24-Bit, 1.8V to 3.3V Bi-Directional Level Shifting Transceiver

Product Features

- PI74HSTL1212 is designed for translation between 1.8V HSTL and LVCMOS
- Supports 1.8V HSTL Class I Buffer
- Industrial operation at –40°C to +85°C
- Dual Independent 12-Bit Slice Direction Control
- Packaging: 64-pin plastic 240-mil TSSOP (A)

Product Description

Pericom Semiconductor's HSTL series of logic circuits are produced using the Company's advanced submicron CMOS technology, achieving industry leading performance.

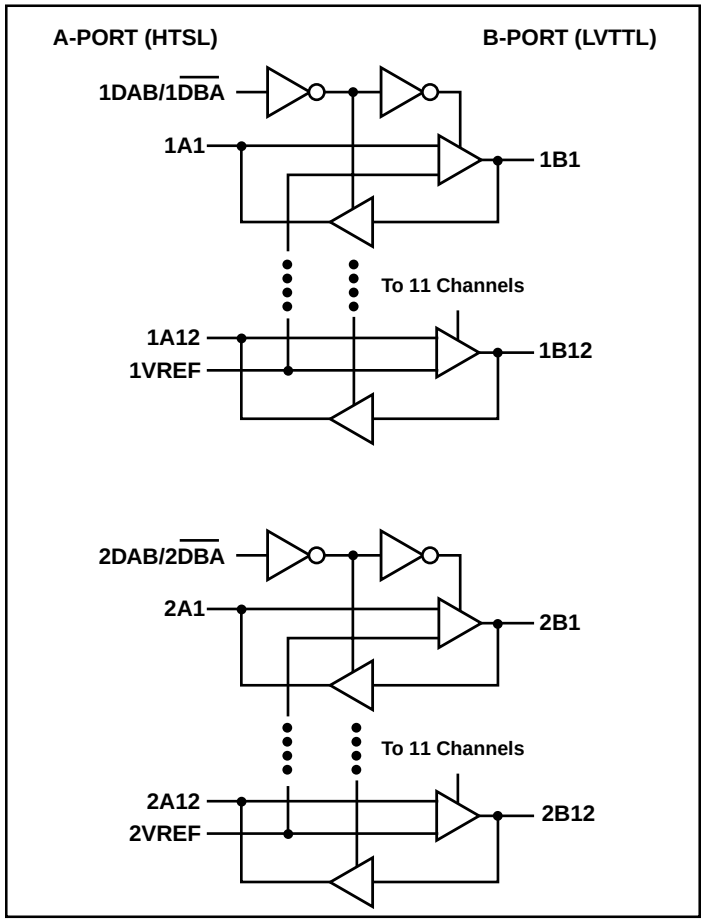
Pericom Semiconductor's PI74HSTL1212 consists of two 12-Bit bi-directional non-inverting tranceivers with two separate supply rails, A-Port ($V_{CC}A$) set at 1.8V, and B-Port ($V_{CC}B$) set at 3.3V. Each set of 12 tranceivers allows translation from a 1.8V to 3.3V and back again. The control inputs 1DAB/$\overline{1DBA}$ and 2DAB/$\overline{2DBA}$ allows independent 12-Bit slice direction control for greater flexibility.

The PI74HSTL1212 is particularly useful for asynchronous communications between HSTL and LVTTL/LVCMOS data buses.

