8-BIT LVTTL/GTLP BUS TRANSCEIVER

IDT74GTLP306

FEATURES:

- **Bidirectional interface between GTLP and LVTTL logic levels**
- **Edge Rate Control Circuit reduces output noise**
- **V_{REF} pin provides reference voltage for receiver threshold**
- **CMOS technology for low power dissipation**
- **Special PVT Compensation circuitry to provide consistent performance over variations of process, supply voltage, and temperature**
- **5V tolerant inputs on LVTTL ports**
- **Bus-Hold to eliminate the need for external pull-up resistors for unused inputs to A-Port**
- **Power up/down and power-off high-impedance for live insertion**
- **TTL-compatible Driver and Control inputs**
- **High Output source/sink ±24mA on A-Port pins**
- **Flow-through architecture optimizes system layout**
- **Open drain on GTLP to support wired OR connection**
- **ESD performance of >2000V**
- **Available in TSSOP package**

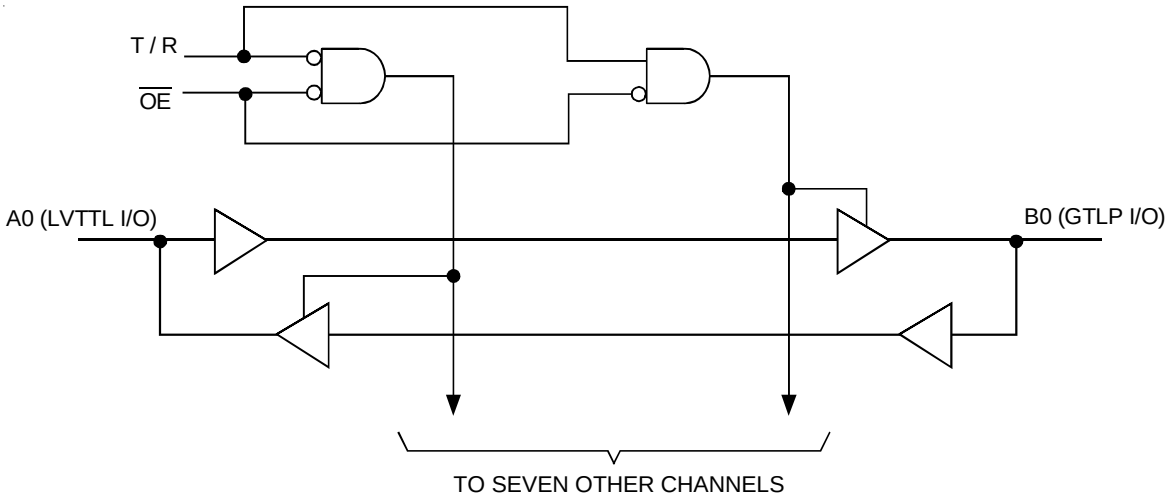
DESCRIPTION:

The GTLP306 is an 8-bit bus transceiver. It provides signal level translation, from LVTTL to GTLP, for applications requiring a high-speed interface between cards operating at LVTTL logic levels and back-planes operating at GTLP logic levels. GTLP provides reduced output swing (<1V), reduced input threshold levels, and output edge-rate control to minimize signal setting times. The GTLP306 is a derivative of the Gunning Transceiver Logic (GTL) JEDEC standard JESD8-3 and incorporates internal edge-rate control, which is process, voltage, and temperature (PVT) compensated.

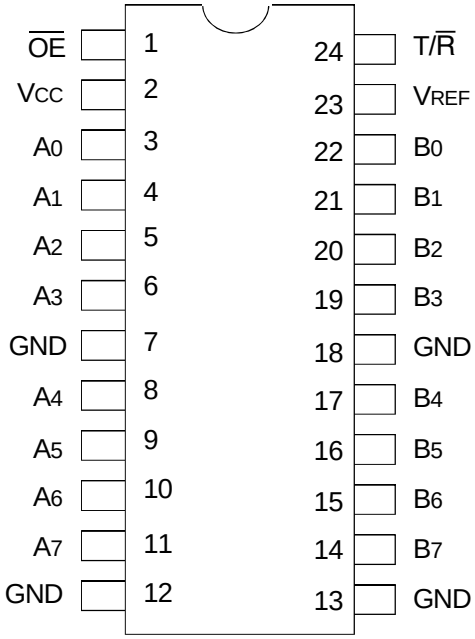
The GTLP306 combines a transceiver function with an LVTTL to GTLP translation. Data polarity is non-inverting, and the data flow direction is controlled by the T/$\overline{R}$ pin. The outputs are enabled to allow data through the device when $\overline{OE}$ is low. Otherwise, both A and B are placed in a high-impedance state.

