280Mb/s Bidirectional Level Translator for Push-Pull Applications

Features

- 0.85V to 2.7V on A Port and 1.35V to 3.6V on B Port
- VCCA may be Greater than, Equal to, or Less than VCCB
- High-Speed with 280 Mb/s Guaranteed Date Rate
- 30 pF Capacitive Drive Capability
- Low Bit-to-Bit Skew
- Overvoltage Tolerant Enable and I/O Pins
- Non-Preferential Power-Up Sequencing
- Power-Off Protection
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative.
  https://www.diodes.com/quality/product-definitions/
- Package: UQFN1.7x2.0-12(ZM)

Applications

- Mobile Phones, PDAs
- Other Portable Devices

Description

The PI4ULS3V504 is a 4-bit configurable, dual-supply autosensing bidirectional level translator that does not require a direction control pin. The B and A ports are designed to track two different power supply rails, VCCB and VCCA respectively.

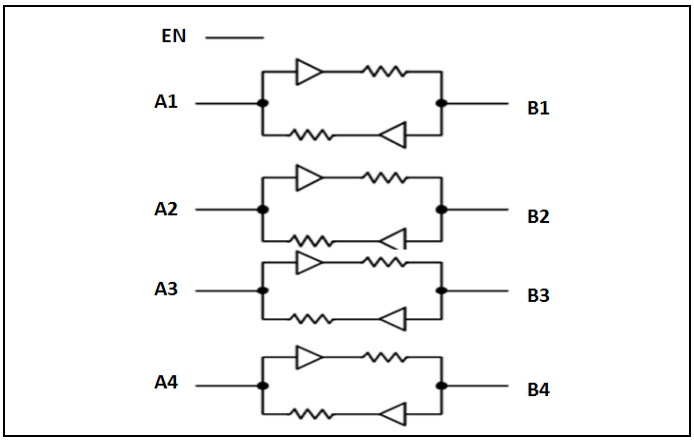
The PI4ULS3V504 offers the feature that the values of the VCCB and VCCA supplies are independent. Design flexibility is maximized because VCCA can be set to a value either greater than or less than the VCCB supply.

The PI4ULS3V504 has high-output current capability, which allows the translator to drive high-capacitive loads such as most high-frequency EMI filters. Another feature of the PI4ULS3V504 is that each An and Bn channel can function as either an input or an output.

An output enable (EN) input is available to reduce the power consumption. The EN pin can be used to disable both I/O ports by putting them in 3-state, which significantly reduces the supply current.

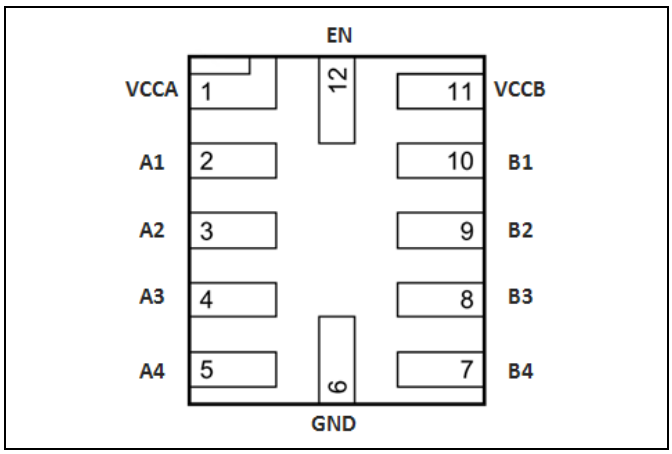
The PI4ULS3V504 is 2 kV system-level ESD capable.

Block Diagram



Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Configuration



UQFN2.0*1.7-12(ZM) (Top View)

Pin Description

Pin#	Pin Name	Type	Description
1	V_{CCA}	Power	A-port supply voltage.0.85V ≤ VCCA ≤ 2.7 V
2	A1	I/O	Input/output A. Referenced to VCCA.
3	A2	I/O	Input/output A. Referenced to VCCA
4	A3	I/O	Input/output A. Referenced to VCCA.
5	A4	I/O	Input/output A. Referenced to VCCA
6	GND	GND	Ground.
7	B4	I/O	Input/output B. Referenced to VCCB
8	B3	I/O	Input/output B. Referenced to VCCB
9	B2	I/O	Input/output B. Referenced to VCCB
10	B1	I/O	Input/output B. Referenced to VCCB
11	V_{CCB}	Power	B-port supply voltage.1.35 V ≤ VCCB ≤ 3.6 V
12	EN	Input	Output enable (active High). Pull EN low to place all outputs in 3-state mode.