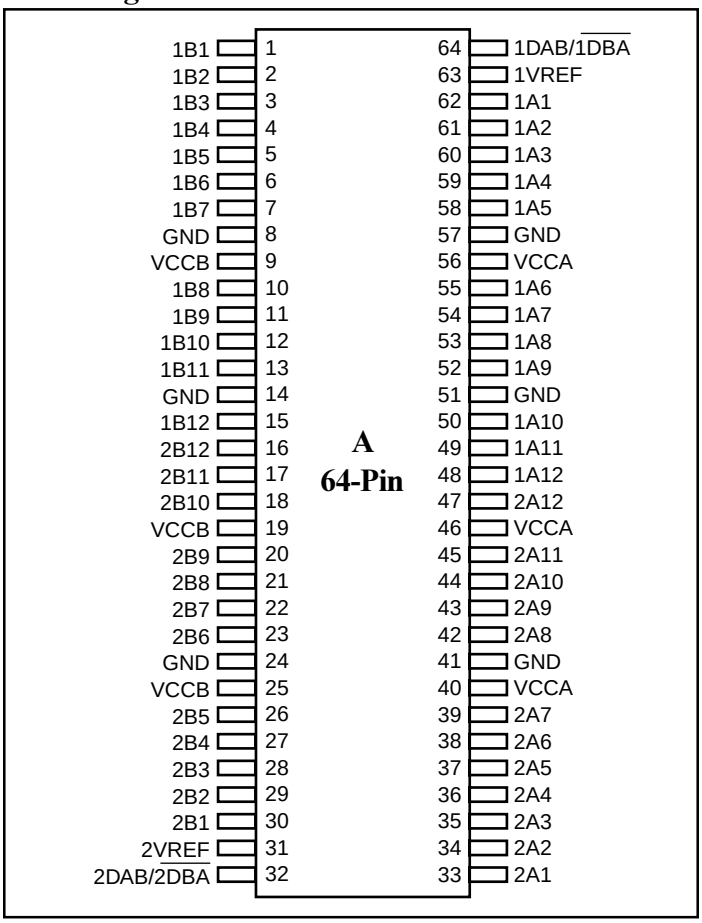
Truth Table (Each 12-bit slice)

Inputs	Operation
XDAB / X$\overline{DBA}$	
H (TTL)	XA to XB HSTL to LVTTL (LVCMOS)
L (TTL)	XB to XA, LVTTL (LVCMOS) to HSTL

Logic Block Diagram



Pin Configuration



Maximum Ratings

(Absolute maximum ratings over operating free-air temperature range from V_{CCB} at 3.3V & V_{CCA} at 1.5 - 2.5V (unless otherwise noted)

Supply voltage range:	V_{CCA}	–0.5V to 3.6V
	V_{CCB}	–0.5V to 3.6V
Input Voltage Range, V_I	Except I/O ports(1)	–0.5V to 3.6V
	I/O port A(2)	–0.5V to V_{CCA}+0.1V
	I/O port B(1)	–0.5V to V_{CCB}+0.1V
Input clamp current, I_{IK} (V_I <0)		–25mA
Output clamp current, I_{OK} (V_O <0)		–25mA
Continuous output current, I_O		±25mA
Continuous current through each V_{CC} or GND		±50mA
Package thermal impedance, 0_{JA}(3): A package		55°C/W
Storage temperature range, T_{STG}		–65°C to 150°C

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.

Notes:
1. This value is limited to 3.6V maximum.
2. This value is limited to 2.7V maximum.
3. The package thermal impedance is calculated in accordance with JESD 51.

Recommended Operating Conditions for V_{CCB} at 3.3V(4)

		Min.	Max.	Units
V_{CCB}	Supply voltage	3.0	3.6	V
V_{IH}	High-level voltage	2		
V_{IL}	Low-level voltage		0.8	
V_{IA}	Input Voltage	0	V_{CCB}	
V_{OB}	Output Voltage	0	V_{CCB}	
I_{OH}	High-level output current		–12	mA
I_{OL}	Low-level output current		12	
T_A	Operating free-air temperature	–40	85	°C

Recommended Operating Conditions for V_{CCA} at 1.8V(4)

			Min.	Nom.	Max.	Units
V_{CCA}	Supply Voltage		1.7	1.8	1.9	V
V_{REF}	Reference Voltage		0.85	0.9	0.95	V
V_{IN}	Input Voltage		0		1.9	V
V_{IH}	AC High-Level Input Voltage	All Inputs	V_{REF} +200mV			V
V_{IL}	AC Low-Level Input Voltage				V_{REF} –200mV	V
V_{IH}	DC High-Level Input Voltage		V_{REF} +100mV		V_{CCA} +300mV	V
V_{IL}	DC Low-Level Input Voltage		–500mV		V_{REF} –100mV	V
I_{OH}	High-Level Output Current				–8	mA
I_{OL}	Low-Level Output Current				8	mA
T_A	Operating Free-Air Temperature		–40		85	°C

Note:
4. To ensure proper device operation, all unused device inputs must be held at the associated V_{CC} or GND.

