



3.3V CMOS 18-BIT UNIVERSAL BUS TRANSCEIVER WITH PARITY GENERATORS/CHECKERS, 5V TOLERANT I/O

IDT74LVC16901A

FEATURES:

- Typical $t_{SK(0)}$ (Output Skew) < 250ps
- ESD > 2000V per MIL-STD-883, Method 3015; > 200V using machine model (C = 200pF, R = 0)
- 0.50mm pitch TSSOP package
- Extended commercial range of -40°C to +85°C
- $V_{CC} = 3.3V \pm 0.3V$, Normal Range
- $V_{CC} = 2.7V$ to $3.6V$, Extended Range
- CMOS power levels (0.4 μ W typ. static)
- All inputs, outputs and I/O are 5 Volt tolerant
- Supports hot insertion

Drive Features for LVC16901:

- High Output Drivers: $\pm 24mA$
- Reduced system switching noise

APPLICATIONS:

- 5V and 3.3V mixed voltage systems
- Data communication and telecommunication systems

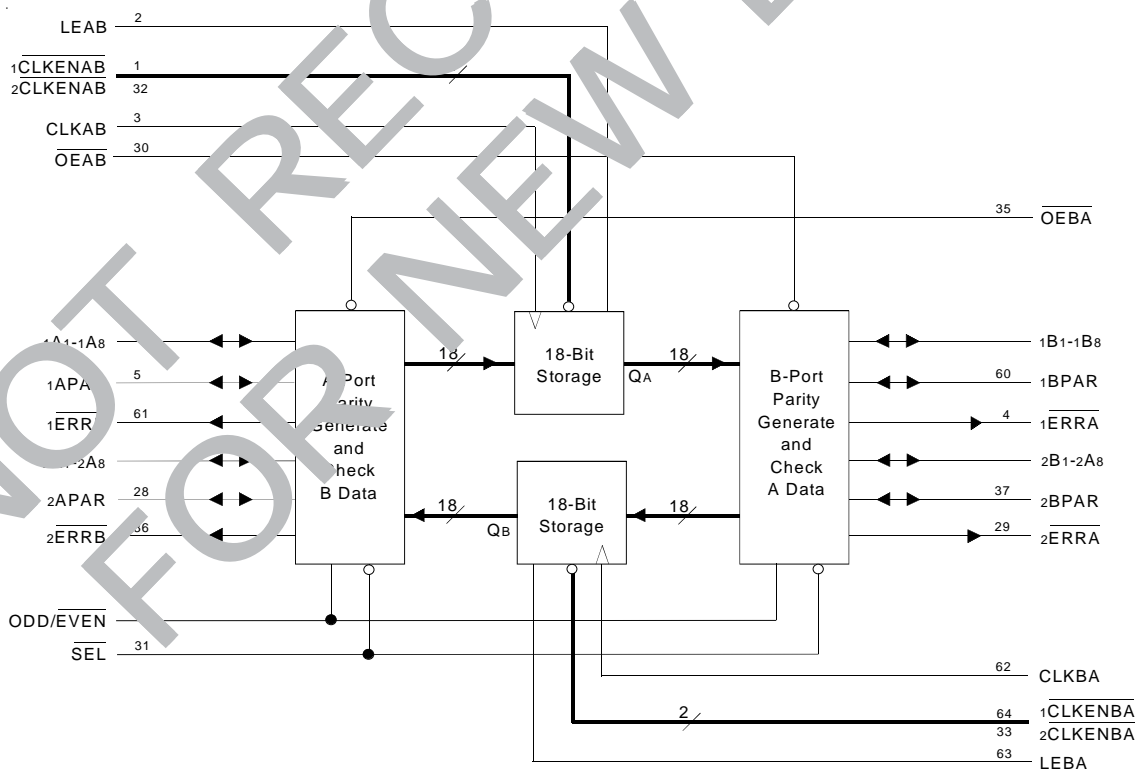
DESCRIPTION:

This 18-bit universal bus transceiver is built using advanced dual metal CMOS technology. The LVC16901 is a dual 9-bit to dual 9-bit parity transceiver with registers. The device can operate as a feed-through transceiver or it can generate/check parity from the two 8-bit data buses in either direction.