Maximum Ratings

Storage Temperature	-65°C to +150°C
DC Supply Voltage port B	-0.5V to +4.6V
DC Supply Voltage port A	-0.5V to+3.6V
Vi(A) referenced DC Input / Output Voltage	-0.5V to +3.6V
Vi(B) referenced DC Input / Output Voltage	-0.5V to+4.6V
Enable Control Pin DC Input Voltage	-0.5V to+3.6V
DC Input Diode Current(V_I<GND)	-50mA
DC Output Diode Current(V_O<GND)	-50mA
DC Supply Current through V_{CCB}	±100mA
DC Supply Current through V_{CCA}	±100mA
DC Ground Current through Ground Pin	±100mA

Note:
Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Operation Conditions

Symbol	Parameter		Min	Typ	Max	Unit
V_{CCA}	A-Side Positive DC Supply Voltage		0.85	—	2.7	V
V_{CCB}	B-Side Positive DC Supply Voltage		1.35	—	3.6	V
V_I	Enable Control Pin Voltage		GND	—	2.7	V
V_{IO}	Bus Input/Output Pin Voltage	I/O A	GND	—	2.7	V
		I/O B	GND	—	3.6	V
T_A	Operating Temperature Range		-40	—	+85	°C
At/Av	Input Transition Rise or Rate, V_I, V_{IO} from 30% to 70% of V_{CC}; V_{CC}= 3.3 V ± 0.3 V		0	—	10	ns

DC Electrical Characteristics

Sym	Parameter	Test Conditions[*1]	V_{CCB}[*2] (V)	V_{CCA}[*3] (V)	-40°C to +85°C			Unit
					Min	Typ[*4]	Max	
V_{IHB}	B Port Input HIGH Voltage	—	1.35-3.6	0.85-2.7	2/3 × V_{CCB}	—	—	V
V_{ILB}	B Port Input LOW Voltage	—	1.35-3.6	0.85-2.7	—	—	1/3 × V_{CCB}	V
V_{IHA}	A Port Input HIGH Voltage	—	1.35-3.6	0.85-2.7	2/3 × V_{CCA}	—	—	V
V_{ILA}	A Port Input LOW Voltage	—	1.35-3.6	0.85-2.7	—	—	1/3 × V_{CCA}	V
V_{IH}[*5]	Control Pin Input HIGH Voltage	T_A = +25°C	1.35-3.6	0.85-2.7	2/3 × V_{CCA}	—	—	V
V_{IL}[*5]	Control Pin Input LOW Voltage	T_A = +25°C	1.35-3.6	0.85-2.7	—	—	1/3 × V_{CCA}	V
V_{OHB}	B Port Output HIGH Voltage	B port source current = 20μA	1.35-3.6	0.85-2.7	0.9 × V_{CCB}	—	—	V
V_{OLB}	B Port Output LOW Voltage	B port sink current = 20μA	1.35-3.6	0.85-2.7	—	—	0.2	V
V_{OHA}	A Port Output HIGH Voltage	A port source current= 20μA	1.35-3.6	0.85-2.7	0.9 × V_{CCA}	—	-	V
V_{OLA}	A Port Output LOW Voltage	A port sink current = 20μA	1.35-3.6	0.85-2.7	—	—	0.2	V
I_{QVB}	V_{CCB} Supply Current	EN = V_{CCA}, I_O = 0A, (I/O_B= 0V or V_{CCB}, I/O_A= float) or (I/O_B = float, I/O_A = 0V or V_{CCA})	1.35-3.6	0.85-2.7	—	0.2	1.5	μA
I_{QVA}	V_{CCA} Supply Current		1.35-3.6	0.85-2.7	—	0.1	1	μA
I_{TS-B}	B Port Tristate Output Mode Supply Current	T_A=+25°C, EN=0V (I/O_B = 0V or V_{CCB}, I/O_A = float) or (I/O_B = float, I/O_A = 0V or V_{CCA})	1.35-3.6	0.85-2.7	—	0.2	1.5	μA
I_{TS-A}	A Port Tristate Output Mode Supply Current		1.35-3.6	0.85-2.7	—	0.1	1	μA
I_{OZ}	I/O Tristate Output Mode Leakage Current	T_A= +25°C, EN= 0V	1.35-3.6	0.85-2.7	—	—	±1	μA
I_I	Control Pin Input Current	T_A = +25°C	1.35-3.6	0.85-2.7	—	—	±1	μA
I_{OFF}	Power Off Leakage Current	I/O_B = 0 to 3.6V, I/O_A = 0 to 2.5V	0	0	—	—	2	μA
			1.35-3.6	0	—	—	2	
			0	0.85-2.7	—	—	2	

Note:
1. Normal test conditions are V_I= 0 V, $C_{IOB} \leq$ 15 pF and $C_{IOA} \leq$ 15 pF, unless otherwise specified.
2. V_{CCB} is the supply voltage associated with the I/O B port, and B ranges from +1.35V to 3.6V under normal operating conditions.
3. V_{CCA} is the supply voltage associated with the I/O A port, and A ranges from +0.85V to 2.7V under normal operating conditions.
4. Typical values are for V_{CCB}= +2.8V, V_{CCA} = +1.8V and T_A = +25°C. All units are production tested at T_A = +25°C. Limits over the operating temperature range are guaranteed by design.
5. When V_{CCA} <1.0V , V_{IH} is 0.75*V_{CCA} (Min) , V_{IL} is 0.25*V_{CCA}(Max).

