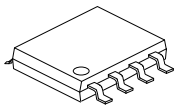
DUAL SUPPLY TRANSLATING RANSCEIVER; AUTO DIRECTION SENSING; 3-STATE



SOP-8

■ DESCRIPTION

The **UNTB0102** is a 2-bit, dual supply translating transceiver with auto direction sensing, that enables bidirectional voltage level translation. It features two 2-bit input-output ports (An and Bn), one output enable input (OE) and two supply pins (V_{CCA} and V_{CCB}). V_{CCA} can be supplied at any voltage between 1.2V and 3.6V and V_{CCB} can be supplied at any voltage between 1.65V and 5.5V, making the device suitable for translating between any of the low voltage nodes (1.2V, 1.5V, 1.8V, 2.5V, 3.3V and 5.0V).

Pins An and OE are referenced to V_{CCA} and pins Bn are referenced to V_{CCB}. A LOW level at pin OE causes the outputs to assume a high-impedance OFF-state. This device is fully specified for partial power-down applications using I_{OFF}. The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

■ FEATURES

* 1.2V to 3.6V on A Port and 1.65V to 5.5V on B Port
* I_{OFF} circuitry provides partial Power-down mode operation
* Inputs accept voltages up to 5.5V

■ APPLICATION

* Handset
* Smartphone
* Tablet
* Desktop PC

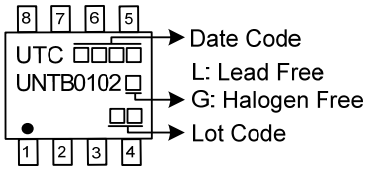
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
UNTB0102L-S08-R	UNTB0102G-S08-R	SOP-8	Tape Reel

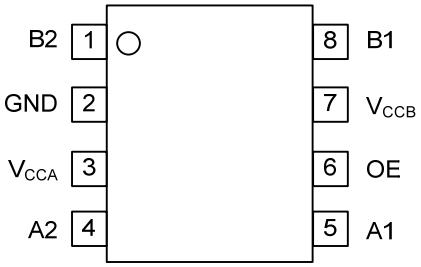
UNTB0102G-S08-R
(1)Packing Type
(2) Package Type
(3) Green Package

(1) R: Tape Reel
(2) S08: SOP8
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	I/O	DESCRIPTION
1	B2	I/O	Input/output B2. Referenced to V_{CCB}
2	GND		Ground
3	V_{CCA}		A-Port supply voltage 1.2V ≤ V_{CCA} ≤ 3.6V and V_{CCA} ≤ V_{CCB}.
4	A2	I/O	Input/output A2. Referenced to V_{CCA}
5	A1	I/O	Input/output A1. Referenced to V_{CCA}
6	OE	I	3-state output-mode enable. Pull OE low to place all outputs in 3-state mode. Referenced to V_{CCA}
7	V_{CCB}		B-Port supply voltage 1.65V ≤ V_{CCB} ≤ 5.5V
8	B1	I/O	Input/output B1. Referenced to V_{CCB}

Note: I=Input, O=Output, I/O=Input and Output.