Electrical Characteristics, V_{CCA}

Over recommended operating free-air temperature range for V_{CCA} = 1.8V ±100mV

Parameters		Test Conditions	V_{CCA}	Min.	Typ.(1)	Max.	Units
V_{OH}		I_{OH} = –8mA	1.7	V_{CCA} –0.4			V
V_{OL}		I_{OH} = 8mA	1.7			0.4	
I_{DD}		V_{IN} = 0 or V_{CCA}	1.9			TBD	
I_I	Data Inputs	V_{IN} = 0 or V_{CCA}	1.9			±5	µA
	V_{REF}	V_{REF} = 0.95V	1.9			90	
C_O	Outputs	V_O = 0	0		6.0		pF

Note:
1. Typical values at V_{CCA} 1.8V and T_A = 25°C

Electrical Characteristics, V_{CCB}

Over recommended operating free-air temperature range for V_{CCB} = 3.3V ±300mV

Parameters		Test Conditions	V_{CCB}	Min.	Typ.(1)	Max.	Units
V_{IK}		I_I = –18mA	3.0			–1.2	V
V_{OH}		I_{OH} = –12mA	3.0	2.4			
V_{OL}		I_{OH} = 12mA	3.0			0.5	
I_{DD}		V_{IN} = 0 or V_{CCB}	3.6			TBD	
I_I	Control Inputs	V_{IN} = 0 or V_{CCB}	3.6			±5	µA
	Data Inputs	V_{IN} = 0 or V_{CCB}	3.6			±5	
C_I	Control Inputs	V_{IN} = 0 or 3.3V	3.3		4.4		pF
C_O	Outputs	V_O = 0	0		6.0		

Note:
1. Typical values at V_{CCB} 3.3V and T_A = 25°C

Switching Characteristics

Over recommended operating free-air temperature range (see Figures 1, 2, & 3)

Parameter	From (Input)	To (Output)	V_{CCA} = 1.8V ± 0.1V	V_{CCB} = 3.3V ± 0.3V	Units
			Min.	Max.	
t_{PD}	A	B	1.0	3.0	ns
	B	A	1.0	3.0	
$t_{sk(o)}$(1)				0.3	

Note:
1. This is the skew between any two outputs in the same 12-bit bank of the same package switching in any direction on the same port. This is guaranteed by design, this is not a production test.

Parameter Measurement Information - B to A Direction
V_{CCB} = 3.3V±0.3V and V_{CCA} = 1.8V ±0.10V

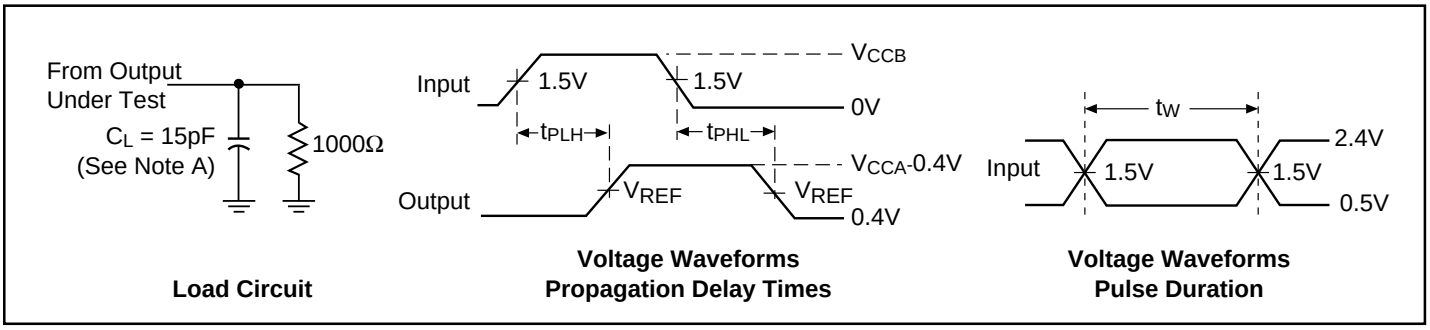


Figure 1. Load Circuit and Voltage Waveforms

Parameter Measurement Information - A to B Direction
V_{CCA} = 1.8V ± 0.10V and V_{CCB} = 3.3V ± 0.3V