AC Electrical Characteristics

Timing Characteristics

Symbol	Parameter	Test Conditions[*1]	V_{CCB} (V)[*2]	V_{CCA}(V)[*3]	−40°C to +85°C			Unit
					Min	Typ[*4]	Max	
t_{R-B}	I/O B Rise Time	C_{IOB} = 15 pF	1.35 - 3.6	0.85 - 2.7	—	3	8	ns
			2.5 - 3.6	0.85 - 2.7	—	0.8	4	
t_{F-B}	I/O B Fall Time	C_{IOB} = 15 pF	1.35 - 3.6	0.85 - 2.7	—	0.6	3	ns
			2.5 - 3.6	0.85 - 2.7	—	0.5	3	
t_{R-A}	I/O A Rise Time	C_{IOA} = 15 pF	1.35 - 3.6	0.85 - 2.7	—	4	12	ns
			1.35 - 3.6	1.8 - 2.7	—	0.7	4	
t_{F-A}	I/O A Fall Time	C_{IOA} = 15 pF	1.35 - 3.6	0.85 - 2.7	—	0.8	4	ns
			1.35 - 3.6	1.8 - 2.7	—	0.5	3	
Z_{OB}	I/O B One-Shot Output Impedance	*5	1.5 2.5 3.6	0.9 - 2.5	—	37 20 15	— — —	Ω
Z_{OA}	I/O A One-Shot Output Impedance	*5	1.5 – 3.3	1.5 1.8 3.6	—	52 17 15	— — —	Ω
t_{PD_A-B}	Propagation Delay (Driving I/O B)	C_{IOB} = 15 pF	1.35 - 3.6	0.85 - 2.7	—	9.8	35	ns
			2.5 - 3.6	1.8 - 2.7	—	2.3	10	
		C_{IOB} = 30 pF	1.35 - 3.6	0.85 - 2.7	—	10	35	
			2.5 - 3.6	1.8 - 2.7	—	2.5	10	
t_{PD_B-A}	Propagation Delay (Driving I/O AL)	C_{IOA} = 15 pF	1.35 - 3.6	0.85 - 2.7	—	9.4	35	ns
			2.5 - 3.6	1.8 - 2.7	—	1.6	10	
		C_{IOA} = 30 pF	1.35 - 3.6	0.85 - 2.7	—	9.6	35	
			2.5 - 3.6	1.8 - 2.7	—	1.8	10	
t_{SK}	Channel-to-Channel Skew	C_{IOB} = 15 pF, C_{IOA} = 15 pF *5	1.35 - 3.6	0.85 - 2.7	—	—	0.15	ns
t_{EN-B} (t_{PZH})	I/O_B Output Enable Time	C_{IOB} = 15pF, I/O_A = V_{CCA}	1.35 - 3.6	0.85 - 2.7	—	120	250	ns
			2.5 - 3.6	1.8 - 2.7	—	40	160	ns
t_{EN-B} (t_{PZL})		C_{IOB} = 15pF, I/O_A = 0V	1.35 - 3.6	0.85 - 2.7	—	80	200	ns
			2.5 - 3.6	1.8 - 2.7	—	40	160	ns
t_{EN-A} (t_{PZH})	I/O_A Output Enable Time	C_{IOA} = 15pF, I/O_B = V_{CCB}	1.35 - 3.6	0.85 - 2.7	—	120	250	ns
			2.5 - 3.6	1.8 - 2.7	—	40	160	ns
t_{EN-A} (t_{PZL})		C_{IOA} = 15pF, I/O_B = 0V	1.35 - 3.6	0.85 - 2.7	—	50	200	ns
			2.5 - 3.6	1.8 - 2.7	—	30	160	ns
t_{DIS-B} (t_{PHZ})	I/O_B Output Disable Time	C_{IOB} = 15pF, I/O_A = $V_{CC\,A}$	1.35 - 3.6	0.85 - 2.7	—	200	400	ns
			2.5 - 3.6	1.8 - 2.7	—	200	400	ns
t_{DIS-B} (t_{PLZ})		C_{IOB} = 15pF, I/O_A = 0V	1.35 - 3.6	0.85 - 2.7	—	60	175	ns
			2.5 - 3.6	1.8 - 2.7	—	60	175	ns
t_{DIS-A} (t_{PHZ})	I/O_A Output Disable Time	C_{IOA} = 15pF, I/O_B = V_{CCB}	1.35 - 3.6	0.85 - 2.7	—	180	400	ns
			2.5 - 3.6	1.8 - 2.7	—	100	400	ns
t_{DIS-A} (t_{PLZ})		C_{IOA} = 15pF, I/O_B = 0V	1.35 - 3.6	0.85 - 2.7	—	50	175	ns
			2.5 - 3.6	1.8 - 2.7	—	50	175	ns
MDR	Maximum Data Rate	C_{IO} = 15pF	1.35 - 3.6	0.85 - 2.7	133	—	—	mbps
			2.5 - 3.6	1.8 - 2.7	280	—	—	mbps
		C_{IO} = 30pF	1.35 - 3.6	0.85 - 2.7	80	—	—	mbps
			2.5 - 3.6	1.8 - 2.7	200	—	—	mbps