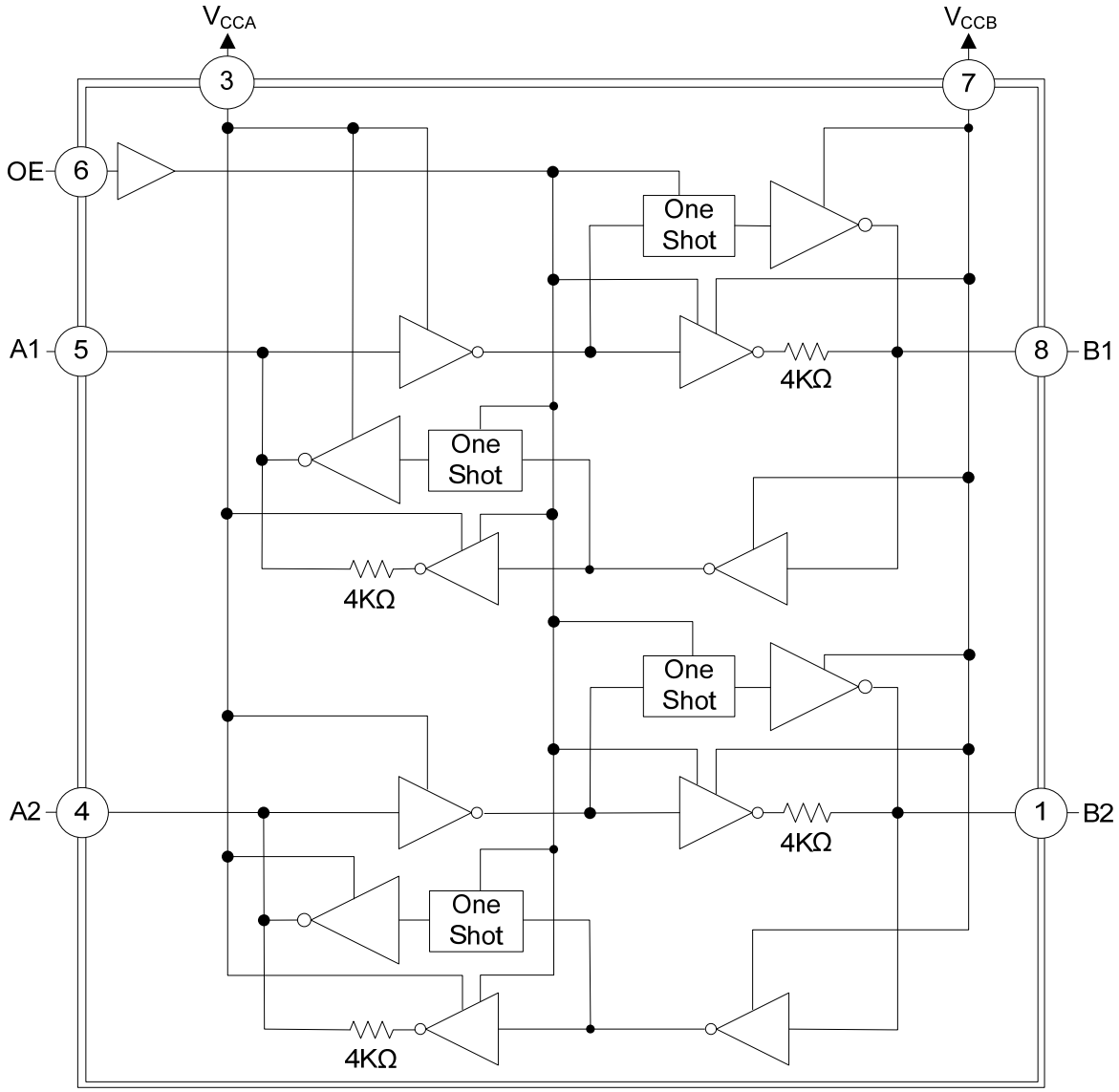
■ FUNCTION TABLE

SUPPLY VOLTAGE		INPUTS	INPUTS/OUTPUT	
V_{CCA}	V_{CCB}	OE	An	Bn
1.2V ~ V_{CCB}	1.65V ~ 5.5V	L	Z	Z
1.2V ~ V_{CCB}	1.65V ~ 5.5V	H	Input or Output	Output or Input
GND (Note 2)	GND (Note 2)	X	Z	Z

Notes: 1. H = High voltage level；L = Low voltage level；Z : High impedance OFF-state；X = Don't care.

2. When either V_{CCA} or V_{CCB} is at GND level, the device goes into Power-down mode.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CCA}	-0.5 ~ 6.5	V
Supply Voltage		V_{CCB}	-0.5 ~ 6.5	V
Input Voltage		V_{IN}	-0.5 ~ 6.5	V
Output Voltage	Active mode	V_{OUT}	-0.5 ~ V_{CCO}+0.5	V
	Power-down or 3-state mode		-0.5 ~ 6.5	V
Input Clamp Current	V_{IN}<0V	I_{IK}	-50	mA
Output Clamp Current	V_{OUT}<0V	I_{OK}	-50	mA
Continuous Output Current	V_{OUT}=0~V_{CCO}	I_{OUT}	±50	mA
Supply Current	I_{CCA} or I_{CCB}	I_{CC} / I_{GND}	±100	mA
Storage Temperature Range		T_{STG}	-65 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. The value of V_{CCA} and V_{CCB} are provided in the recommended operating conditions table.

■ RECOMMENDED OPERATING CONDITIONS (T_A=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage A		V_{CCA}		1.2		3.6	V
Supply Voltage B		V_{CCB}		1.65		5.5	V
Input Voltage		V_{IN}		0		V_{CCI}	V
Output Voltage	A Port	V_{OUT}	Power-down or 3-state mode, V_{CCA}=1.2V~3.6V, V_{CCB}=1.65V~5.5V	0		3.6	V
	B Port			0		5.5	V
High-Level Input Voltage	A or B Port and OE input	V_{IH}	V_{CCA}=1.2V~3.6V, V_{CCB}=1.65V~5.5V	V_{CCI} ×0.65		V_{CCI}	V
Low-Level Input Voltage	A or B Port and OE input	V_{IL}	V_{CCA}=1.2V~3.6V, V_{CCB}=1.65V~5.5V	0		V_{CCI} ×0.35	V
Input Transition Rise or Fall Rate		Δt/Δv	V_{CCA}=1.2V~3.6V, V_{CCB}=1.65V~5.5V			40	ns/V
Operating Temperature		T_A		-40		+125	°C

Notes: 1. The A and B sides of an unused data I/O pair must be held in the same state, that is, both at V_{CCI} or both at GND.
2. V_{CCA} must be less than or equal to V_{CCB} and must not exceed 3.6V.
3. V_{CCI} is the supply voltage associated with the input port.

