is in partial-power-down mode.

8.4 Device Functional Modes

Table 2 lists the device functions for the DIR input.

Table 2. Function Table

INPUT(1) DIR	OPERATION
L	B data to A bus
H	A data to B bus

(1) Input circuits of the data I/Os always are active.

9 Application and Implementation

NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

The SN74AXC1T45 device can be used in level-translation applications for interfacing devices or systems with one another when they are operating at different interface voltages. The maximum data rate can be up to 500 Mbps when the device translate signal is from 1.8 V to 3.3 V.

9.1.1 Enable Times

Calculate the enable times for the SN74AXC1T45 using the following formulas:

t_{PZH} (DIR to A) = t_{PLZ} (DIR to B) + t_{PLH} (B to A) (1)

t_{PZL} (DIR to A) = t_{PHZ} (DIR to B) + t_{PHL} (B to A) (2)

t_{PZH} (DIR to B) = t_{PLZ} (DIR to A) + t_{PLH} (A to B) (3)

t_{PZL} (DIR to B) = t_{PHZ} (DIR to A) + t_{PHL} (A to B) (4)

In a bidirectional application, these enable times provide the maximum delay time from the time the DIR bit is switched until an output is expected. For example, if the SN74AXC1T45 initially is transmitting from A to B, then 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.

9.2 Typical Applications

9.2.1 Unidirectional Logic Level-Shifting Application

Figure 21 shows an example of the SN74AXC1T45 being used in a unidirectional logic level-shifting application.

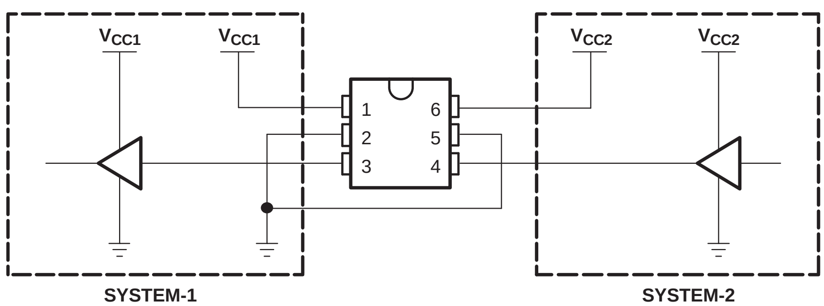


Figure 21. Unidirectional Logic Level-Shifting Application

Table 3. Unidirectional Level Shifting Function

PIN	NAME	FUNCTION	DESCRIPTION
1	V_{CCA}	V_{CC1}	SYSTEM-1 supply voltage (0.65 V to 3.6 V)
2	GND	GND	Device GND
3	A	OUT	Output level depends on V_{CC1} voltage.
4	B	IN	Input threshold value depends on V_{CC2} voltage.
5	DIR	DIR	GND (low level) determines B-port to A-port direction.
6	V_{CCB}	V_{CC2}	SYSTEM-2 supply voltage (0.65 V to 3.6 V)

9.2.1.1 Design Requirements

For this design example, use the parameters listed in Table 4.

Table 4. Design Parameters

DESIGN PARAMETERS	EXAMPLE VALUES
Input voltage range	0.65 V to 3.6 V
Output voltage range	0.65 V to 3.6 V

9.2.1.2 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 SN74AXC1T45 device to determine the input voltage range. For a valid logic-high, the value must exceed the high-level input voltage (V_{IH}) of the input port. For a valid logic low the value must be less than the low-level input voltage (V_{IL}) of the input port.
- Output voltage range
  – Use the supply voltage of the device that the SN74AXC1T45 device is driving to determine the output voltage range.

9.2.1.3 Application Curve

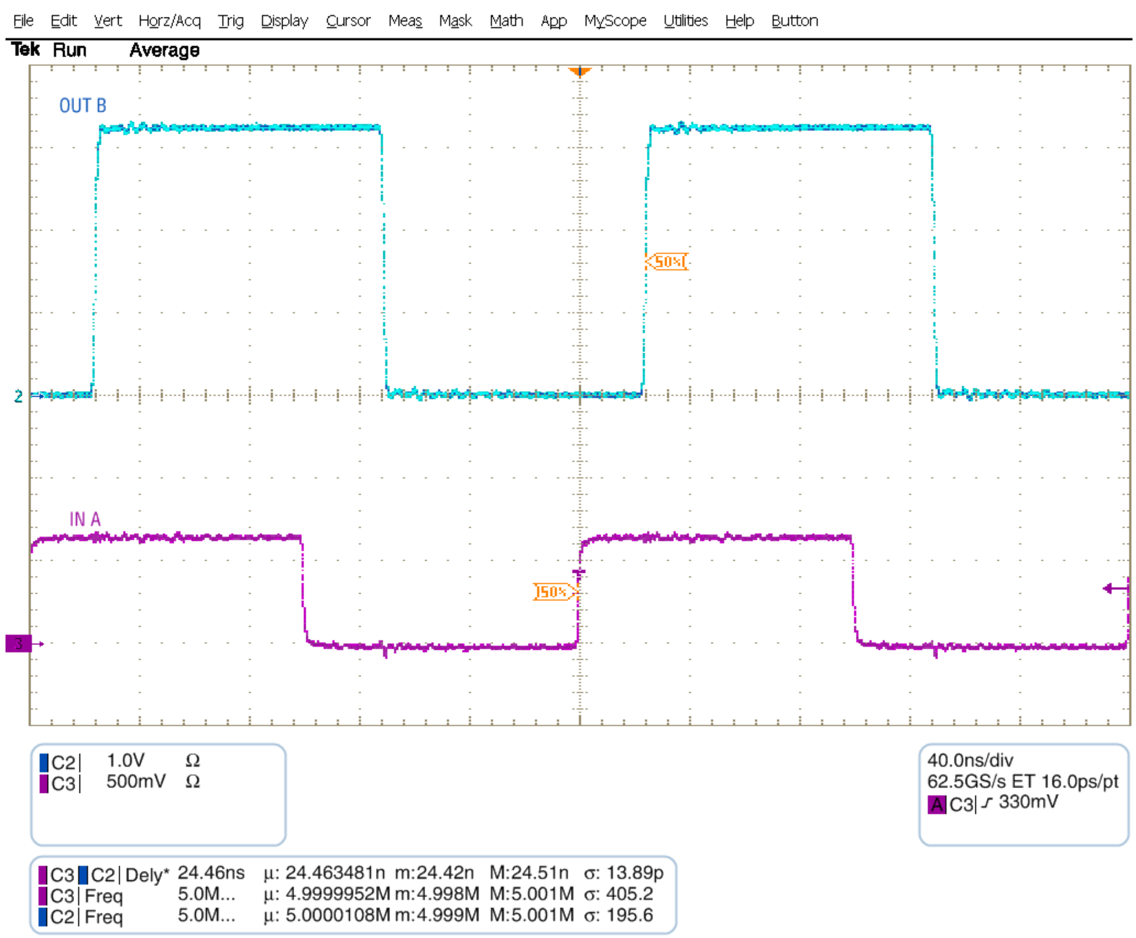


Figure 22. Up Translation at 2.5 MHz (0.7 V to 3.3 V)

9.2.2 Bidirectional Logic Level-Shifting Application

Figure 23 shows the SN74AXC1T45 being used in a bidirectional logic level-shifting application. Because the SN74AXC1T45 does not have an output-enable (OE) pin, the system designer should take precautions to avoid bus contention between SYSTEM-1 and SYSTEM-2 when changing directions.