Notes:

1. Normal test conditions are V_I= 0 V, $C_{IOB} \leq$ 15 pF and $C_{IOA} \leq$ 15 pF, unless otherwise specified.
2. V_{CCB} is the supply voltage associated with the I/O B port, and B ranges from +1.35 V to 3.6V under normal operating conditions.
3. V_{CCA} is the supply voltage associated with the I/O A port, and A ranges from +0.85 V to 2.7V under normal operating conditions.
4. Typical values are tested at T_A = +25°C. Limits over the operating temperature range are guaranteed by design.
5. Guaranteed by design.

Power Consumption (T_A =25°C)

Symbol[*1]	Parameter	Test Conditions	V_{CCB} (V)[*2]	V_{CCA} (V)[*3]	Typ[*4]	Unit
C_{PD_VCCA}	A = Input port, B = Output Port	C_{Load} = 0, f = 1MHz, EN = V_{CCA} (outputs enabled)	1.35 - 3.6	0.85 - 2.7	40	pF
	B = Input port, A = Output Port	C_{Load} = 0, f = 1MHz, EN = V_{CCA} (outputs enabled)	1.35 - 3.6	0.85 - 2.7	40	pF
C_{PD_VCCB}	A = Input port, B = Output Port	C_{Load} = 0, f = 1MHz, EN = V_{CCA} (outputs enabled)	1.35 - 3.6	0.85 - 2.7	40	pF
	B = Input port, A = Output Port	C_{Load} = 0, f = 1MHz, EN = V_{CCA} (outputs enabled)	1.35 - 3.6	0.85 - 2.7	40	pF
C_{PD_VCCA}	A = Input port, B = Output Port	C_{Load} = 0, f = 1MHz, EN = GND (outputs disabled)	1.35 - 3.6	0.85 - 2.7	1	pF
	B = Input port, A = Output Port	C_{Load} = 0, f = 1MHz, EN = GND (outputs disabled)	1.35 - 3.6	0.85 - 2.7	1	pF
C_{PD_VCCB}	A = Input port, B = Output Port	C_{Load} = 0, f = 1MHz, EN = GND (outputs disabled)	1.35 - 3.6	0.85 - 2.7	1	pF
	B = Input port, A = Output Port	C_{Load} = 0, f = 1MHz, EN = GND (outputs disabled)	1.35 - 3.6	0.85 - 2.7	1	pF

Notes:

1. C_{PD_VCCA} and C_{PD_VCCB} are defined as the value of the IC's equivalent capacitance from which the operating current can be calculated for the A and B power supplies, respectively. I_{CC} = I_{CC} (dynamic) + I_{CC} (static) ≈I_{CC}(operating) ≈CPD x VCC x f_{IN} x N_{SW} where I_{CC} = I_{CC_VCCB}+ I_{CC_VCCA} and NSW = total number of outputs switching.
2. V_{CCB} is the supply voltage associated with the I/O B port, and V_{CCB} ranges from +1.35V to 3.6V under normal operating conditions.
3. V_{CCA} is the supply voltage associated with the I/O A port, and V_{CCA} ranges from +0.8 V to 2.7V under normal operating conditions.
4. Typical values are at T_A = +25°C. Limits over the operating temperature range are guaranteed by design.