■ ELECTRICAL CHARACTERISTICS (T_A =25°C , unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
High-Level Output Voltage	A Port	V_{OH}	V_{CCA}=1.2V, I_{OH}=-20μA			1.1		V
			V_{CCA}=1.4V~3.6V, I_{OH}=-20μA		V_{CCO} -0.4			V
	B Port		V_{CCB}=1.65V~5.5V, I_{OH}=-20μA		V_{CCO} -0.4			V
Low-Level Output Voltage	A Port	V_{OL}	V_{CCA}=1.2V, I_{OL}=20μA			0.09		V
			V_{CCA}=1.4V~3.6V, I_{OL}=20μA				0.4	V
	B Port		V_{CCB}=1.65V~5.5V, I_{OL}=20μA				0.4	V
Input Leakage Current	OE	$I_{I(LEAK)}$	V_{IN}=V_{CCI} or GND, V_{CCA}=1.2V~3.6V, V_{CCB}=1.65V~5.5V				±5	μA
Power OFF Leakage Current	A Port	I_{OFF}	V_{IN} or V_{OUT}=0~3.6V, V_{CCA}=0V, V_{CCB}=0V~5.5V				±10	μA
	B Port		V_{IN} or V_{OUT}=0~5.5V, V_{CCA}=0V~3.6V, V_{CCB}=0V				±10	μA
High-Impedance State Output Current	A or B Port	I_{OZ}	V_{CCA}=1.2V~3.6V, V_{CCB}=1.65V~5.5V, OE=GND				±10	μA
Quiescent Supply Current		I_{CCA}	V_{IN}=0V or V_{CCI}, I_{OUT}=0A	V_{CCA}=1.2V V_{CCB}=1.65V~5.5V		0.05		μA
				V_{CCA}=1.4V~3.6V V_{CCB}=1.65V~5.5V OE=LOW			15	μA
				V_{CCA}=1.4V~3.6V V_{CCB}=1.65V~5.5V OE=HIGH			20	μA
				V_{CCA}=3.6V V_{CCB}=0V OE=HIGH			15	μA
				V_{CCA}=0V V_{CCB}=5.5V OE=HIGH			-15	μA
		I_{CCB}		V_{CCA}=1.2V V_{CCB}=1.65V~5.5V		3.3		μA
				V_{CCA}=1.4V~3.6V V_{CCB}=1.65V~5.5V OE=LOW			15	μA
				V_{CCA}=1.4V~3.6V V_{CCB}=1.65V~5.5V OE=HIGH			20	μA
				V_{CCA}=3.6V V_{CCB}=0V OE=HIGH			-15	μA
				V_{CCA}=0V V_{CCB}=5.5V OE=HIGH			15	μA
		I_{CCA}+I_{CCB}		V_{CCA}=1.2V V_{CCB}=1.65V~5.5V		3.3		μA
				V_{CCA}=1.4V~3.6V V_{CCB}=1.65V~5.5V			40	μA

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Capacitance	OE Input	C_{IN}	V_{CCA}=1.2~3.6V, V_{CCB}=1.65V~5.5V		1		pF
Output Capacitance	A Port	C_{IO}	V_{CCA}=1.2~3.6V, V_{CCB}=1.65V~5.5V		4		pF
	B Port		V_{CCA}=1.2~3.6V, V_{CCB}=1.65V~5.5V		7.5		pF

Notes: 1. V_{CCI} is the supply voltage associated with the input port.
2. V_{CCO} is the supply voltage associated with the output port.

■ SWITCHING CHARACTERISTICS (T_A =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Propagation Delay From Input (A) to Output (B)	t_{PD}	V_{CCA}=1.2V	V_{CCB}=1.8V		5.9		ns
			V_{CCB}=2.5V		4.8		ns
			V_{CCB}=3.3V		4.4		ns
			V_{CCB}=5V		4.2		ns
		V_{CCA}=1.5V±0.1V	V_{CCB}=1.8V±0.15V	1.4		12.9	ns
			V_{CCB}=2.5V±0.2V	1.2		10.1	ns
			V_{CCB}=3.3V±0.3V	1.1		10	ns
			V_{CCB}=5V±0.5V	0.8		9.9	ns
		V_{CCA}=1.8V±0.15V	V_{CCB}=1.8V±0.15V	1.6		11	ns
			V_{CCB}=2.5V±0.2V	1.4		7.7	ns
			V_{CCB}=3.3V±0.3V	1.3		6.8	ns
			V_{CCB}=5V±0.5V	1.2		6.5	ns
		V_{CCA}=2.5V±0.2V	V_{CCB}=2.5V±0.2V	1.1		6.3	ns
			V_{CCB}=3.3V±0.3V	1.0		5.2	ns
			V_{CCB}=5V±0.5V	0.9		4.7	ns
		V_{CCA}=3.3V±0.3V	V_{CCB}=3.3V±0.3V	0.9		4.7	ns
			V_{CCB}=5V±0.5V	0.8		4.0	ns
Propagation Delay From Input (B) to Output (A)		V_{CCA}=1.2V	V_{CCB}=1.8V		5.6		ns
			V_{CCB}=2.5V		4.8		ns
			V_{CCB}=3.3V		4.5		ns
			V_{CCB}=5V		4.4		ns
		V_{CCA}=1.5V±0.1V	V_{CCB}=1.8V±0.15V	0.9		14.2	ns
			V_{CCB}=2.5V±0.2V	0.7		12	ns
			V_{CCB}=3.3V±0.3V	0.4		11.7	ns
			V_{CCB}=5V±0.5V	0.3		13.7	ns
		V_{CCA}=1.8V±0.15V	V_{CCB}=1.8V±0.15V	1.5		12	ns
			V_{CCB}=2.5V±0.2V	1.3		8.4	ns
			V_{CCB}=3.3V±0.3V	1.0		7.6	ns
			V_{CCB}=5V±0.5V	0.9		7.1	ns
		V_{CCA}=2.5V±0.2V	V_{CCB}=2.5V±0.2V	1.2		6.6	ns
			V_{CCB}=3.3V±0.3V	1.1		5.1	ns
			V_{CCB}=5V±0.5V	0.9		4.4	ns
		V_{CCA}=3.3V±0.3V	V_{CCB}=3.3V±0.3V	1.0		7.9	ns
			V_{CCB}=5V±0.5V	0.9		6.8	ns