The LVC16901 features independent clock (CLKAB or CLKBA), latch-enable (LEAB or LEBA), and dual 9-bit clock enable ($\overline{CLKENAB}$ or $\overline{CLKENBA}$) inputs. It also provides parity-enable (\overline{SEL}) and parity-select (ODD/EVEN) inputs and separate error-signal (\overline{ERRA} and \overline{ERRB}) outputs for checking parity. The direction of data flow is controlled by \overline{OEAB} and \overline{OEBA} . When \overline{SEL} is low, the parity functions are enabled. When \overline{SEL} is high, the parity functions are disabled and the device acts as an 18-bit registered transceiver. Inputs can be driven from either 3.3V or 5V devices. This feature allows the use of this device as a translator in a mixed 3.3V/5V supply system.

The LVC16901 has been designed with a $\pm 24mA$ output driver. This driver is capable of driving a moderate to heavy load while maintaining speed performance.

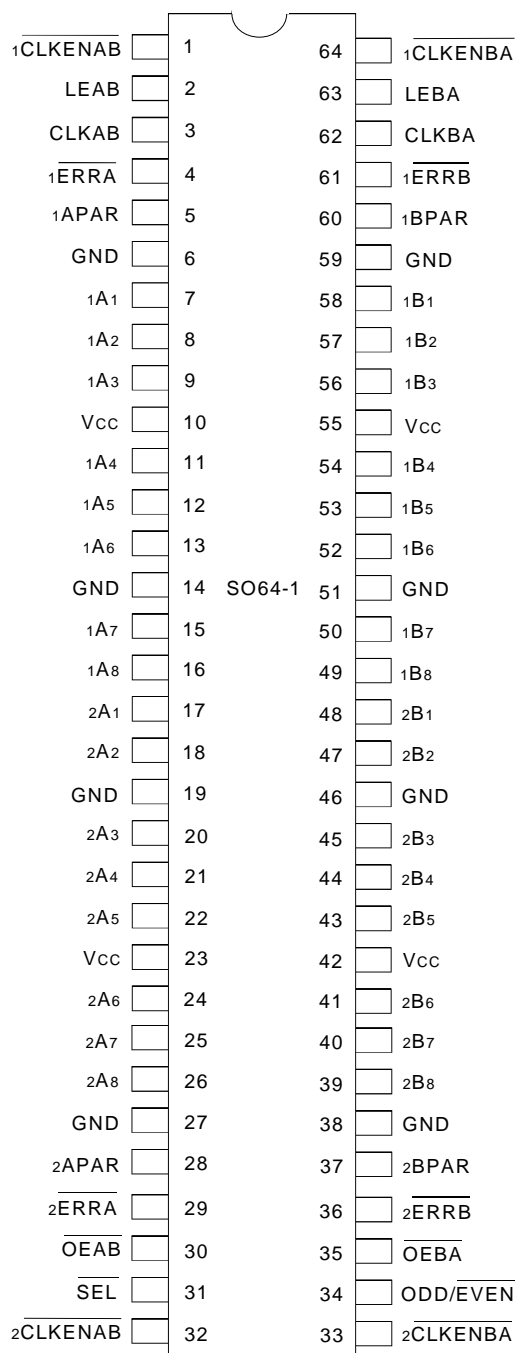
FUNCTIONAL BLOCK DIAGRAM



EXTENDED COMMERCIAL TEMPERATURE RANGE

APRIL 2000

PIN CONFIGURATION



TSSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS (1)

Symbol	Description	Max.	Unit
VTERM	Terminal Voltage with Respect to GND	- 0.5 to +6.5	V
TSTG	Storage Temperature	- 65 to +150	°C
IOUT	DC Output Current	- 50 to +50	mA
IIK	Continuous Clamp Current, Vi < 0 or Vo < 0	- 50	mA
ICC	Continuous Current through each Vcc or GND	±100	mA

LVC Link

NOTE:

- 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.