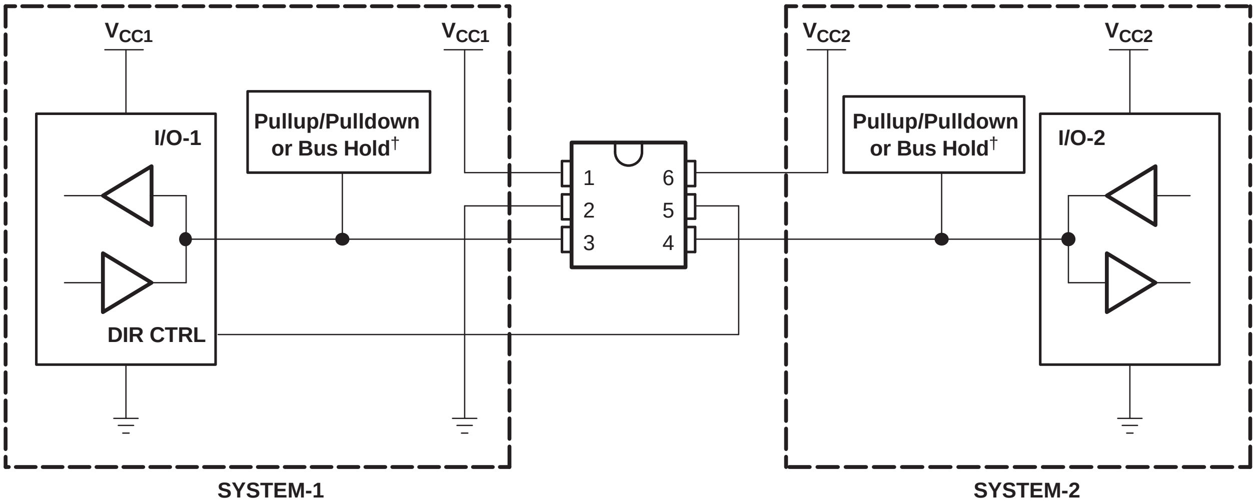


Figure 23. Bidirectional Logic Level-Shifting Application

Table 5 lists the data transmission from SYSTEM-1 to SYSTEM-2 and then from SYSTEM-2 to SYSTEM-1.

Table 5. Data Transmission: SYSTEM-1 and SYSTEM-2

STATE	DIR CTRL	I/O-1	I/O-2	DESCRIPTION
1	H	Out	In	SYSTEM-1 data to SYSTEM-2
2	H	Hi-Z	Hi-Z	SYSTEM-2 is getting ready to send data to SYSTEM-1. I/O-1 and I/O-2 are disabled. The bus-line state depends on pullup or pulldown resistors.(1)
3	L	Hi-Z	Hi-Z	DIR bit is flipped. I/O-1 and I/O-2 still are disabled. The bus-line state depends on pullup or pulldown resistors.(1)
4	L	In	Out	SYSTEM-2 data to SYSTEM-1

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

9.2.2.1 Design Requirements

Refer to *Design Requirements*.

9.2.2.2 Detailed Design Procedure

Refer to *Detailed Design Procedure*.

9.2.2.3 Application Curve

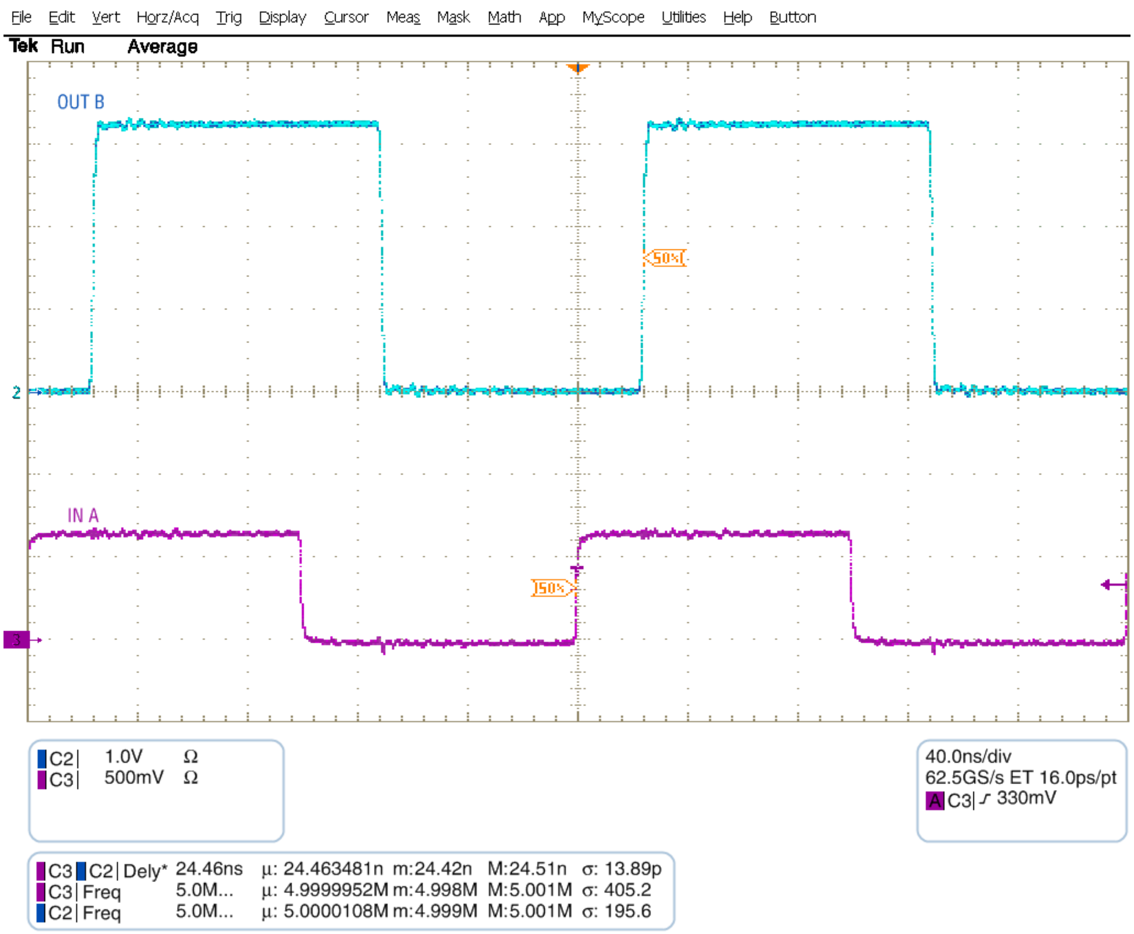


Figure 24. Up Translation at 2.5 MHz (0.7 V to 3.3 V)

10 Power Supply Recommendations

The SN74AXC1T45 device uses two separate configurable power-supply rails, V_{CCA} and V_{CCB}. The V_{CCA} power-supply rail accepts any supply voltage from 0.65 V to 3.6 V and the V_{CCB} power-supply rail accepts any supply voltage from 0.65 V to 3.6 V. The A port and B port are designed to track the V_{CCA} and V_{CCB} supplies respectively allowing for low-voltage, bidirectional translation between any of the 0.7-V, 0.8-V, 0.9-V, 1.2-V, 1.5 -V, 1.8-V, 2.5-V, and 3.3-V voltage nodes.

10.1 Power-Up Considerations

A proper power-up sequence must 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 the ground before any supply voltage is applied.
2. Power up the V_{CCA} and V_{CCB} supplies. The V_{CCA} and V_{CCB} supplies can be ramped in any order.