■ SWITCHING CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Enable Time From Input (OE) to Output (A or B)	t_{en}	V_{CCA}=1.2V	V_{CCB}=1.8V			0.5	μs
			V_{CCB}=2.5V			0.5	μs
			V_{CCB}=3.3V			0.5	μs
			V_{CCB}=5V			0.5	μs
		V_{CCA}=1.5V±0.1V	V_{CCB}=1.8V±0.15V			1.0	μs
			V_{CCB}=2.5V±0.2V			1.0	μs
			V_{CCB}=3.3V±0.3V			1.0	μs
			V_{CCB}=5V±0.5V			1.0	μs
		V_{CCA}=1.8V±0.15V	V_{CCB}=1.8V±0.15V			1.0	μs
			V_{CCB}=2.5V±0.2V			1.0	μs
			V_{CCB}=3.3V±0.3V			1.0	μs
			V_{CCB}=5V±0.5V			1.0	μs
		V_{CCA}=2.5V±0.2V	V_{CCB}=2.5V±0.2V			1.0	μs
			V_{CCB}=3.3V±0.3V			1.0	μs
			V_{CCB}=5V±0.5V			1.0	μs
		V_{CCA}=3.3V±0.3V	V_{CCB}=3.3V±0.3V			1.0	μs
			V_{CCB}=5V±0.5V			1.0	μs
Disable Time From Input (OE) to Output (A)	t_{dis}	V_{CCA}=1.2V	V_{CCB}=1.8V		81		ns
			V_{CCB}=2.5V		69		ns
			V_{CCB}=3.3V		83		ns
			V_{CCB}=5V		68		ns
		V_{CCA}=1.5V±0.1V	V_{CCB}=1.8V±0.15V			320	ns
			V_{CCB}=2.5V±0.2V			260	ns
			V_{CCB}=3.3V±0.3V			260	ns
			V_{CCB}=5V±0.5V			280	ns
		V_{CCA}=1.8V±0.15V	V_{CCB}=1.8V±0.15V			260	ns
			V_{CCB}=2.5V±0.2V			230	ns
			V_{CCB}=3.3V±0.3V			230	ns
			V_{CCB}=5V±0.5V			230	ns
		V_{CCA}=2.5V±0.2V	V_{CCB}=2.5V±0.2V			200	ns
			V_{CCB}=3.3V±0.3V			200	ns
			V_{CCB}=5V±0.5V			200	ns
		V_{CCA}=3.3V±0.3V	V_{CCB}=3.3V±0.3V			280	ns
			V_{CCB}=5V±0.5V			280	ns
Disable Time From Input (OE) to Output (B)		V_{CCA}=1.2V	V_{CCB}=1.8V		81		ns
			V_{CCB}=2.5V		69		ns
			V_{CCB}=3.3V		83		ns
			V_{CCB}=5V		68		ns
		V_{CCA}=1.5V±0.1V	V_{CCB}=1.8V±0.15V			200	ns
			V_{CCB}=2.5V±0.2V			200	ns
			V_{CCB}=3.3V±0.3V			200	ns
			V_{CCB}=5V±0.5V			200	ns
		V_{CCA}=1.8V±0.15V	V_{CCB}=1.8V±0.15V			200	ns
			V_{CCB}=2.5V±0.2V			200	ns
			V_{CCB}=3.3V±0.3V			200	ns
			V_{CCB}=5V±0.5V			200	ns
		V_{CCA}=2.5V±0.2V	V_{CCB}=2.5V±0.2V			200	ns
			V_{CCB}=3.3V±0.3V			200	ns
			V_{CCB}=5V±0.5V			200	ns
		V_{CCA}=3.3V±0.3V	V_{CCB}=3.3V±0.3V			220	ns
			V_{CCB}=5V±0.5V			220	ns

■ SWITCHING CHARACTERISTICS (Cont.)