CAPACITANCE (TA = +25°C, f = 1.0MHz)

Symbol	Parameter(1)	Conditions	Typ.	Max.	Unit
CIN	Input Capacitance	VIN = 0V	4.5	6	pF
COUT	Output Capacitance	VOUT = 0V	6.5	8	pF
Ci/O	I/O Port Capacitance	VIN = 0V	6.5	8	pF

LVC Link

NOTE:

- As applicable to the device type.

PIN DESCRIPTION

Pin Names	Description
OEAB	A-to-B Output Enable Input (Active LOW)
OEBA	B-to-A Output Enable Input (Active LOW)
LEAB	A-to-B Latch Enable Input
LEBA	B-to-A Latch Enable Input
$\overline{x}CLKENAB$	A-to-B 9-bit Clock Enables
$\overline{x}CLKENBA$	B-to-A 9-bit Clock Enables
CLKAB	A-to-B Clock Input
CLKBA	B-to-A Clock Input
$\overline{x}ERRA$	A Error-Signal Outputs
$\overline{x}ERRB$	B Error-Signal Outputs
xAPAR	A Port Parities
xBPAR	B Port Parities
ODD/EVEN	Parity Select Input
SEL	Parity Enables
xAx	A-to-B Data Inputs or B-to-A 3-State Outputs
xBx	B-to-A Data Inputs or A-to-B 3-State Outputs

FUNCTION TABLE (1,2)

Inputs					Outputs
CLKENAB	OEAB	LEAB	CLKAB	xAx	xBx
X	H	X	X	X	Z
X	L	H	X	L	L
X	L	H	X	H	H
H	L	L	X	X	B ₀ ⁽³⁾
L	L	L	↑	L	L
L	L	L	↑	H	H
L	L	L	L	X	B ₀ ⁽³⁾
L	L	L	H	X	B ₀ ⁽⁴⁾

PARITY ENABLE

Inputs			Operation or Function	
SEL	OEBA	OEAB		
L	H	L	Parity is checked on port A and is generated on port B.	
L	L	H	Parity is checked on port B and is generated on port A.	
L	H	H	Parity is checked on port B and port A.	
L	L	L	Parity is generated on port A and B if device is in FF mode.	
H	L	L	Parity functions are disabled; device acts as a standard 18 bit registered transceiver.	QA data to B, QB data to A
H	L	H		QB data to A
H	H	L		QA data to B
H	H	H		Isolation

NOTES:

1. A-to-B data flow is shown. B-to-A data flow is similar but uses OEBA, LEBA, and CLKENBA.
2. H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care
Z = High-Impedance
↑ = LOW-to-HIGH Transition
3. Output level before the indicated steady-state input conditions were established.
4. Output level before the indicated steady-state input conditions were established, provided that CLKAB was LOW before LEAB went LOW.