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.
- Placing 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

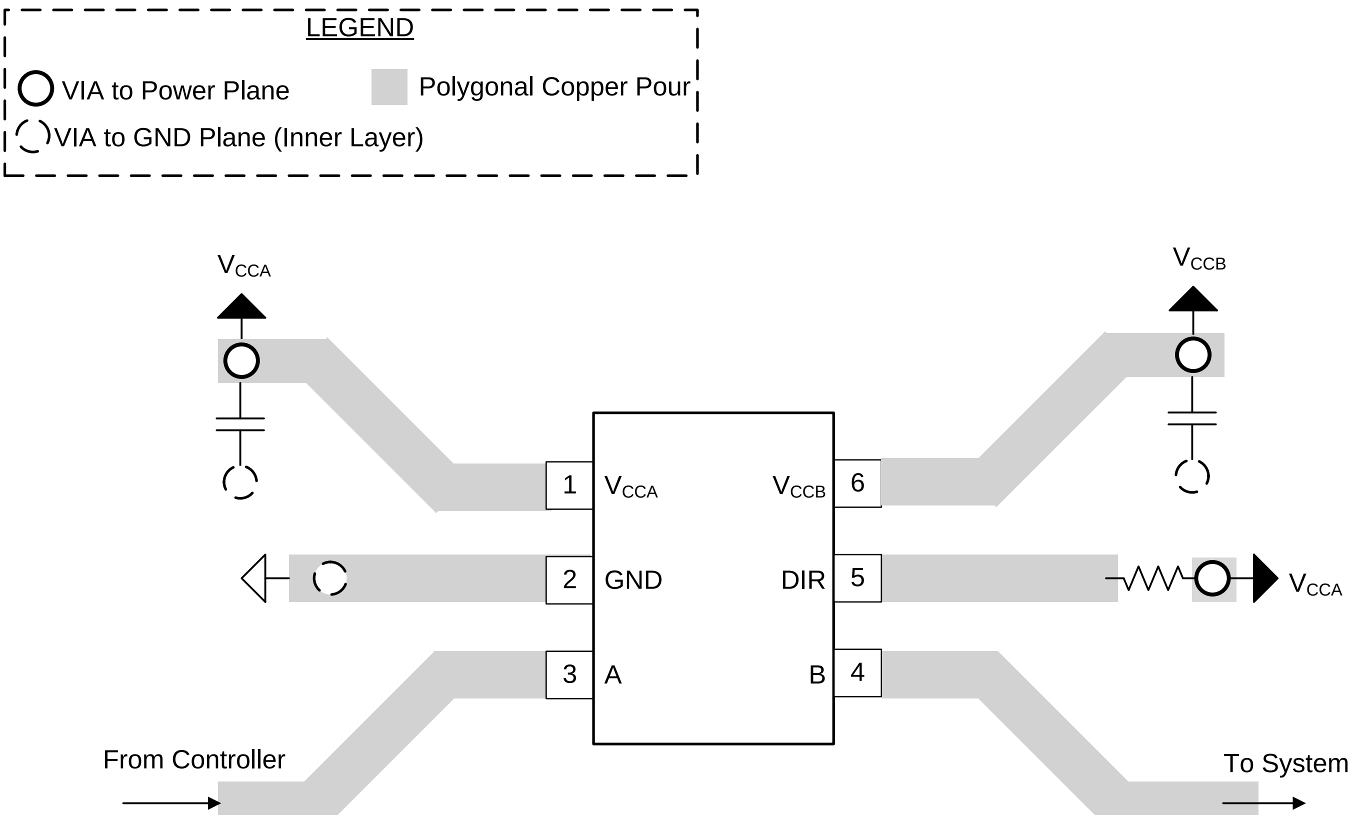


Figure 25. PCB Layout Example

12 Device and Documentation Support

12.1 Documentation Support

12.1.1 Related Documentation

For related documentation see the following:

- Texas Instruments, *Evaluate SN74AXC1T45DRL Using a Generic EVM* application report
- Texas Instruments, *Implications of Slow or Floating CMOS Inputs* application report
- Texas Instruments, *Power Sequencing for the AXC Family of Devices* application report

12.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* 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 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™ Online Community ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

12.4 Trademarks

E2E is a trademark of Texas Instruments.

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

SLYZ022 — *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/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
PSN74AXC1T45DTQR	ACTIVE	X2SON	DTQ	6	3000	TBD	Call TI	Call TI	-40 to 125		Samples
SN74AXC1T45DBVR	ACTIVE	SOT-23	DBV	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	1GRL	Samples
SN74AXC1T45DCKR	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	1A3	Samples
SN74AXC1T45DEAR	ACTIVE	X2SON	DEA	6	5000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	CR	Samples
SN74AXC1T45DRLR	ACTIVE	SOT-5X3	DRL	6	4000	Green (RoHS & no Sb/Br)	CU NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	1A1	Samples
SN74AXC1T45DTQR	ACTIVE	X2SON	DTQ	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	CW	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/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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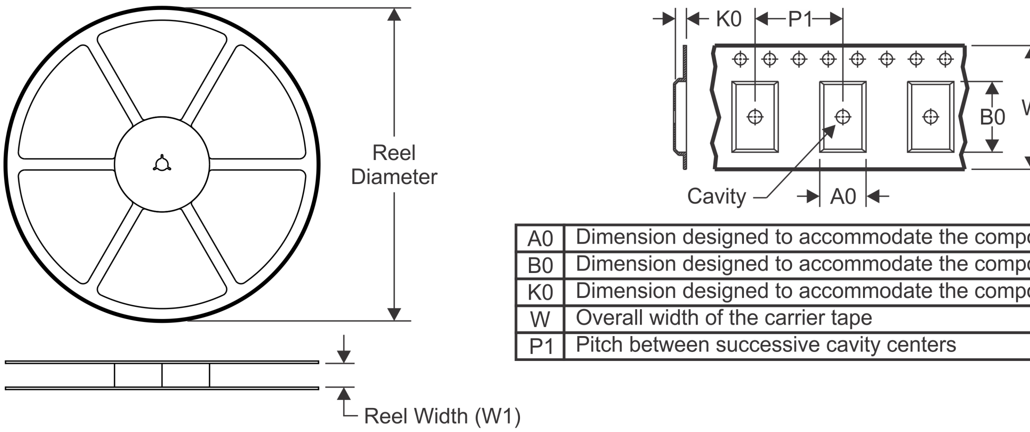
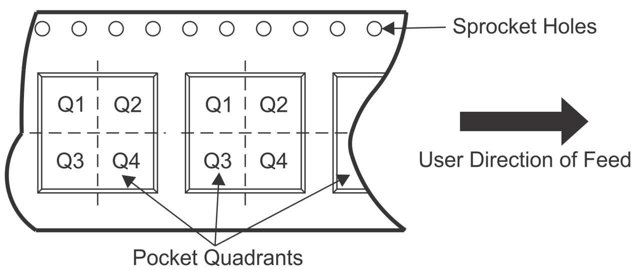
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION



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

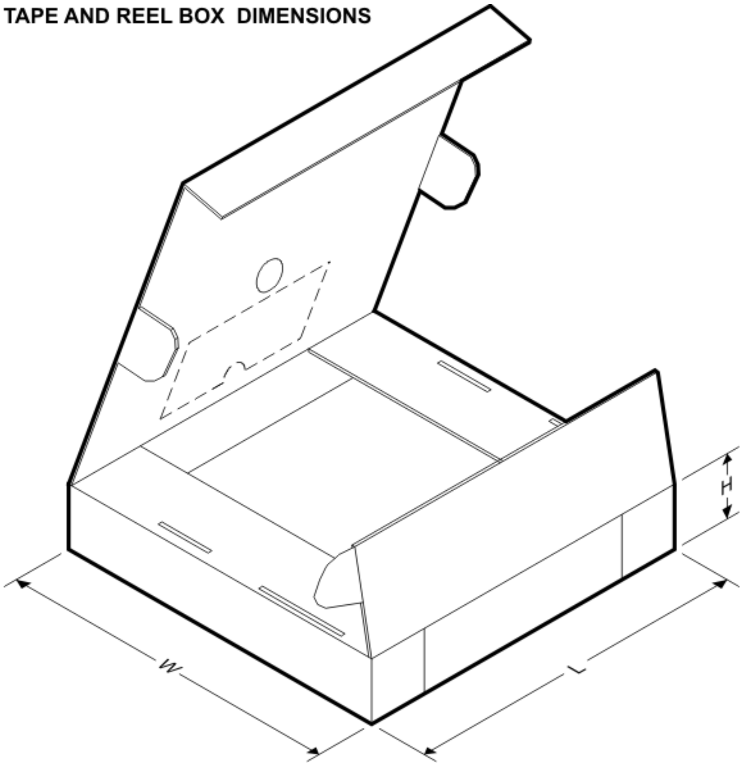
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74AXC1T45DBVR	SOT-23	DBV	6	3000	180.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
SN74AXC1T45DCKR	SC70	DCK	6	3000	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3
SN74AXC1T45DEAR	X2SON	DEA	6	5000	180.0	9.5	1.13	1.13	0.5	4.0	8.0	Q3
SN74AXC1T45DRLR	SOT-5X3	DRL	6	4000	180.0	8.4	1.98	1.78	0.69	4.0	8.0	Q3
SN74AXC1T45DTQR	X2SON	DTQ	6	3000	180.0	9.5	0.94	1.13	0.5	2.0	8.0	Q2

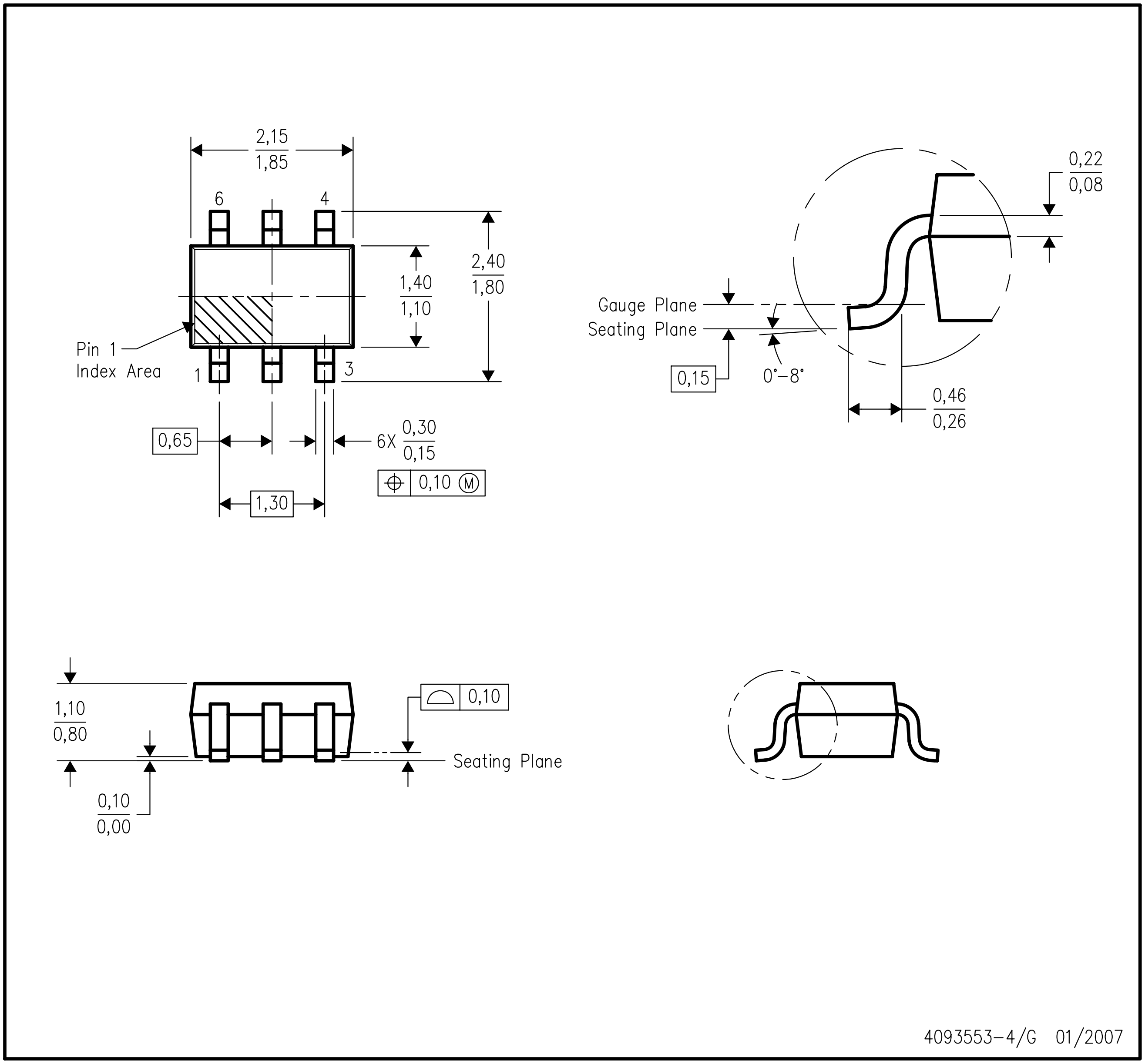
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AXC1T45DBVR	SOT-23	DBV	6	3000	210.0	185.0	35.0
SN74AXC1T45DCKR	SC70	DCK	6	3000	180.0	180.0	18.0
SN74AXC1T45DEAR	X2SON	DEA	6	5000	189.0	185.0	36.0
SN74AXC1T45DRLR	SOT-5X3	DRL	6	4000	183.0	183.0	20.0
SN74AXC1T45DTQR	X2SON	DTQ	6	3000	189.0	185.0	36.0