PARAMETER		SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Transition Time	A Port	t_t	V_{CCA}=1.2V	V_{CCB}=1.8V		4.0		ns
				V_{CCB}=2.5V		4.0		ns
				V_{CCB}=3.3V		4.1		ns
				V_{CCB}=5V		4.1		ns
			V_{CCA}=1.5V±0.1V	V_{CCB}=1.8V±0.15V	0.9		5.1	ns
				V_{CCB}=2.5V±0.2V	0.9		5.1	ns
				V_{CCB}=3.3V±0.3V	0.9		5.1	ns
				V_{CCB}=5V±0.5V	0.9		5.1	ns
			V_{CCA}=1.8V±0.15V	V_{CCB}=1.8V±0.15V	0.8		4.1	ns
				V_{CCB}=2.5V±0.2V	0.8		4.1	ns
				V_{CCB}=3.3V±0.3V	0.8		4.1	ns
				V_{CCB}=5V±0.5V	0.8		4.1	ns
			V_{CCA}=2.5V±0.2V	V_{CCB}=2.5V±0.2V	0.7		3.0	ns
				V_{CCB}=3.3V±0.3V	0.7		3.0	ns
				V_{CCB}=5V±0.5V	0.7		3.0	ns
			V_{CCA}=3.3V±0.3V	V_{CCB}=3.3V±0.3V	0.7		4.5	ns
				V_{CCB}=5V±0.5V	0.7		4.5	ns
Transition Time	B Port		V_{CCA}=1.2V	V_{CCB}=1.8V		2.6		ns
				V_{CCB}=2.5V		2.0		ns
				V_{CCB}=3.3V		1.7		ns
				V_{CCB}=5V		1.4		ns
			V_{CCA}=1.5V±0.1V	V_{CCB}=1.8V±0.15V	0.9		4.7	ns
				V_{CCB}=2.5V±0.2V	0.6		3.2	ns
				V_{CCB}=3.3V±0.3V	0.5		2.5	ns
				V_{CCB}=5V±0.5V	0.4		2.7	ns
			V_{CCA}=1.8V±0.15V	V_{CCB}=1.8V±0.15V	0.9		4.7	ns
				V_{CCB}=2.5V±0.2V	0.6		3.2	ns
				V_{CCB}=3.3V±0.3V	0.5		2.5	ns
				V_{CCB}=5V±0.5V	0.4		2.7	ns
			V_{CCA}=2.5V±0.2V	V_{CCB}=2.5V±0.2V	0.7		3.2	ns
				V_{CCB}=3.3V±0.3V	0.5		2.5	ns
				V_{CCB}=5V±0.5V	0.4		2.7	ns
			V_{CCA}=3.3V±0.3V	V_{CCB}=3.3V±0.3V	0.5		4.1	ns
				V_{CCB}=5V±0.5V	0.4		4.7	ns

■ SWITCHING CHARACTERISTICS (Cont.)

PARAMETER		SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Data Rate		f_{data}	V_{CCA}=1.2V	V_{CCB}=1.8V		70		Mbps
				V_{CCB}=2.5V		80		Mbps
				V_{CCB}=3.3V		80		Mbps
				V_{CCB}=5V		80		Mbps
Pulse Duration	Data Inputs	t_W		V_{CCB}=1.8V		15		ns
				V_{CCB}=2.5V		13		ns
				V_{CCB}=3.3V		13		ns
				V_{CCB}=5V		13		ns
Data Rate		f_{data}	V_{CCA}=1.5V±0.1V	V_{CCB}=1.8V±0.15V			40	Mbps
				V_{CCB}=2.5V±0.2V			40	Mbps
				V_{CCB}=3.3V±0.3V			40	Mbps
				V_{CCB}=5V±0.5V			40	Mbps
Pulse Duration	Data Inputs	t_W		V_{CCB}=1.8V±0.15V	25			ns
				V_{CCB}=2.5V±0.2V	25			ns
				V_{CCB}=3.3V±0.3V	25			ns
				V_{CCB}=5V±0.5V	25			ns
Data Rate		f_{data}	V_{CCA}=1.8V±0.15V	V_{CCB}=1.8V±0.15V			49	Mbps
				V_{CCB}=2.5V±0.2V			60	Mbps
				V_{CCB}=3.3V±0.3V			60	Mbps
				V_{CCB}=5V±0.5V			60	Mbps
Pulse Duration	Data Inputs	t_W		V_{CCB}=1.8V±0.15V	20			ns
				V_{CCB}=2.5V±0.2V	17			ns
				V_{CCB}=3.3V±0.3V	17			ns
				V_{CCB}=5V±0.5V	17			ns
Data Rate		f_{data}	V_{CCA}=2.5V±0.2V	V_{CCB}=2.5V±0.2V			85	Mbps
				V_{CCB}=3.3V±0.3V			100	Mbps
				V_{CCB}=5V±0.5V			100	Mbps
Pulse Duration	Data Inputs	t_W		V_{CCB}=2.5V±0.2V	12			ns
				V_{CCB}=3.3V±0.3V	10			ns
				V_{CCB}=5V±0.5V	10			ns
Data Rate		f_{data}	V_{CCA}=3.3V±0.3V	V_{CCB}=3.3V±0.3V			100	Mbps
				V_{CCB}=5V±0.5V			100	Mbps
Pulse Duration	Data Inputs	t_W		V_{CCB}=3.3V±0.3V	10			ns
				V_{CCB}=5V±0.5V	10			ns

Notes: 1. Delay between OE going LOW and when the outputs are actually disabled.
2. Skew between any two outputs of the same package switching in the same direction.