PARITY

Inputs							Outputs					
SEL	OEBA	OEAB	ODD/EVEN	Σ OF INPUTS A1–A8 = H	Σ OF INPUTS B1–B8 = H	xAPAR	xBPAR	xAPAR	xERRA	xBPAR	xERRB	
L	H	L	L	0, 2, 4, 6, 8	N/A	L	N/A	N/A	H	L	Z	
L	H	L	L	1, 3, 5, 7	N/A	L	N/A	N/A	L	H	Z	
L	H	L	L	0, 2, 4, 6, 8	N/A	H	N/A	N/A	L	L	Z	
L	H	L	L	1, 3, 5, 7	N/A	H	N/A	N/A	H	H	Z	
L	L	H	L	N/A	0, 2, 4, 6, 8	N/A	L	L	Z	N/A	H	
L	L	H	L	N/A	1, 3, 5, 7	N/A	L	H	Z	N/A	L	
L	L	H	L	N/A	0, 2, 4, 6, 8	N/A	L	L	Z	N/A	L	
L	L	H	L	N/A	1, 3, 5, 7	N/A	L	H	Z	N/A	L	
L	H	L	H	0, 2, 4, 6, 8	N/A	L	N/A	N/A	L	H	Z	
L	H	L	H	1, 3, 5, 7	N/A	L	N/A	N/A	H	L	Z	
L	H	L	H	0, 2, 4, 6, 8	N/A	H	N/A	N/A	L	H	Z	
L	H	L	H	1, 3, 5, 7	N/A	H	N/A	N/A	L	L	Z	
L	L	H	H	N/A	0, 2, 4, 6, 8	N/A	L	H	Z	N/A	L	
L	L	H	H	N/A	1, 3, 5, 7	N/A	L	L	Z	N/A	H	
L	L	H	H	N/A	0, 2, 4, 6, 8	N/A	L	H	Z	N/A	H	
L	L	H	H	N/A	1, 3, 5, 7	N/A	L	L	Z	N/A	L	
L	H	H	L	0, 2, 4, 6, 8	0, 2, 4, 6, 8	L	L	N/A	H	N/A	H	
L	H	H	L	1, 3, 5, 7	1, 3, 5, 7	L	L	N/A	L	N/A	L	
L	H	H	L	0, 2, 4, 6, 8	0, 2, 4, 6, 8	H	H	N/A	L	N/A	L	
L	H	H	L	1, 3, 5, 7	1, 3, 5, 7	H	H	N/A	H	N/A	H	
L	H	H	H	0, 2, 4, 6, 8	0, 2, 4, 6, 8	L	L	N/A	L	N/A	L	
L	H	H	H	1, 3, 5, 7	1, 3, 5, 7	L	L	N/A	H	N/A	H	
L	H	H	H	0, 2, 4, 6, 8	0, 2, 4, 6, 8	H	H	N/A	H	N/A	H	
L	H	H	H	1, 3, 5, 7	1, 3, 5, 7	H	H	N/A	L	N/A	L	
L	L	L	L	N/A	N/A	N/A	N/A	PE ⁽¹⁾	Z	PE ⁽¹⁾	Z	
L	L	L	H	N/A	N/A	N/A	N/A	PO ⁽²⁾	Z	PO ⁽²⁾	Z	

NOTES:

1. Parity output is set to the level so that the specific bus side is set to even parity.
2. Parity output is set to the level so that the specific bus side is set to odd parity.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Operating Condition: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$

Symbol	Parameter	Test Conditions		Min.	Typ. ⁽¹⁾	Max.	Unit
V _{IH}	Input HIGH Voltage Level	V _{CC} = 2.3V to 2.7V		1.7	—	—	V
		V _{CC} = 2.7V to 3.6V		2	—	—	
V _{IL}	Input LOW Voltage Level	V _{CC} = 2.3V to 2.7V		—	—	0.7	V
		V _{CC} = 2.7V to 3.6V		—	—	0.8	
I _{IH} I _{IL}	Input Leakage Current	V _{CC} = 3.6V	V _I = 0 to 5.5V	—	—	±5	μA
I _{OZH} I _{OZL}	High Impedance Output Current (3-State Output pins)	V _{CC} = 3.6V	V _O = 0 to 5.5V	—	—	±10	μA
I _{OFF}	Input/Output Power Off Leakage	V _{CC} = 0V, V _{IN} or V _O ≤ 5.5V		—	—	±50	μA
V _{IK}	Clamp Diode Voltage	V _{CC} = 2.3V, I _{IN} = -18mA		—	-0.7	-1.2	V
V _H	Input Hysteresis	V _{CC} = 3.3V		—	100	—	mV
I _{CCL} I _{CCH} I _{CCZ}	Quiescent Power Supply Current	V _{CC} = 3.6V	V _{IN} = GND or V _{CC}	—	—	10	μA
			3.6 ≤ V _{IN} ≤ 5.5V ⁽²⁾	—	—	10	
ΔI _{CC}	Quiescent Power Supply Current Variation	One input at V _{CC} - 0.6V other inputs at V _{CC} or GND		—	—	500	μA

LVC Link

NOTES:

- Typical values are at V_{CC} = 3.3V, +25°C ambient.
- This applies in the disabled state only.