Test Circuits

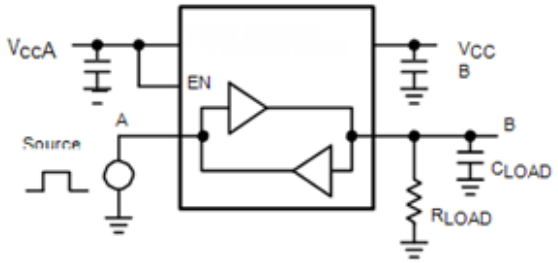


Figure 1. Driving A Test Circuit

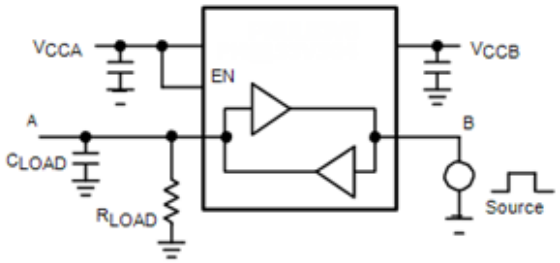


Figure 2. Driving B Test Circuit

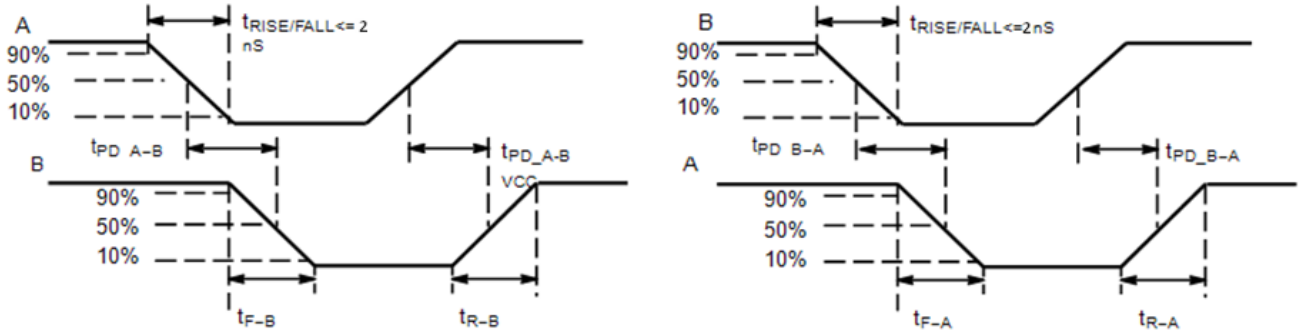
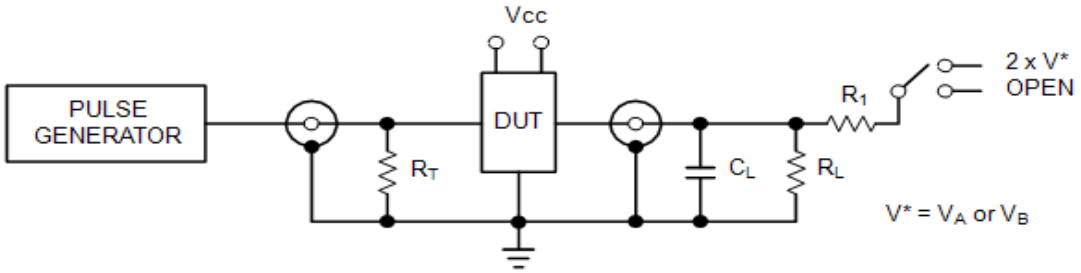


Figure 3. Definition of Timing Specification Parameters



Test	Switch
t_{PZH}, t_{PHZ}	Open
t_{PZL}, t_{PLZ}	2 x V*

C_L = 15 pF or equivalent (Includes jig and probe capacitance)
R_L = R_1 = 50 kΩ or equivalent
R_T = Z_{OUT} of pulse generator (typically 50 Ω)
V* = V_A or V_B for A or B measurements, respectively.