■ OPERATING CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	A Port Input B Port Output	C_{PDA}	C_L=0, f=10MHz t_r=t_f=1nS OE=V_{CCA} (Output Enabled)	V_{CCA}=1.2V, V_{CCB}=1.8V		5		pF
				V_{CCA}=1.2V, V_{CCB}=5V		5		pF
				V_{CCA}=1.5V, V_{CCB}=1.8V		5		pF
				V_{CCA}=1.8V, V_{CCB}=1.8V		5		pF
				V_{CCA}=2.5V, V_{CCB}=2.5V		5		pF
				V_{CCA}=2.5V, V_{CCB}=5V		5		pF
				V_{CCA}=3.3V, V_{CCB}=3.3~5V		5		pF
	B Port Input A Port Output			V_{CCA}=1.2V, V_{CCB}=1.8V		8		pF
				V_{CCA}=1.2V, V_{CCB}=5V		8		pF
				V_{CCA}=1.5V, V_{CCB}=1.8V		8		pF
				V_{CCA}=1.8V, V_{CCB}=1.8V		8		pF
				V_{CCA}=2.5V, V_{CCB}=2.5V		8		pF
				V_{CCA}=2.5V, V_{CCB}=5V		8		pF
				V_{CCA}=3.3V, V_{CCB}=3.3~5V		8		pF
Power Dissipation Capacitance	A Port Input B Port Output		C_L=0, f=10MHz t_r=t_f=1nS OE=GND (Output Disabled)	V_{CCA}=1.2V, V_{CCB}=1.8V		0.12		pF
				V_{CCA}=1.2V, V_{CCB}=5V		0.12		pF
				V_{CCA}=1.5V, V_{CCB}=1.8V		0.04		pF
				V_{CCA}=1.8V, V_{CCB}=1.8V		0.05		pF
				V_{CCA}=2.5V, V_{CCB}=2.5V		0.08		pF
				V_{CCA}=2.5V, V_{CCB}=5V		0.08		pF
				V_{CCA}=3.3V, V_{CCB}=3.3~5V		0.07		pF

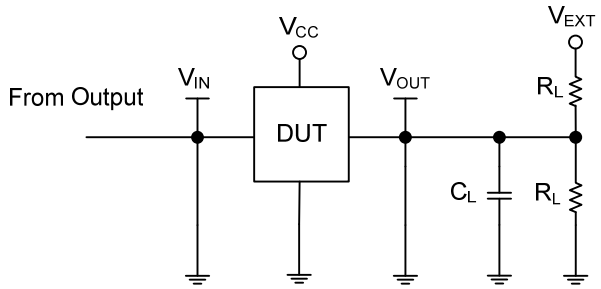
■ OPERATING CHARACTERISTICS (Cont.)

PARAMETER		SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	B Port Input A Port Output	C_{PDA}	C_L=0, f=10MHz t_r=t_f=1nS OE=GND (Output Disabled)	V_{CCA}=1.2V, V_{CCB}=1.8V		0.01		pF
				V_{CCA}=1.2V, V_{CCB}=5V		0.01		pF
				V_{CCA}=1.5V, V_{CCB}=1.8V		0.01		pF
				V_{CCA}=1.8V, V_{CCB}=1.8V		0.01		pF
				V_{CCA}=2.5V, V_{CCB}=2.5V		0.01		pF
				V_{CCA}=2.5V, V_{CCB}=5V		0.01		pF
				V_{CCA}=3.3V, V_{CCB}=3.3~5V		0.01		pF
	A Port Input B Port Output	C_{PDB}	C_L=0, f=10MHz t_r=t_f=1nS OE=V_{CCA} (Output Enabled)	V_{CCA}=1.2V, V_{CCB}=1.8V		18		pF
				V_{CCA}=1.2V, V_{CCB}=5V		18		pF
				V_{CCA}=1.5V, V_{CCB}=1.8V		18		pF
				V_{CCA}=1.8V, V_{CCB}=1.8V		18		pF
				V_{CCA}=2.5V, V_{CCB}=2.5V		18		pF
				V_{CCA}=2.5V, V_{CCB}=5V		18		pF
				V_{CCA}=3.3V, V_{CCB}=3.3~5V		18		pF
	B Port Input A Port Output			V_{CCA}=1.2V, V_{CCB}=1.8V		13		pF
				V_{CCA}=1.2V, V_{CCB}=5V		16		pF
				V_{CCA}=1.5V, V_{CCB}=1.8V		12		pF
				V_{CCA}=1.8V, V_{CCB}=1.8V		12		pF
				V_{CCA}=2.5V, V_{CCB}=2.5V		12		pF
				V_{CCA}=2.5V, V_{CCB}=5V		12		pF
				V_{CCA}=3.3V, V_{CCB}=3.3~5V		13		pF

■ OPERATING CHARACTERISTICS (Cont.)