OUTPUT DRIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Max.	Unit
V _{OH}	Output HIGH Voltage	V _{CC} = 2.3V to 3.6V	I _{OH} = -0.1mA	V _{CC} - 0.2	—	V
		V _{CC} = 2.3V	I _{OH} = -6mA	2	—	
		V _{CC} = 2.3V	I _{OH} = -12mA	1.7	—	
		V _{CC} = 2.7V		2.2	—	
		V _{CC} = 3.0V		2.4	—	
		V _{CC} = 3.0V	I _{OH} = -24mA	2.2	—	
V _{OL}	Output LOW Voltage	V _{CC} = 2.3V to 3.6V	I _{OL} = 0.1mA	—	0.2	V
		V _{CC} = 2.3V	I _{OL} = 6mA	—	0.4	
			I _{OL} = 12mA	—	0.7	
		V _{CC} = 2.7V	I _{OL} = 12mA	—	0.4	
		V _{CC} = 3.0V	I _{OL} = 24mA	—	0.55	

LVC Link

NOTE:

- V_{IH} and V_{IL} must be within the min. or max. range shown in the DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE table for the appropriate V_{CC} range. T_A = -40°C to +85°C.

OPERATING CHARACTERISTICS, T_A = 25°C

Symbol	Parameter	Test Conditions	V _{CC} = 1.8V	V _{CC} = 2.5V ± 0.2V	V _{CC} = 3.3V ± 0.3V	Unit
			Typical	Typical	Typical	
CPD	Power Dissipation Capacitance Outputs enabled	C _L = 0pF f = 10Mhz	37	52	68	pF
CPD	Power Dissipation Capacitance Outputs disabled		16	22	28	pF

SWITCHING CHARACTERISTICS ⁽¹⁾

Symbol	Parameter	V _{CC} = 1.8V ⁽²⁾		V _{CC} = 2.5V ± 0.2V		V _{CC} = 2.7V		V _{CC} = 3.3V ± 0.3V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
f _{MAX}		125	—	125	—	125	—	125	—	MHz
t _{PLH} t _{PHL}	Propagation Delay xAx to xBx or xBx to xAx	—	7	1	6.2	—	5.8	1	5.4	ns
t _{PLH} t _{PHL}	Propagation Delay xAx to xBPAR or xBx to xAPAR	—	12.7	2	9.9	—	8.6	2	7.7	ns
t _{PLH} t _{PHL}	Propagation Delay xAPAR to xBPAR or xBPAR to xAPAR	—	8.4	1	6.7	—	6.2	1	5.7	ns
t _{PLH} t _{PHL}	Propagation Delay xAPAR to xERRA or xBPAR to xERRB	—	13	2	10.7	—	9.7	2	8.5	ns
t _{PLH} t _{PHL}	Propagation Delay ODD/EVEN to xERRB or xERRA	—	9.9	1.5	9.7	—	8.9	1.5	7.8	ns
t _{PLH} t _{PHL}	Propagation Delay ODD/EVEN to xAPAR or xBPAR	—	10.4	1.5	9.3	—	8.6	1.5	7.5	ns
t _{PLH} t _{PHL}	Propagation Delay SEL to xAPAR or xBPAR	—	9.5	1	7.1	—	6.9	1	6.1	ns
t _{PLH} t _{PHL}	Propagation Delay LEBA to xAx or LEAB to xBx	—	9.5	1	7	—	6.5	1	5.8	ns
t _{PLH} t _{PHL}	Propagation Delay LEBA to xAPAR or LEAB to xBPAR (parity feed through)	—	11	1.5	7.7	—	7	1.5	6.3	ns
t _{PLH} t _{PHL}	Propagation Delay LEBA to xAPAR or LEAB to xBPAR (parity generated)	—	14.5	2.5	10.8	—	9.3	2	8.4	ns
t _{PLH} t _{PHL}	Propagation Delay LEBA to xERRB or LEAB to xERRA	—	15.3	2.5	10.9	—	9.5	2	8.5	ns
t _{PLH} t _{PHL}	Propagation Delay CLKBA to xAx or CLKAB to xBx	—	10.5	1	7.4	—	6.8	1	6.1	ns
t _{PLH} t _{PHL}	Propagation Delay CLKBA to xAPAR or CLKAB to xBPAR (parity feed through)	—	11.5	1.5	8.1	—	7.3	1.5	6.6	ns
t _{PLH} t _{PHL}	Propagation Delay CLKBA to xAPAR or CLKAB to xBPAR (parity generated)	—	15.5	2.5	11.2	—	9.7	2	8.7	ns
t _{PLH} t _{PHL}	Propagation Delay CLKBA to xERRB or CLKAB to xERRA	—	16.5	2.5	11.5	—	9.9	2	8.9	ns