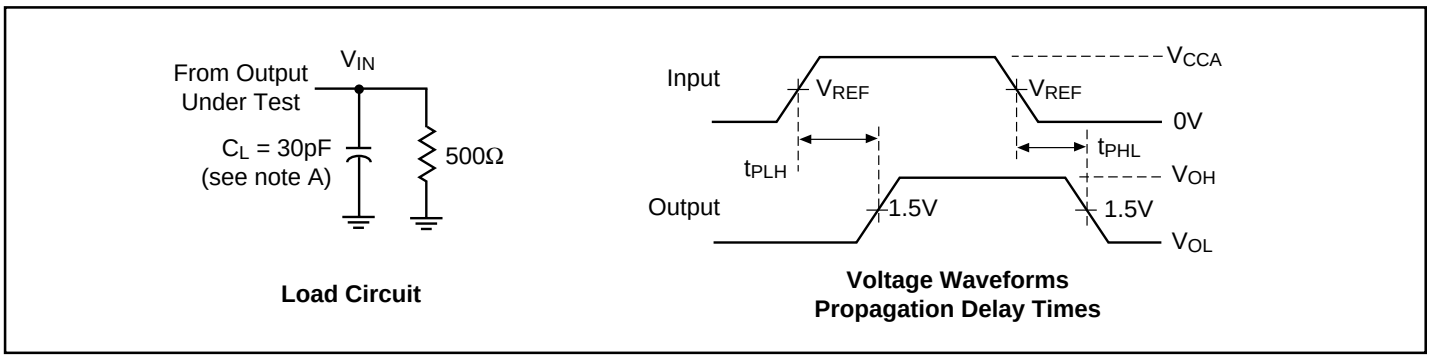


Figure 2. Load Circuit and Voltage Waveforms

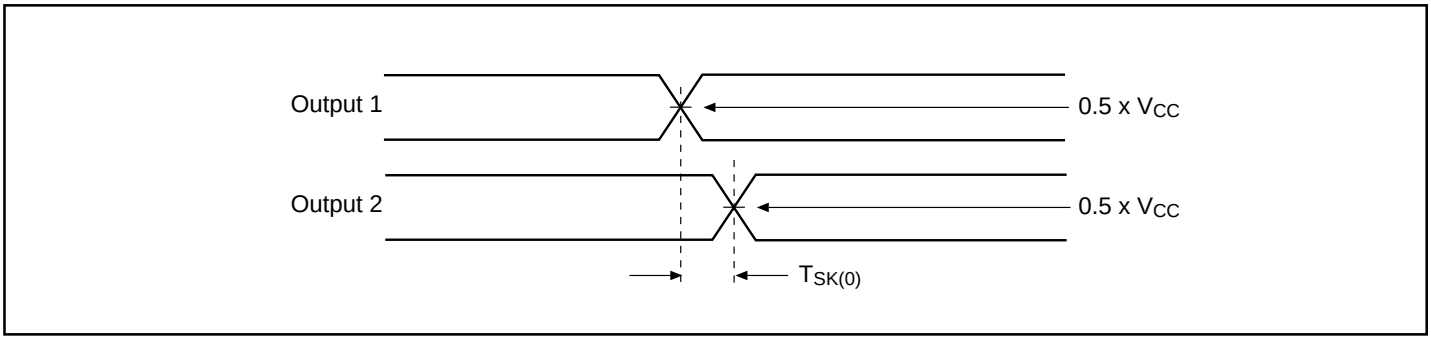
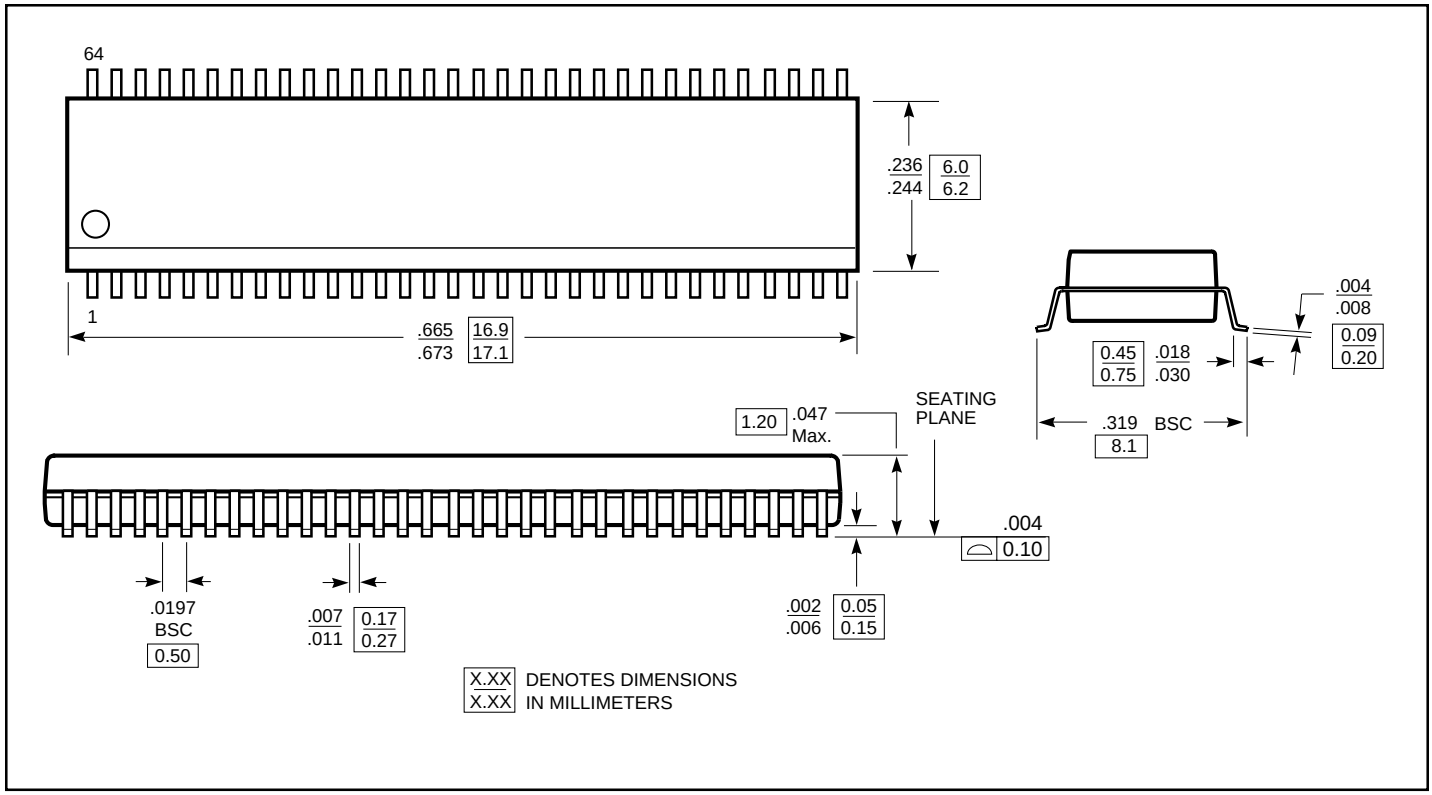


Figure 3. Opposite Edge Skew

Notes:
A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10Mz, Z_O = 50 ohms, $t_R \leq 2.5$ns, $t_F \leq 2.5$ns.
D. The outputs are measured one at a time with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{DIS}.
F. t_{PZL} and t_{PZH} are the same as t_{EN}.
G. t_{PLH} and t_{PHL} are the same as t_{PD}.

Packaging Mechanical: 64-pin TSSOP (A)



Ordering Information	Description
PI74HSTL1212A	64-pin, 240-mil wide plastic TSSOP