PARAMETER		SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	A Port Input B Port Output	C_{PDB}	C_L=0, f=10MHz t_r=t_f=1nS OE=GND (Output Disabled)	V_{CCA}=1.2V, V_{CCB}=1.8V		0.01		pF
				V_{CCA}=1.2V, V_{CCB}=5V		0.01		pF
				V_{CCA}=1.5V, V_{CCB}=1.8V		0.01		pF
				V_{CCA}=1.8V, V_{CCB}=1.8V		0.01		pF
				V_{CCA}=2.5V, V_{CCB}=2.5V		0.01		pF
				V_{CCA}=2.5V, V_{CCB}=5V		0.01		pF
				V_{CCA}=3.3V, V_{CCB}=3.3~5V		0.01		pF
	B Port Input A Port Output			V_{CCA}=1.2V, V_{CCB}=1.8V		0.07		pF
				V_{CCA}=1.2V, V_{CCB}=5V		0.09		pF
				V_{CCA}=1.5V, V_{CCB}=1.8V		0.07		pF
				V_{CCA}=1.8V, V_{CCB}=1.8V		0.07		pF
				V_{CCA}=2.5V, V_{CCB}=2.5V		0.05		pF
				V_{CCA}=2.5V, V_{CCB}=5V		0.09		pF
				V_{CCA}=3.3V, V_{CCB}=3.3~5V		0.09		pF

■ TEST CIRCUIT AND WAVEFORMS



Notes: R_L=Load resistance.
C_L=Load capacitance including jig and probe capacitance.
V_{EXT}=External voltage for measuring switching times.

Table 1. Measurement Points

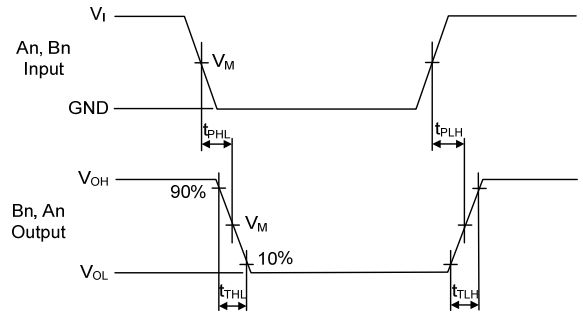
Supply Voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
1.2V	$0.5\times V_{CCI}$	$0.5\times V_{CCO}$	V_{OL}+0.1V	V_{OH}－0.1V
1.5V±0.1V	$0.5\times V_{CCI}$	$0.5\times V_{CCO}$	V_{OL}+0.1V	V_{OH}－0.1V
1.8V±0.15V	$0.5\times V_{CCI}$	$0.5\times V_{CCO}$	V_{OL}+0.15V	V_{OH}－0.15V
2.5V±0.2V	$0.5\times V_{CCI}$	$0.5\times V_{CCO}$	V_{OL}+0.15V	V_{OH}－0.15V
3.3V±0.3V	$0.5\times V_{CCI}$	$0.5\times V_{CCO}$	V_{OL}+0.3V	V_{OH}－0.3V
5V±0.5V	$0.5\times V_{CCI}$	$0.5\times V_{CCO}$	V_{OL}+0.3V	V_{OH}－0.3V

Table 2. Test Data

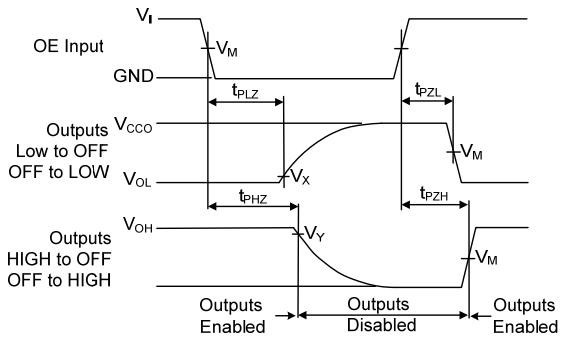
Supply Voltage		Input		Load		V_{EXT}		
V_{CCA}	V_{CCB}	V_I	Δt/Δv	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
1.2V~3.6V	1.65V~5.5V	V_{CCI}	≤1.0 ns/V	15pF	50kΩ, 1MΩ	Open	Open	$2\times V_{CCO}$

Notes: 1. V_{CCI} is the supply voltage associated with the input.
2. For measuring data rate, pulse width, propagation delay and output rise and fall measurements, R_L=1MΩ; for measuring enable and disable times, R_L=50kΩ.
3. V_{CCO} is the supply voltage associated with the output

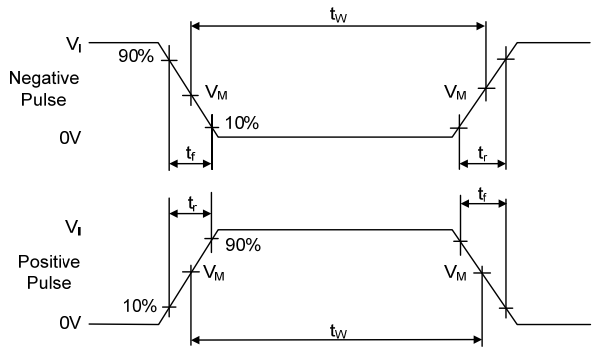
■ TEST CIRCUIT AND WAVEFORMS (Cont.)