DCK (R–PDSO–G6) PLASTIC SMALL–OUTLINE PACKAGE



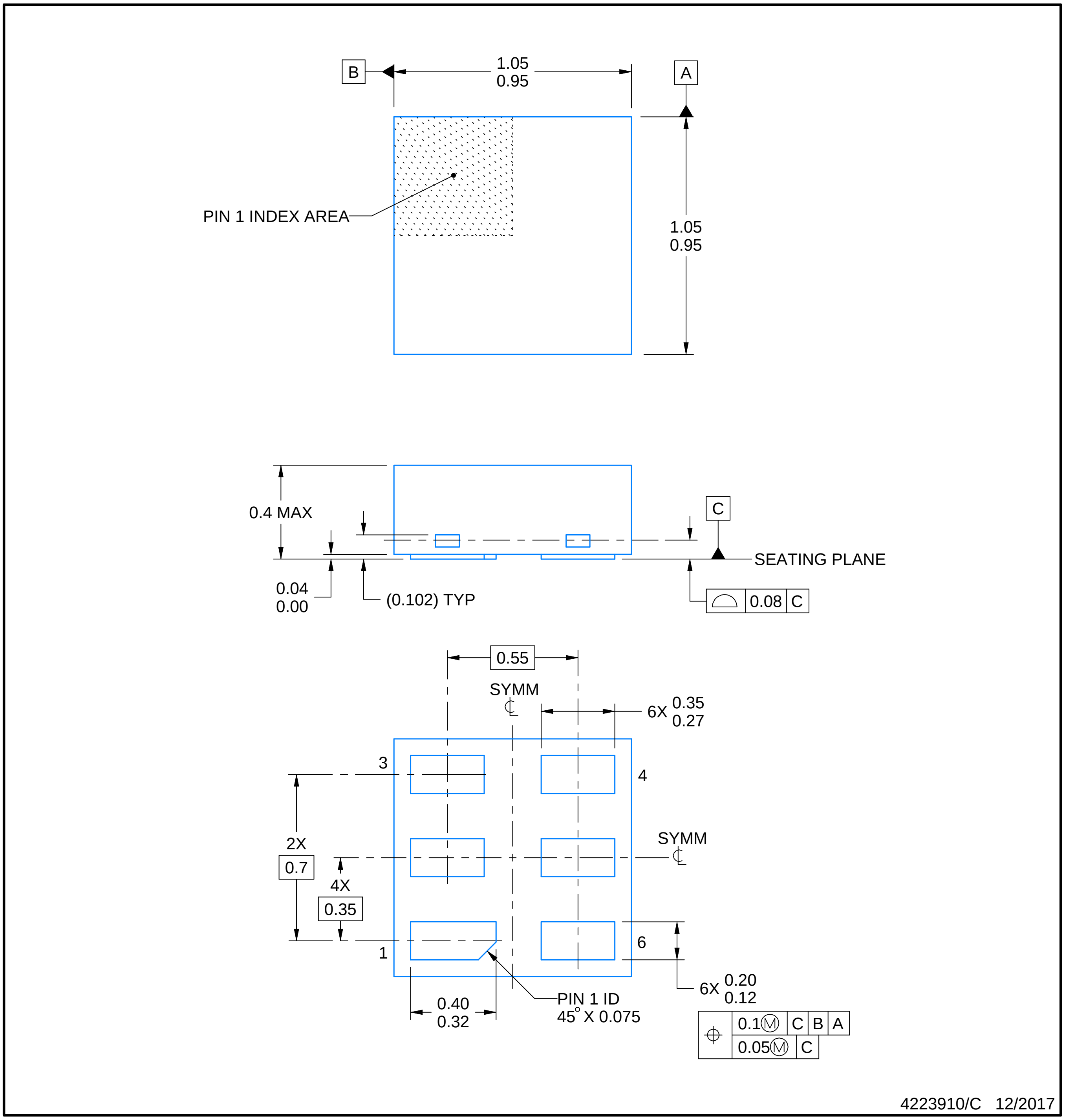
NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
D. Falls within JEDEC MO–203 variation AB.

DEA0006A

PACKAGE OUTLINE

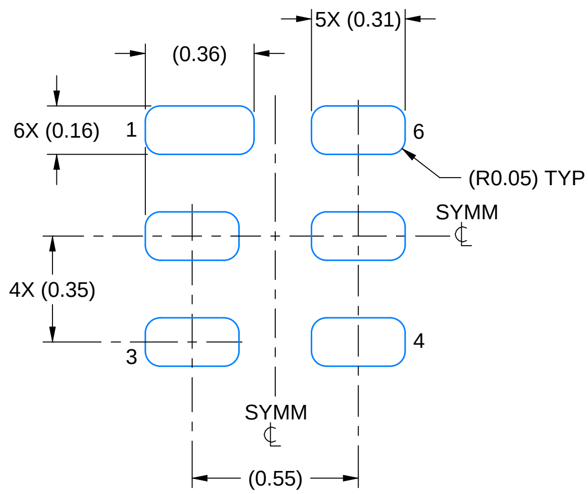
X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD

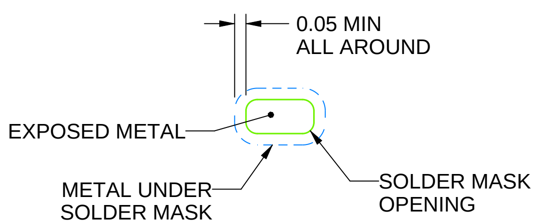


NOTES:

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
EXPOSED METAL SHOWN
SCALE:40X



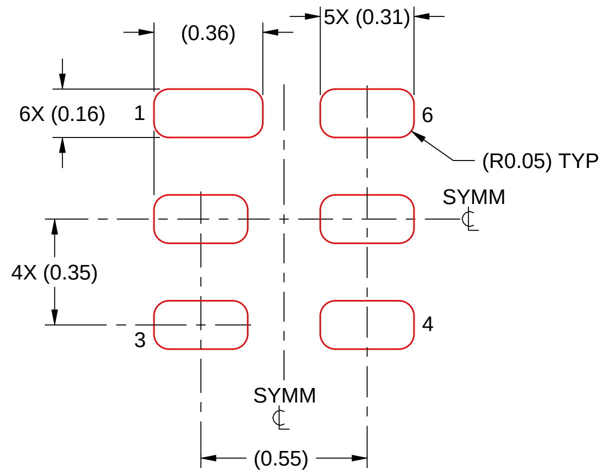
SOLDER MASK
DEFINED

SOLDER MASK DETAILS

4223910/C 12/2017

NOTES: (continued)

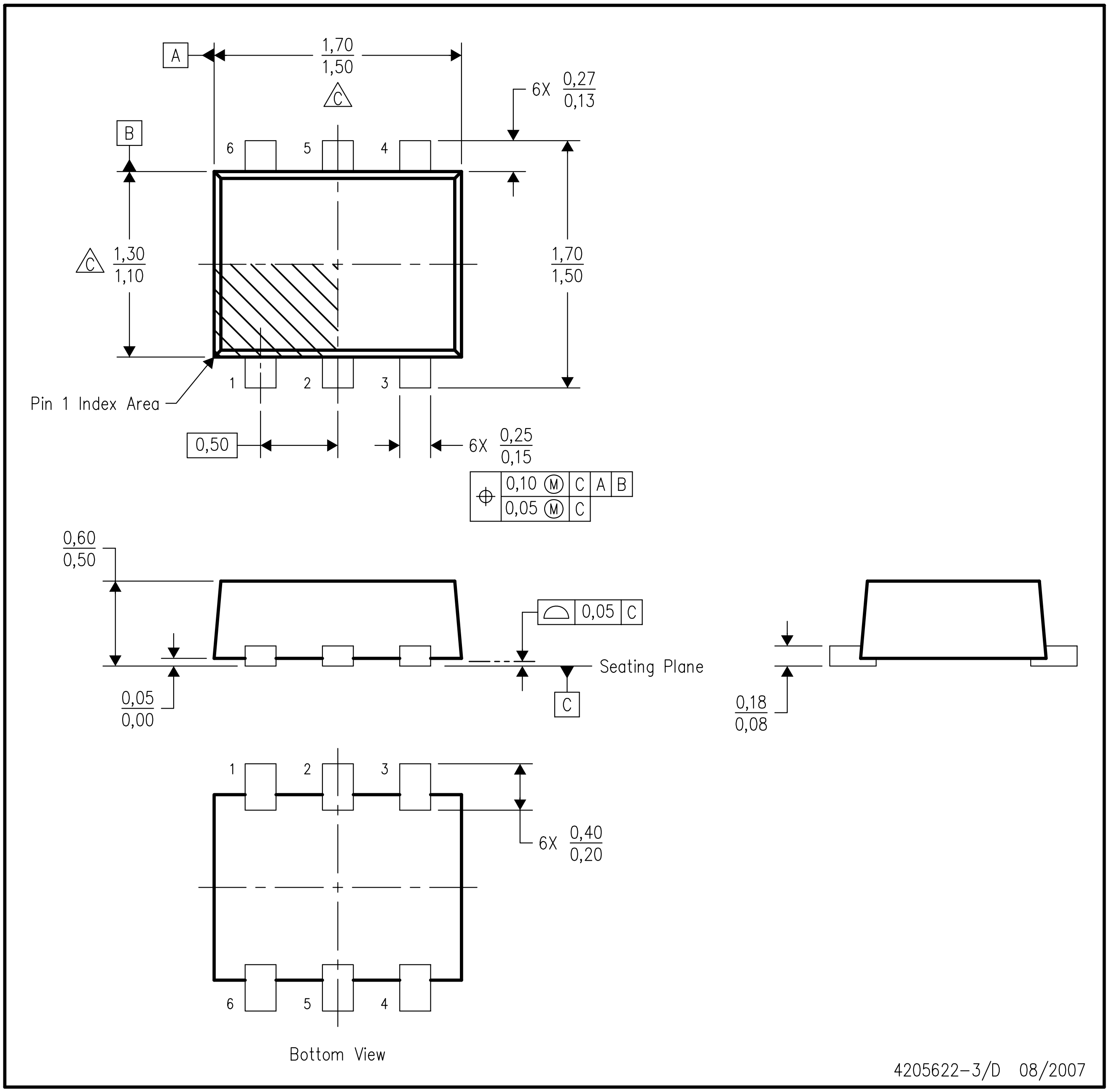
3. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).