Figure 4. Test Circuit for Enable/Disable Time Measurement

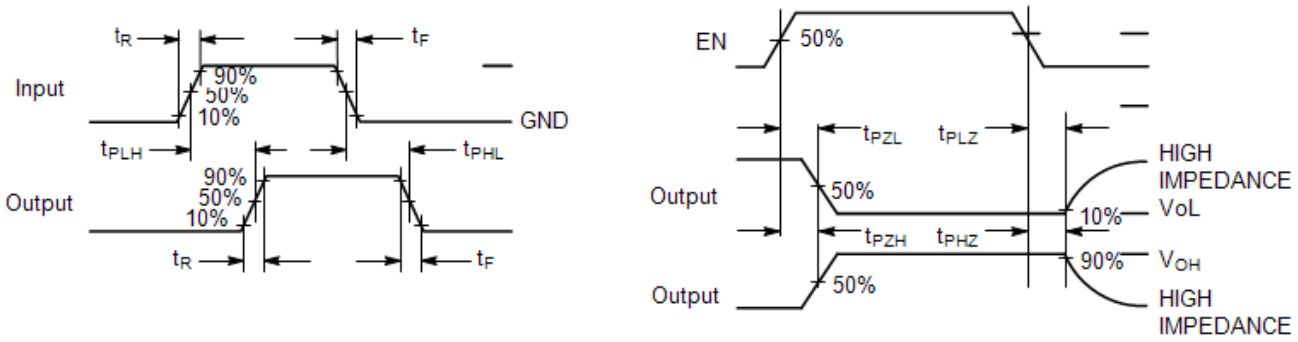
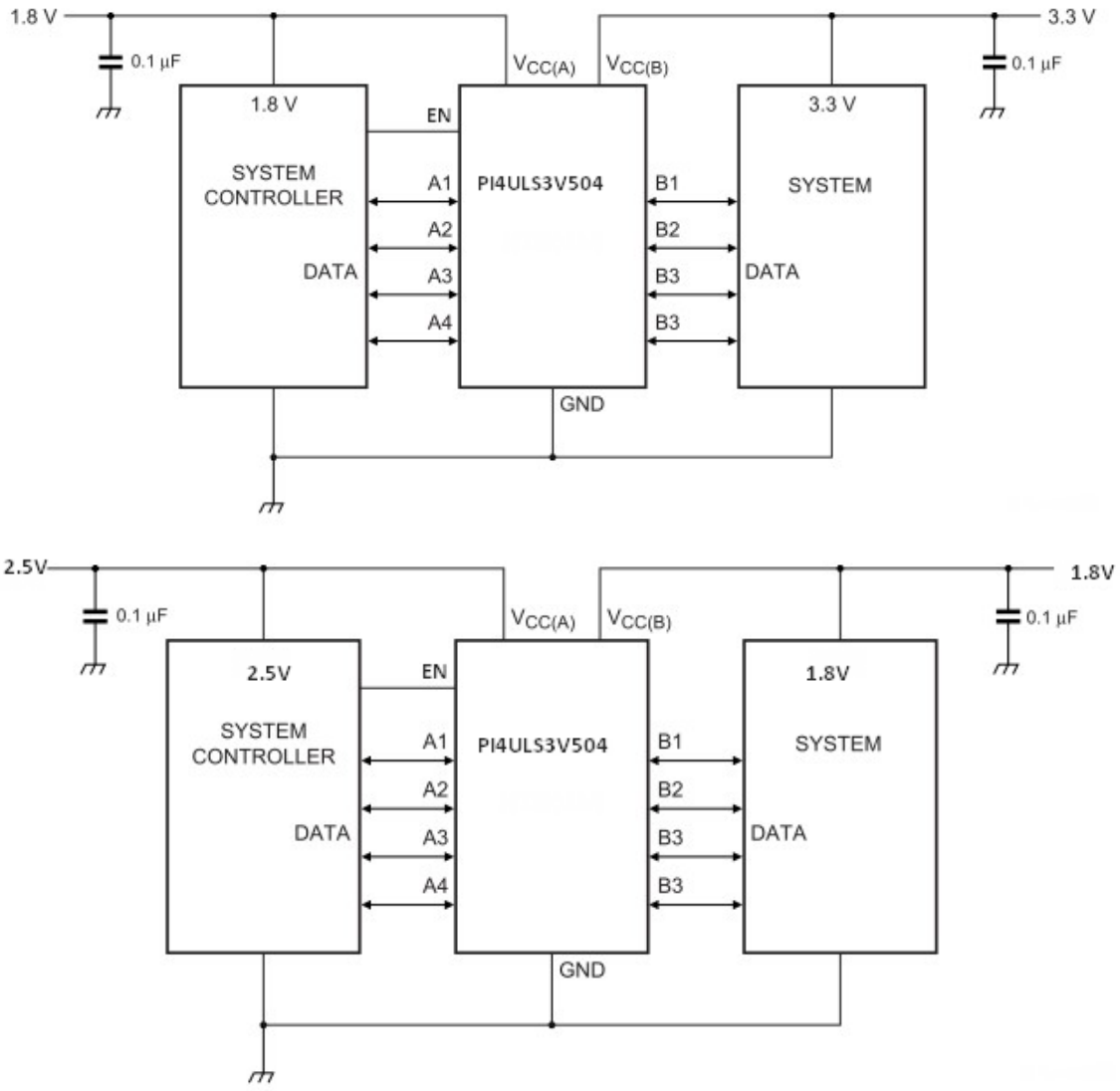


Figure 5. Timing Definitions for Propagation Delays and Enable/Disable Measurement

Typical Applications



Functional Description

The PI4ULS3V504 is a 4-bit configurable, dual-supply autosensing bidirectional level translator that does not require a direction control pin. The B and A ports are designed to track two different power supply rails, VCCB and VCCA respectively.

The PI4ULS3V504 offers the feature that the values of the VCCB and VCCA supplies are independent. Design flexibility is maximized because VCCA can be set to a value either greater than or less than the VCCB supply.

The PI4ULS3V504 has high-output current capability, which allows the translator to drive high-capacitive loads such as most high-frequency EMI filters. Another feature of the PI4ULS3V504 is that each An and Bn channel can function as either an input or an output.

An Output Enable (EN) input is available to reduce the power consumption. The EN pin can be used to disable both I/O ports by putting them in 3-state, which significantly reduces the supply current.