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES



TEST SWITCHING TIMES

Notes: 1. V_{CCI} is the supply voltage associated with the input V_{CCO} is the supply voltage associated with the output.

2. All input pulses are supplied by generators having the following characteristics: PRR=10MHz for measuring enable and disable times, Z_O=50kΩ, dv/dt ≥ 1V/ns.

■ DETAILED DESCRIPTION

Overview

The architecture of the **UNTB0102** is shown in Figure 1. The device does not require an extra input signal to control the direction of data flow from A to B or from B to A. In a static state, the output drivers of the **UNTB0102** can maintain a defined output level, but the output architecture is designed to be weak, so that they can be overdriven by an external driver when data on the bus starts flowing in the opposite direction. The output of one-shot circuits detect rising or falling edges on the A or B ports. During a rising edge, the one-shot circuits turn on the PMOS transistors (T1, T3) for a short duration, accelerating the LOW-to-HIGH transition. Similarly, during a falling edge, the one-shot circuits turn on the NMOS transistors (T2, T4) for a short duration, accelerating the HIGH-to-LOW transition. During output transitions the typical output impedance is 70 Ω at V_{CCO}=1.2V to 1.8V,50Ω at V_{CCO}=1.8V to 3.3V and 40Ω at V_{CCO}=3.3V to 5.0V.

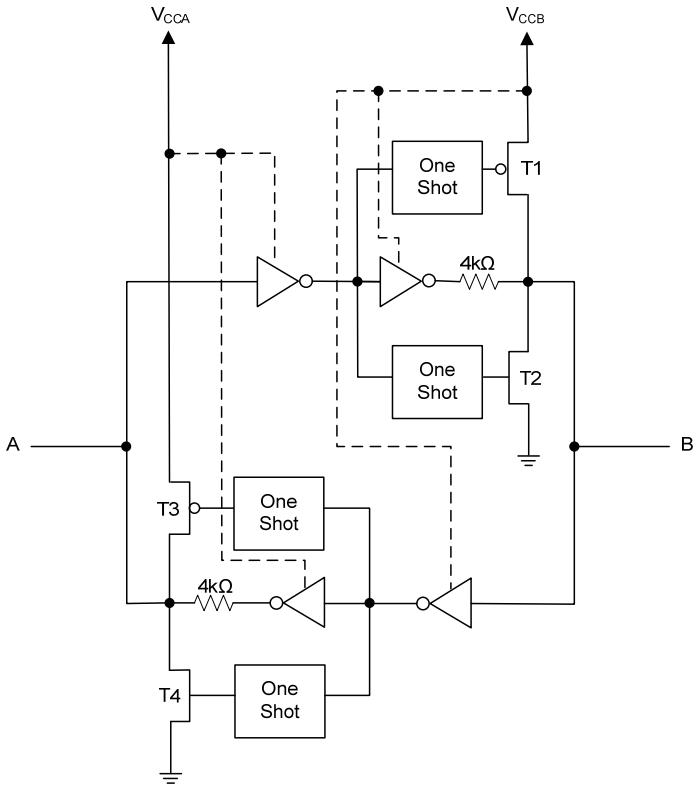


Figure 1. Architecture of UNTB0102 I/O Cell

Power-up

During operation V_{CCA} must never be higher than V_{CCB}, however during power-up $V_{CCA} \geq V_{CCB}$ does not damage the device, so either power supply can be ramped up first. There is no special power-up sequencing required. The **UNTB0102** includes circuitry that disables all output ports when either V_{CCA} or V_{CCB} is switched off.

Enable and Disable

An output enable input (OE) is used to disable the device. Setting OE=LOW causes all I/Os to assume the high-impedance OFF-state. The disable time (tdis with no external load) indicates the delay between when OE goes LOW and when outputs actually become disabled. The enable time (ten) indicates the amount of time the user must allow

for one one-shot circuitry to become operational after OE is taken HIGH. To ensure the high-impedance OFF-state during power-up or power-down, pin OE should be tied to GND through a pull-down resistor, the minimum value of the resistor is determined by the current-sourcing capability of the driver.

Pull-up or Pull-down Resistors on I/O Lines

As mentioned previously the **UNTB0102** is designed with low static drive strength to drive capacitive loads of up to 70pF. To avoid output contention issues, any pull-up or pull-down resistors used must be above 50kΩ. For this reason the **UNTB0102** is not recommended for use in open drain driver applications such as 1-Wire or I^2C-bus. For these applications, the level translator is recommended.

■ TYPICAL APPLICATION CIRCUIT