(CONTINUED ON NEXT PAGE)

SWITCHING CHARACTERISTICS (CONTINUED) ⁽¹⁾

Symbol	Parameter	V _{CC} = 1.8V ⁽²⁾		V _{CC} = 2.5V ± 0.2V		V _{CC} = 2.7V		V _{CC} = 3.3V ± 0.3V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t _{PZH} t _{PZL}	Output Enable Time \overline{OEAB} or \overline{OEBA} to xBx, xBPAR or xAx, xAPAR	—	8.4	1.4	7.3	—	7.1	1	6.3	ns
t _{PZH} t _{PZL}	Output Enable Time \overline{OEAB} or \overline{OEBA} to xERRA or xERRB	—	9	1.4	7.2	—	6.5	1	5.9	ns
t _{PZH} t _{PZL}	Output Enable Time \overline{SEL} to xERRA or xERRB	—	9.5	1.4	7.7	—	7.5	1	6.5	ns
t _{PHZ} t _{PLZ}	Output Disable Time \overline{OEAB} or \overline{OEBA} to xBx, xBPAR or xAx, xAPAR	—	8.1	1.3	7.1	—	6.2	1.5	5.9	ns
t _{PHZ} t _{PLZ}	Output Disable Time \overline{OEAB} or \overline{OEBA} to xERRA or xERRB	—	9.3	1.3	8.3	—	7.5	1	6.7	ns
t _{PHZ} t _{PLZ}	Output Disable Time \overline{SEL} to xERRA or xERRB	—	9.2	1.3	7.4	—	6.4	1.5	5.9	ns
t _{SU}	Set-up Time, HIGH or LOW, xAx, xAPAR or xBx, xBPAR before CLK \uparrow	4.7	—	2.7	—	2.8	—	2.5	—	ns
t _{SU}	Set-up Time, HIGH or LOW, xCLKENAB or xCLKENBA before CLK \uparrow	4.5	—	2.9	—	2.9	—	2.5	—	ns
t _{SU}	Set-up Time, HIGH or LOW, xAx, xAPAR or xBx, xBPAR before LE \downarrow	0	—	2.2	—	2.1	—	2	—	ns
t _H	Hold Time, HIGH or LOW, xAx, xAPAR or xBx, xBPAR after CLK \uparrow	0	—	1.2	—	1.2	—	1.3	—	ns
t _H	Hold Time, HIGH or LOW, xCLKENAB or xCLKENBA after CLK \uparrow	0	—	1.3	—	1.3	—	1.5	—	ns
t _H	Hold Time, HIGH or LOW, xAx, xAPAR or xBx, xBPAR after LE \downarrow	1.7	—	1.7	—	1.9	—	1.7	—	ns
t _w	Pulse Width LEAB or LEBA HIGH	3	—	3	—	3	—	3	—	ns
t _w	Pulse Width CLKAB or CLKBA HIGH or LOW	4	—	3	—	3	—	3	—	ns
tsk(o)	Output Skew ⁽³⁾	—	—	—	—	—	—	—	500	ps

NOTES:

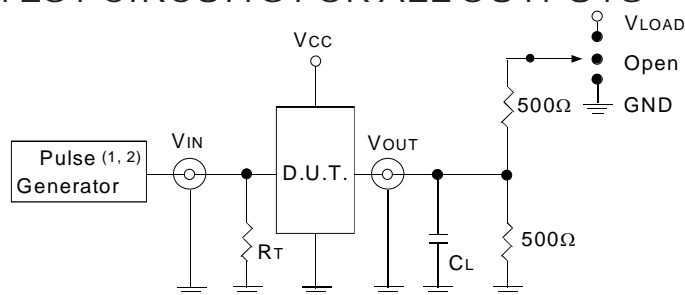
1. See test circuits and waveforms. T_A = -40°C to +85°C.
2. Based on IDT characterization.
3. Skew between any two outputs of the same package and switching in the same direction.