GTLP output low voltage is less than 0.5V. The output high is 1.5V, and the receiver threshold is 1V.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



TSSOP
TOP VIEW

PIN DESCRIPTION

Pin Names	Description(1)
$\overline{OE}$	Output Enable (Active LOW)
T/$\overline{R}$	Transmit/Receive Input
V_{REF}	GTLP Input Reference Voltage
A_0 - A_7	Side A Inputs or 3-State Outputs
B_0 - B_7	Side B Inputs or 3-State Outputs

NOTE:
1. A-Port pins have Bus-Hold. All other pins are standard input, output, or I/O.

FUNCTION TABLE(1)

Inputs		
$\overline{OE}$	T/$\overline{R}$	Output
H	X	High Z on Bus A and Bus B
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B

NOTE:
1. H = HIGH Voltage Level
   X = Don't Care
   L = LOW Voltage Level

ABSOLUTE MAXIMUM RATINGS(1,2)

Symbol	Rating	Max.	Unit
V_{CC}	Supply Voltage	–0.5 to +7	V
V_I	DC Input Voltage	–0.5 to +7	V
V_O	DC Output Voltage, 3-State	–0.5 to +7	V
V_O	DC Output Voltage, Active	–0.5 to +7	V
I_{OL}	DC Output Sink Current into A-port	48	mA
I_{OH}	DC Output Source Current from A-port	–48	mA
I_{OL}	DC Output Sink Current into B-port (in the LOW state)	100	mA
I_{IK}	DC Input Diode Current $V_I < 0V$	–50	mA
I_{OK}	DC Output Diode Current $V_O < 0V$	–50	mA
I_{OK}	DC Output Diode Current $V_O > V_{CC}$	+50	mA
T_{STG}	Storage Temperature	–65 to +150	°C

NOTES:
1. Stresses greater than those listed under ABSOLUTE 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.
2. Unused inputs without Bus-Hold must be held HIGH or LOW.

CAPACITANCE (T_A = +25°C, f = 1.0MHz)

Symbol	Parameter(1)	Conditions	Typ.(2)	Max.	Unit
C_{IN}	Control Pins	$V_I = V_{CCQ}$ or 0	5	—	pF
$C_{I/O}$	A-Port	$V_I = V_{CCQ}$ or 0	7	—	pF
$C_{I/O}$	B-Port	$V_I = V_{CCQ}$ or 0	9	—	pF

NOTES:
1. As applicable to the device type.
2. All typical values are at V_{CC} = 3.3V.

RECOMMENDED OPERATING CONDITIONS(1)

Symbol	Rating	Recommended	Unit
V_{CC}	Supply Voltage	3.15 to 3.45	V
V_{TT}	Bus Termination Voltage	1.35 to 1.65	V
V_I	Input Voltage on A-Port and Control Pins	0 to 5.5	V
I_{OH}	HIGH Level Output Current (A-Port)	-24	mA
I_{OL}	LOW Level Output Current (A-Port)	+24	mA
I_{OL}	LOW Level Output Current (B-Port)	50	mA
T_A	Operating Temperature	–40 to +85	°C

NOTE:
1. Unused inputs without Bus-Hold must be held HIGH or LOW.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Industrial: T_A = –40°C to +85°C, V_{REF} = 1V, V_{CC} = 3.3V ± 5%