Application Information

Level Translator Architecture

The PI4ULS3V504 autosense translator provides bidirectional logic voltage level shifting to transfer data in multiple supply voltage systems. These level translators have two supply voltages, V_{CCA} and VCCB, which set the logic levels on the input and output sides of the translator. When used to transfer data from the I/O VCCA to the I/O VCCB ports, input signals referenced to the VCCA supply are translated to output signals with a logic level matched to VCCB. In a similar manner, the I/O VCCB to I/O VCCA translation shifts input signals with a logic level compatible to VCCB to an output signal matched to VCCA. The PI4ULS3V504 translator consists of bidirectional channels that independently determine the direction of the data flow without requiring a directional pin. One-shot circuits are used to detect the rising or falling input signals. In addition, the one-shots decrease the rise and fall times of the output signal for high-to-low and low-to-high transitions.

Input Driver Requirements

Autosense translators such as the PI4ULS3V504 have a wide bandwidth but a relatively small DC output current rating. The high bandwidth of the bidirectional I/O circuit is used to quickly transform from an input to an output driver and vice versa. The I/O ports have a modest DC current output specification so that the output driver can be over driven when data is sent in the opposite direction. For proper operation, the input driver to the autosense translator should be capable of driving 3mA of peak output current. The bidirectional configuration of the translator results in both input stages being active for a very short time period. Although the peak current from the input signal circuit is relatively large, the average current is small and consistent with a standard CMOS input stage. The PI4ULS3V504 translator has an enable (EN) pin that provides tri–state operation at the I/O pins. Driving the enable pin to a low logic level minimizes the power consumption of the device and drives the I/O VCCB and I/O VCCA pins to a high-impedance state. Normal translation operation occurs when the EN pin is equal to a logic high signal. The EN pin is referenced to the VCCA supply and has overvoltage tolerant (OVT) protection.

Unidirectional versus Bidirectional Translation

The PI4ULS3V504 translator can function as a non-inverting unidirectional translator. One advantage of using the translator as a unidirectional device is that each I/O pin can be configured as either an input or output. The configurable input or output feature is especially useful in applications such as SPI that use multiple unidirectional I/O lines to send data to and from a device. The flexible I/O port of the autosense translator simplifies the trace connections on the PCB.

Power Supply Guidelines

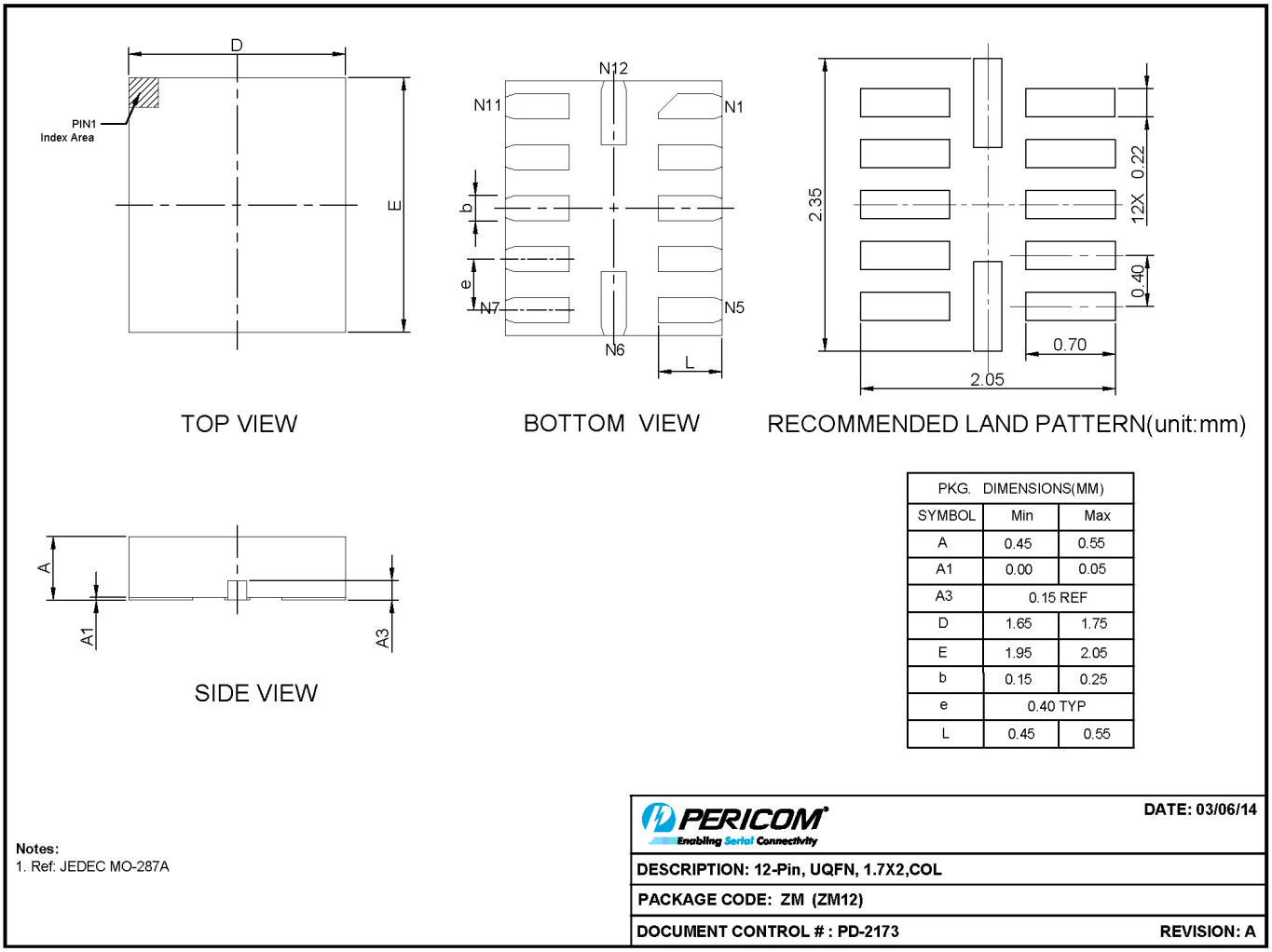
The values of the VCCA and VCCB supplies can be set to anywhere in range 0.85-2.7V and 1.35-3.6V. Design flexibility is maximized because VCCA may be either greater than or less than the VCCB supply. In contrast, the majority of the competitive autosense translators have a restriction that the value of the VCCA supply must be equal to less than (VCCB - 0.4)V. The sequencing of the power supplies will not damage the device during power-up operation. In addition, the I/O VCCB and I/O VCCA pins are in the high-impedance state if either supply voltage is equal to 0V. For optimal performance, 0.01µF to 0.1µF decoupling capacitors should be used on the VCCA and VCCB power supply pins. Ceramic capacitors are a good design choice to filter and bypass any noise signals on the voltage lines to the ground plane of the PCB. The noise immunity will be maximized by placing the capacitors as close as possible to the supply and ground pins, along with minimizing the PCB connection traces. The PI4ULS3V504 translators have a power-down feature that provides design flexibility. The output ports are disabled when either power supply is off (VCCA or VCCB = 0V). This feature causes all of the I/O pins to be in the power saving high impedance state.