SOLDER PASTE EXAMPLE
BASED ON 0.075 mm THICK STENCIL
SCALE:40X

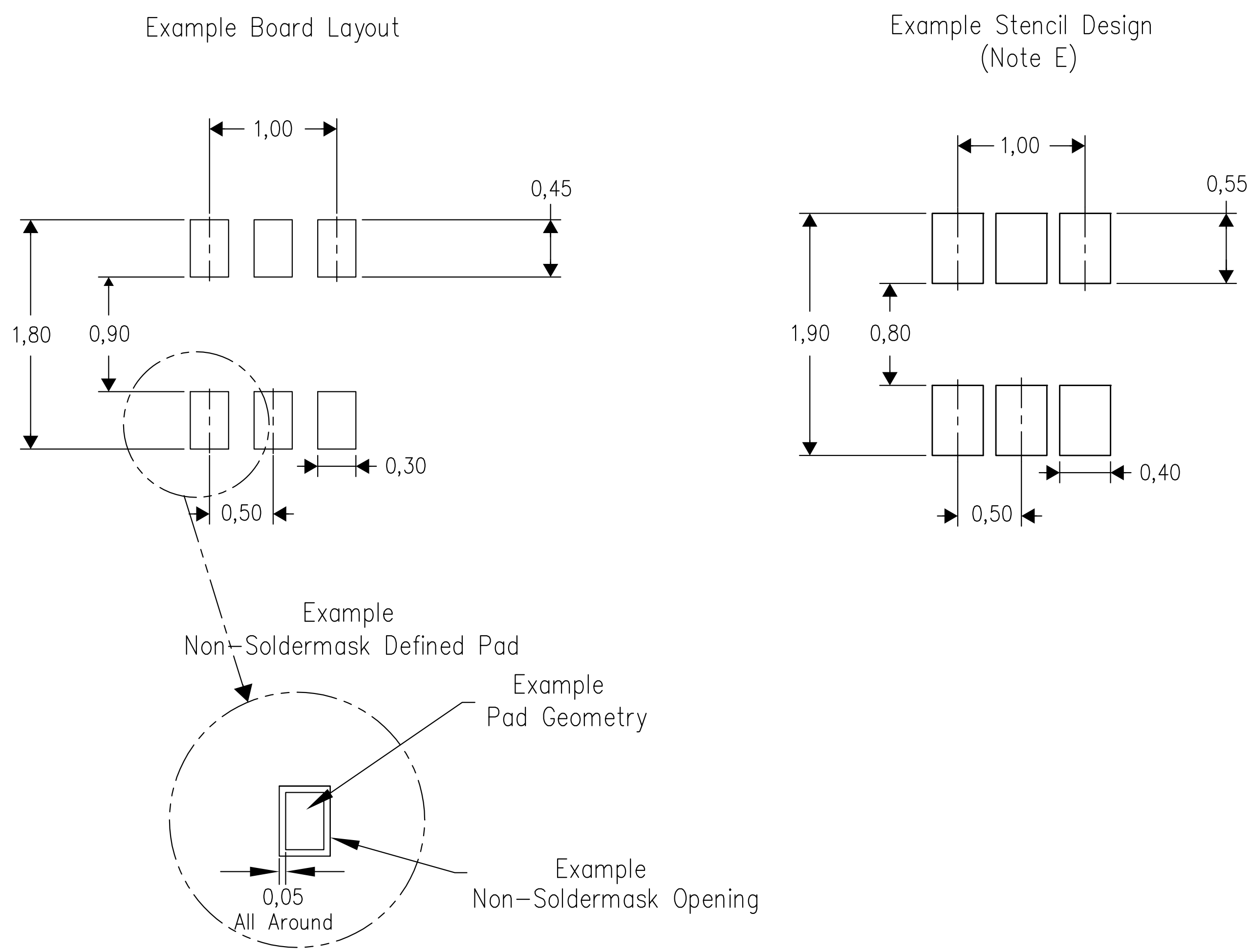
4223910/C 12/2017

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.



NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash, interlead flash, protrusions, or gate burrs. Mold flash, interlead flash, protrusions, or gate burrs shall not exceed 0,15 per end or side.
- D. JEDEC package registration is pending.