Symbol	Parameter	Test Conditions		Min.	Typ.(1)	Max.	Unit
V_{IH}	B-Port	—		V_{REF}+ 0.05	—	V_{TT}	V
	All Other ports	—		2	—	—	
V_{IL}	B-Port	—		0	—	V_{REF}– 0.05	V
	All Other ports	—		—	—	0.8	
V_{REF}	GTLP	—		—	1	—	V
	GTL	—		—	0.8	—	
V_{IK}	—	V_{CC} = 3.15V	I_I = –18mA	—	—	–1.2	V
V_{OH}	A-Port	V_{CC} = Min to Max(2)	I_{OH} = –100µA	V_{CC}–0.2	—	—	V
		V_{CC} = 3.15V	I_{OH} = –12mA	2.4	—	—	
			I_{OH} = –24mA	2	—	—	
V_{OL}	A-Port	V_{CC} = Min to Max(2)	I_{OL} = 100µA	—	—	0.2	V
		V_{CC} = 3.15V	I_{OL} = 24mA	—	—	0.5	
	B-Port	V_{CC} = 3.15V	I_{OL} = 40mA	—	—	0.4	
			I_{OL} = 50mA	—	—	0.55	
I_I	Control Pins	V_{CC} = 3.45V	V_I = 5.5V or 0V	—	—	±5	µA
	A-Port	V_{CC} = 3.45V	V_I = 5.5V	—	—	20	
			V_I = 0	—	—	–20	
	B-Port	V_{CC} = 3.45V	V_I = V_{TT}	—	—	5	
			V_I = 0	—	—	–5	
I_{OFF}	A-Port	V_{CC} = 0	V_I or V_O = 0 to 4.5V	—	—	100	µA
$I_{I(HOLD)}$	A-Port	V_{CC} = 3.15V	V_I = 0.8V	75	—	—	µA
			V_I = 2V	–20	—	—	
I_{OZH}	A-Port	V_{CC} = 3.45V	V_O = 3.45 V	—	—	20	µA
	B-Port		V_O = 1.5V	—	—	5	
I_{OZL}	A-Port	V_{CC} = 3.45V	V_O = 0	—	—	–20	µA
	B-Port		V_O = 0.55V	—	—	–5	
I_{CC} (V_{CC})	A or B Ports	V_{CC} = 3.45V	Outputs HIGH	—	7	18	mA
		I_O = 0	Outputs LOW	—	8	20	
		V_I = V_{CC} or GND	Outputs Disabled	—	8	20	
ΔI_{CC}(3)	A-Port and Control Pins	V_{CC} = 3.45V A or Control Inputs at V_{CC} or GND	One Input at V_{CC} - 0.6V	—	0	1	mA

NOTES:

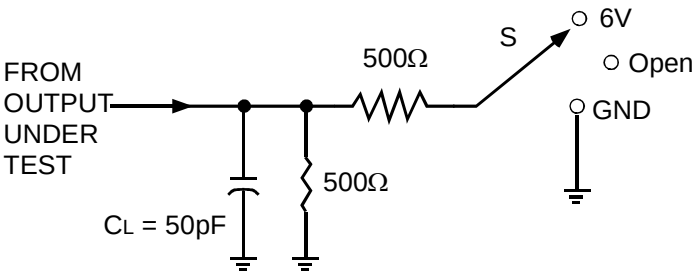
1. All typical values are at V_{CC} = 3.3V and T_A = 25°C.
2. For conditions shown as Max. or Min., use appropriate value specified under Recommended Operating Conditions.
3. ΔI_{CC} is the increase in supply current for each input that is at the specified LVTTL voltage level rather than V_{CC} or GND.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE (1,2)

Symbol	Parameter	Min.	Typ.(3)	Max.	Unit
t_{PLH}	Ax to Bx	1	4	7.5	ns
t_{PHL}		1	5.1	7.5	
t_{PLH}	Bx to Ax	1	5.8	8.3	ns
t_{PHL}		1	4.9	8.3	
t_{RISE}	Transition Time, B outputs (20% to 80%)	—	2.6	—	ns
t_{FALL}	Transition Time, B outputs (20% to 80%)	—	2.6	—	ns
t_{RISE}	Transition Time, A outputs (10% to 90%)	—	2.5	—	ns
t_{FALL}	Transition Time, A outputs (10% to 90%)	—	2.5	—	ns
t_{PZH}, t_{PZL}	$\overline{OE}$ to Ax	1	4.5	9.5	ns
t_{PHZ}, t_{PLZ}		1	4.9	9.5	
t_{PLH}	$\overline{OE}$ to Bx	1	5.4	9.5	ns
t_{PHL}		1	6	9.5	