Part Marking

Y: Year
W: Workweek

Packaging Mechanical

12-UQFN (ZM)



PKG. DIMENSIONS(MM)		
SYMBOL	Min	Max
A	0.45	0.55
A1	0.00	0.05
A3	0.15 REF	
D	1.65	1.75
E	1.95	2.05
b	0.15	0.25
e	0.40 TYP	
L	0.45	0.55

Notes:
1. Ref: JEDEC MO-287A

PERICOM Enabling Serial Connectivity

DATE: 03/06/14

DESCRIPTION: 12-Pin, UQFN, 1.7X2,COL

PACKAGE CODE: ZM (ZM12)

DOCUMENT CONTROL # : PD-2173 REVISION: A

14-0086

For latest package information:
See http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/.

Ordering Information

Part Number	Package Code	Package Description
PI4ULS3V504ZMEX	ZM	12-pin, 1.7×2.0, COL (UQFN)

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. E = Pb-free and Green
5. X suffix = Tape/Reel

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.
Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes Incorporated.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

www.diodes.com

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Translation - Voltage Levels ***category:***

Click to view products by Diodes Incorporated ***manufacturer:***

Other Similar products are found below :

NLSX4373DMR2G NLSX5012MUTAG NLSX0102FCT2G NLSX4302EBMUTCG MC100EPT622MNG NLSX5011MUTCG NLV9306USG NLVSX4014MUTAG NLSV4T3144MUTAG NLVSX4373MUTAG MAX3371ELT+T NLSX3013BFCT1G NLV7WBD3125USG NLSX3012DMR2G 74AVCH1T45FZ4-7 NLVSV1T244MUTBG 74AVC1T45GS-Q100H CLVC16T245MDGGREP MC10H124FNG CAVCB164245MDGGREP CD40109BPWR MC10H350FNG MC10H125FNG MC100EPT21MNR4G MC100EP91DWG NLSX3013FCT1G NLSX5011AMX1TCG PCA9306USG SN74GTL1655DGGR SN74AVCA406LZQSR NLSX4014DTR2G NLSX3018DTR2G LTC1045CN#PBF 74AXP1T34GMH 74AXP1T34GNH PI4ULS3V204LE ADG3245BRUZ-REEL7 ADG3123BRUZ ADG3245BRUZ ADG3308BCPZ-REEL ADG3233BRJZ-REEL7 ADG3233BRMZ ADG3242BRJZ-REEL7 ADG3243BRJZ-REEL7 ADG3245BCPZ ADG3247BRUZ ADG3247BRUZ-REEL ADG3248BKSZ-REEL7 ADG3257BRQZ-REEL ADG3304BCBZ-REEL7