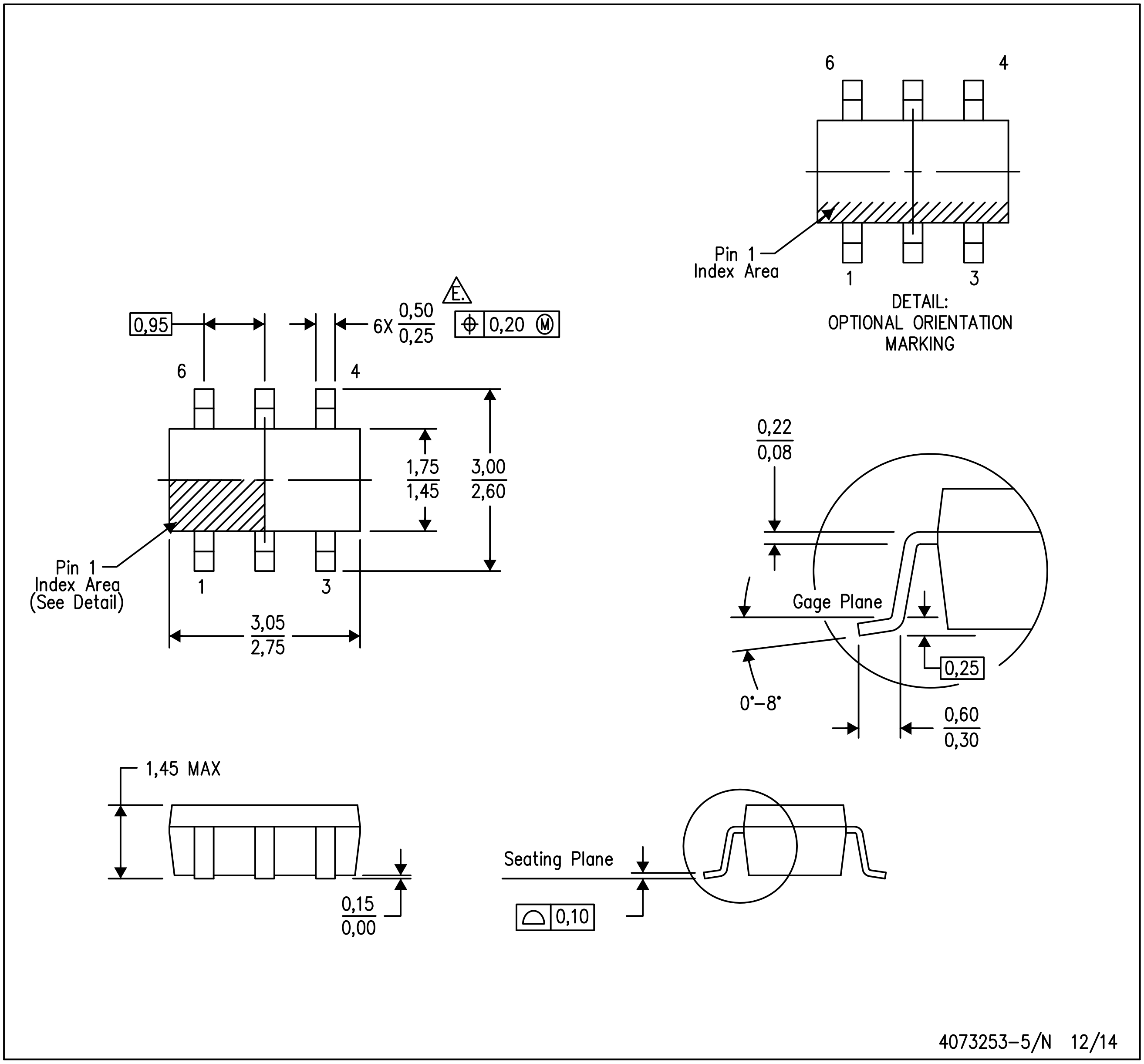
DRL (R–PDSO–N6) PLASTIC SMALL OUTLINE



4208207–3/E 06/12

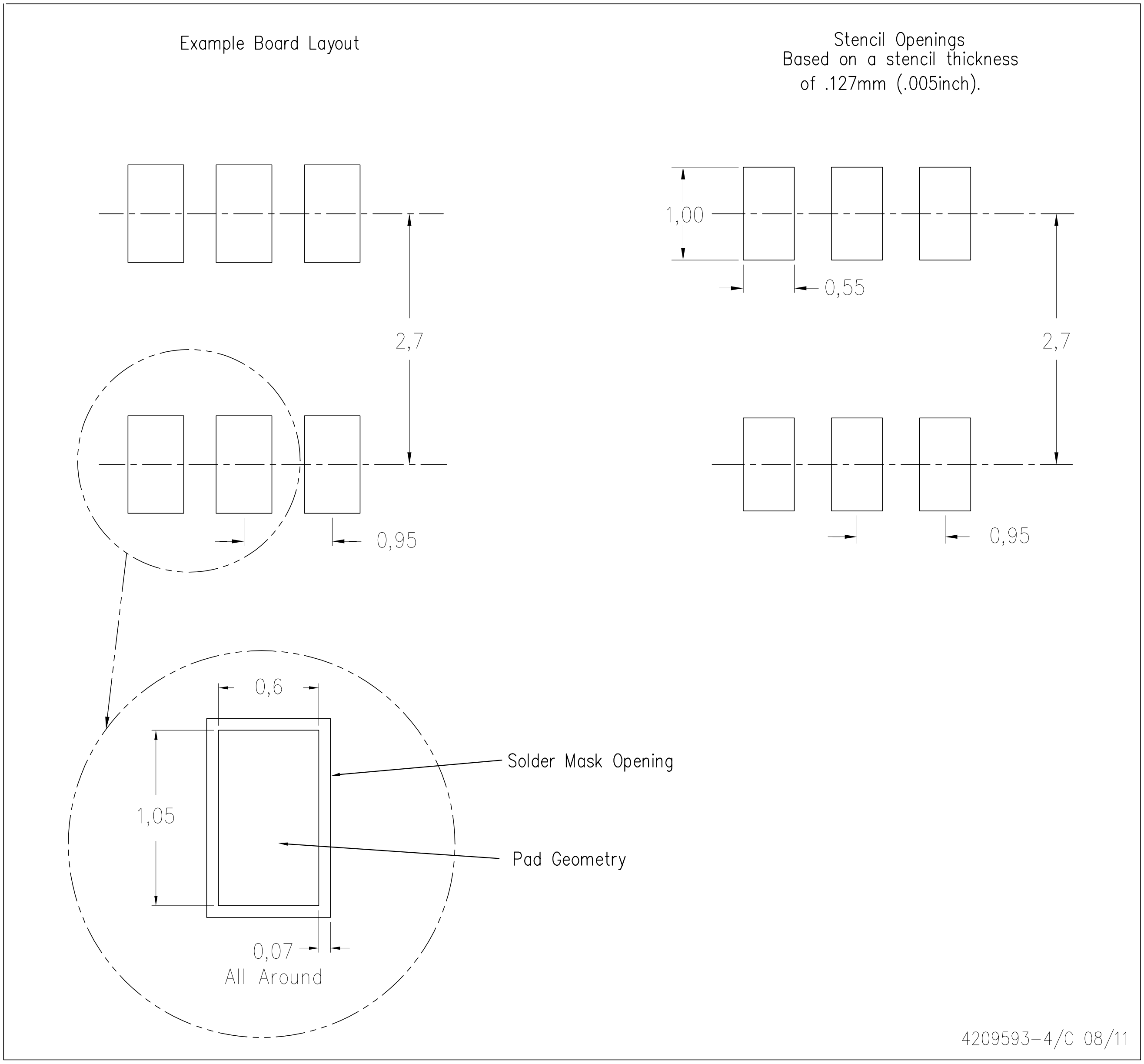
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Publication IPC–7351 is recommended for alternate designs.
D. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.
E. Maximum stencil thickness 0,127 mm (5 mils). All linear dimensions are in millimeters.
F. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
G. Side aperture dimensions over–print land for acceptable area ratio > 0.66. Customer may reduce side aperture dimensions if stencil manufacturing process allows for sufficient release at smaller opening.