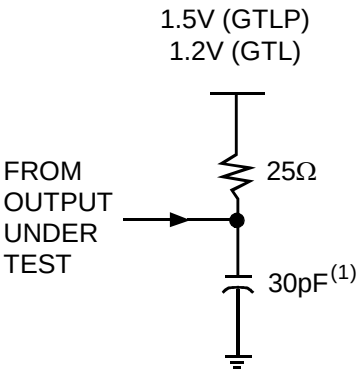
NOTES:
1. See Test Circuits and Waveforms. T_A = –40°C to +85°C.
2. Unless otherwise noted, V_{REF} = 1V.
3. Typical values are at V_{CC} = 3.3V and T_A = 25°C.

TEST CIRCUITS AND WAVEFORMS



NOTE:
1. C_L includes probes and jig capacitance.

Test Circuit for A Outputs(1)

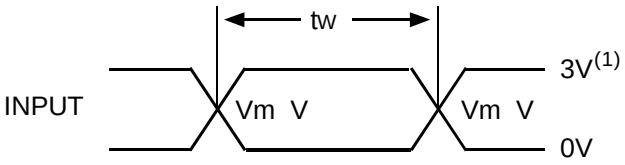


NOTE:
1. C_L includes probes and jig capacitance. For B-Port outputs, C_L = 30pF is used for worst case edge rate.

Test Circuit for B Outputs(1)

SWITCH POSITION

Test	Switch
t_{PLH} / t_{PHL}	Open
t_{PHZ} / t_{PZH}	GND
t_{PLZ} / t_{PZL}	6V

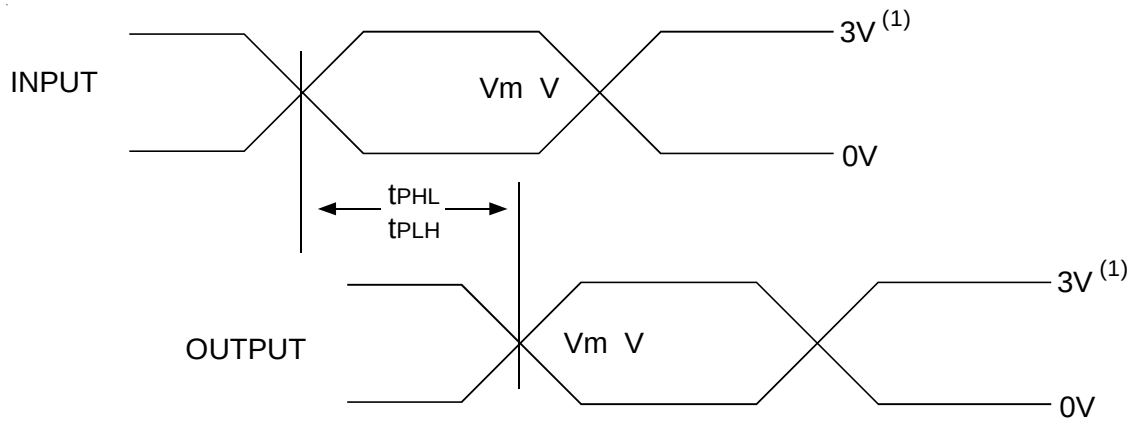


NOTE:
1. 1.5V for B-Port GTLP.
   1.2V for B-Port GTL.

Voltage Waveforms Pulse Duration
(Vm = V_{CC}/2 for A-Port, 1V for GTLP B-Port, and 0.8V for GTL B-Port)

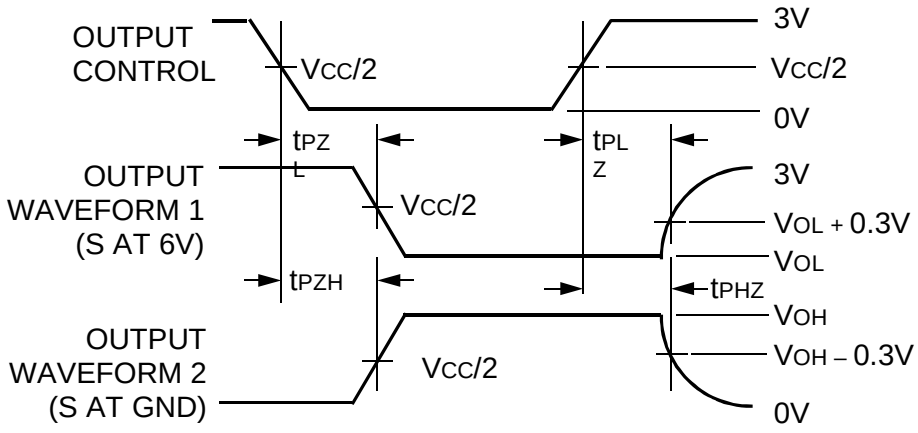
NOTE:
All input pulses have the following characteristics: frequency = 10 MHz, t_R = t_F = 2 ns, Z_O = 50Ω. The outputs are measured one at a time with one transition per measurement.

TEST CIRCUITS AND WAVEFORMS



Voltage Waveforms Propagation Delay Times (2)

NOTES:
1. 1.5V for B-Port GTLP, 1.2V for B-Port GTL.
2. $V_M = V_{CC}/2$ for A-port, 1V for GTLP B-port, and 0.8V for GTL B-port.

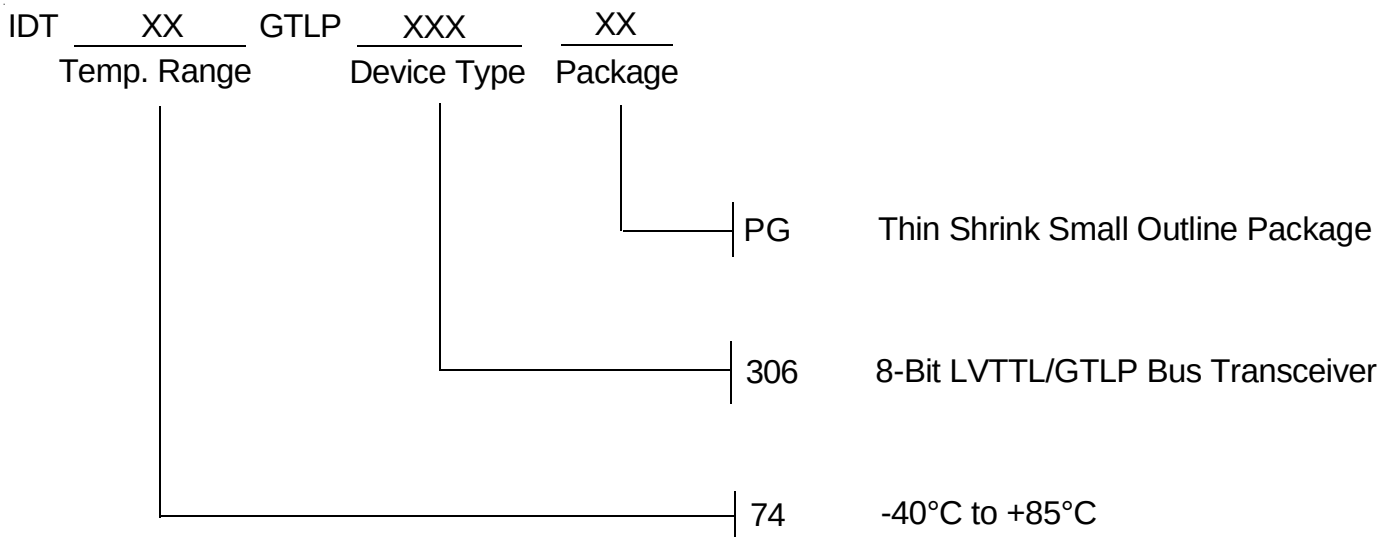


Voltage Waveforms Enable and Disable Times (A-Port)

NOTE:

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.
All input pulses have the following characteristics: frequency = 10 MHz, $t_R = t_F = 2$ ns, $Z_O = 50\Omega$. The outputs are measured one at a time with one transition per measurement.

ORDERING INFORMATION



CORPORATE HEADQUARTERS
2975 Stender Way
Santa Clara, CA 95054

for SALES:
800-345-7015 or 408-727-6116
fax: 408-492-8674
www.idt.com

for Tech Support:
logichelp@idt.com
(408) 654-6459