DBV (R-PDSO-G6) PLASTIC SMALL-OUTLINE PACKAGE

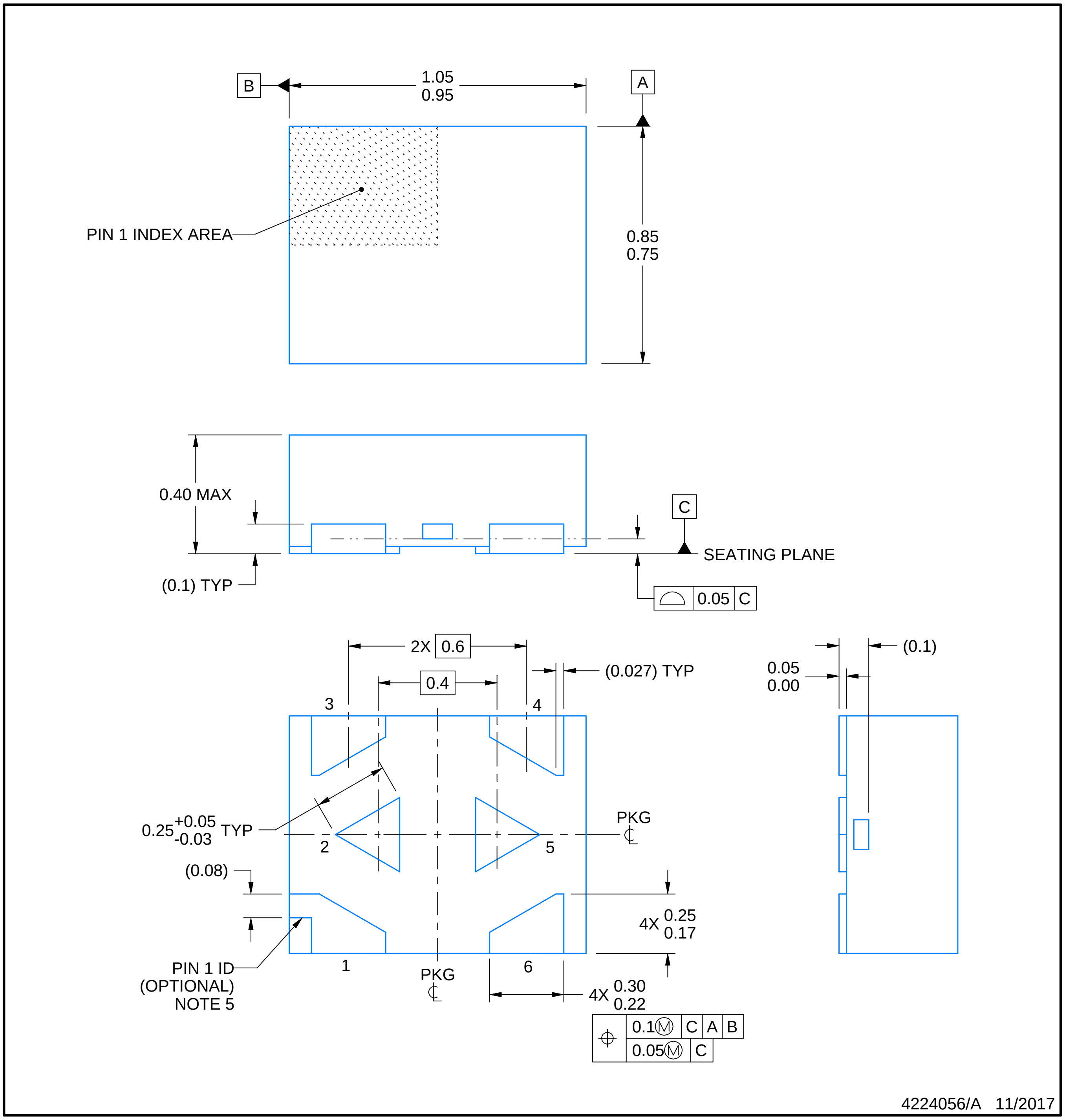


NOTES:
- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Leads 1,2,3 may be wider than leads 4,5,6 for package orientation.
- E. Falls within JEDEC MO-178 Variation AB, except minimum lead width.

DBV (R-PDSO-G6) PLASTIC SMALL OUTLINE

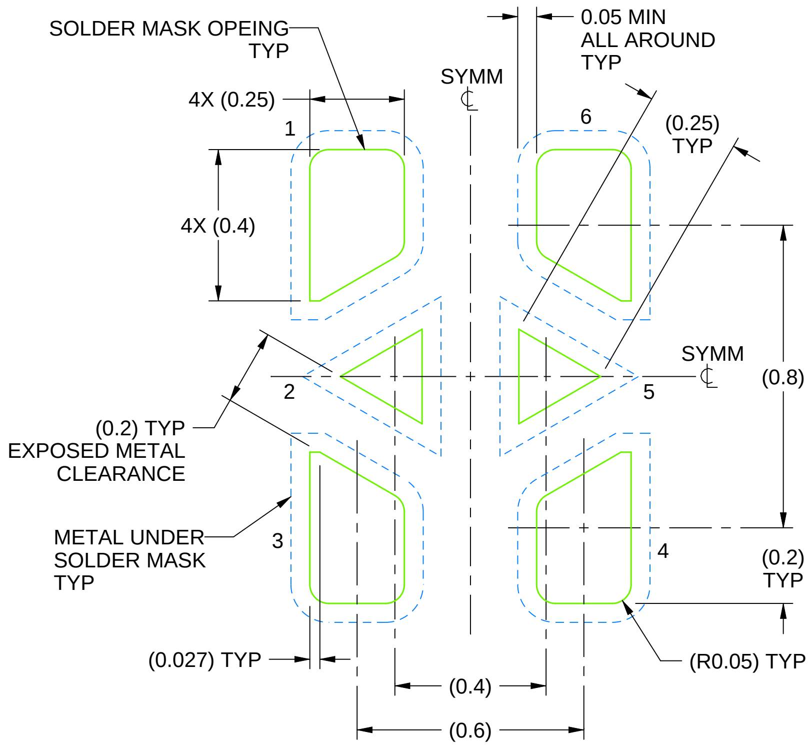


NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
D. Publication IPC-7351 is recommended for alternate designs.
E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



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. The package thermal pads must be soldered to the printed circuit board for optimal thermal and mechanical performance.
4. The size and shape of this feature may vary.
5. Features may not exist. Recommend use of pin 1 marking on top of package for orientation purposes.

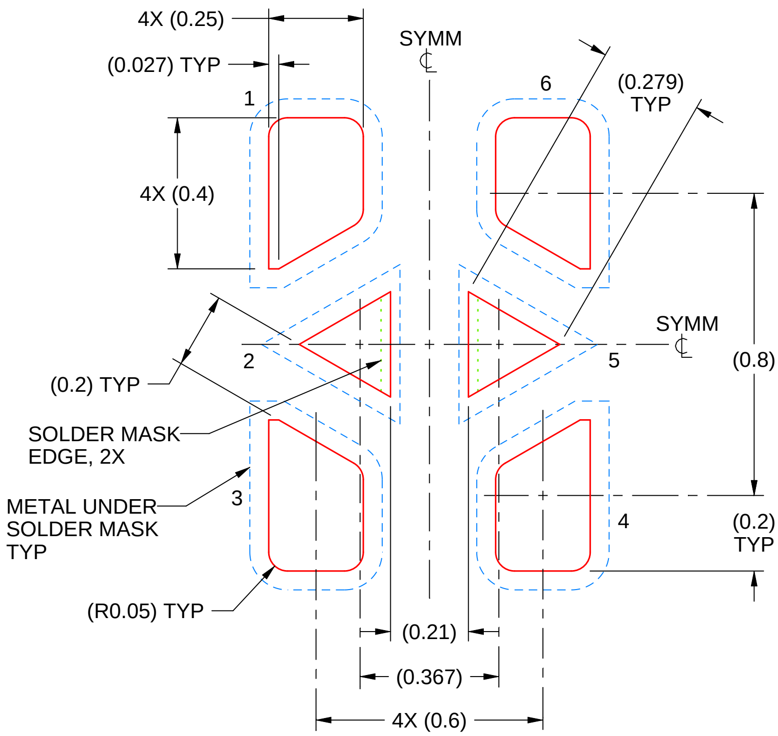


LAND PATTERN EXAMPLE
SOLDER MASK DEFINED
SCALE:50X

4224056/A 11/2017

NOTES: (continued)

6. This package is designed to be soldered to a thermal pads on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
7. Vias are optional depending on application, refer to device data sheet. If some or all are implemented, recommended via locations are shown.



SOLDER PASTE EXAMPLE
BASED ON 0.07 mm THICK STENCIL

PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE
SCALE:50X

4224056/A 11/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

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