TEST CIRCUITS AND WAVEFORMS

TEST CONDITIONS

Symbol	V _{CC} (1) = 3.3V ±0.3V	V _{CC} (1) = 2.7V	V _{CC} (2) = 2.5V ±0.2V	Unit
V _{LOAD}	6	6	2 x V _{CC}	V
V _{IH}	2.7	2.7	V _{CC}	V
V _T	1.5	1.5	V _{CC} / 2	V
V _{LZ}	300	300	150	mV
V _{HZ}	300	300	150	mV
C _L	50	50	30	pF

TEST CIRCUITS FOR ALL OUTPUTS



DEFINITIONS:

C_L = Load capacitance: includes jig and probe capacitance.
R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.

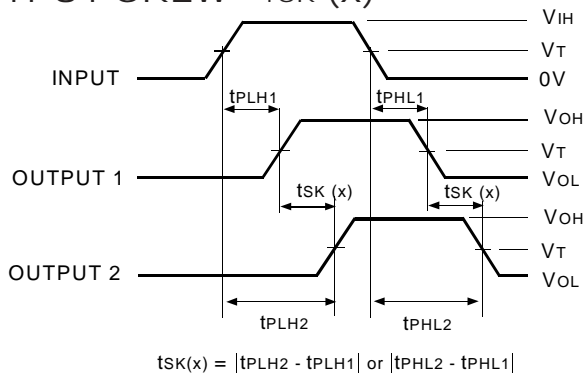
NOTES:

1. Pulse Generator for All Pulses: Rate ≤ 10MHz; t_F ≤ 2.5ns; t_R ≤ 2.5ns.
2. Pulse Generator for All Pulses: Rate ≤ 10MHz; t_F ≤ 2ns; t_R ≤ 2ns.

SWITCH POSITION

Test	Switch
Open Drain Disable Low Enable Low	V _{LOAD}
Disable High Enable High	GND
All Other tests	Open

OUTPUT SKEW - TSK (x)

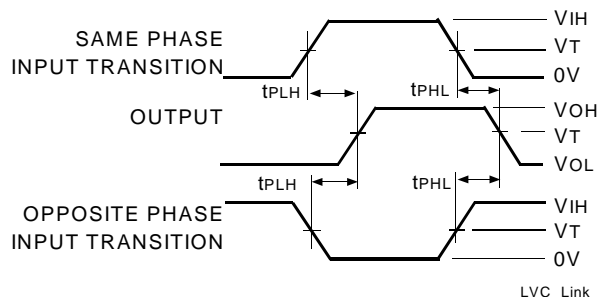


$$tsk(x) = |t_{PLH2} - t_{PLH1}| \text{ or } |t_{PHL2} - t_{PHL1}|$$

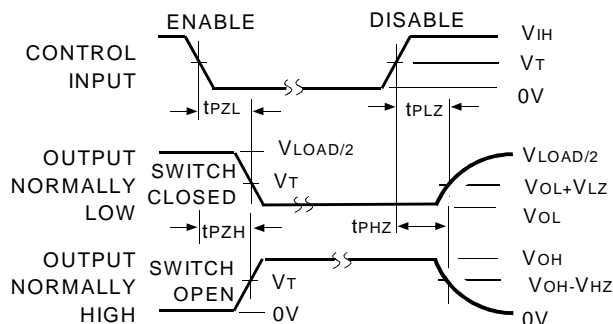
NOTES:

1. For tsk(o) OUTPUT1 and OUTPUT2 are any two outputs.
2. For tsk(b) OUTPUT1 and OUTPUT2 are in the same bank.

PROPAGATION DELAY



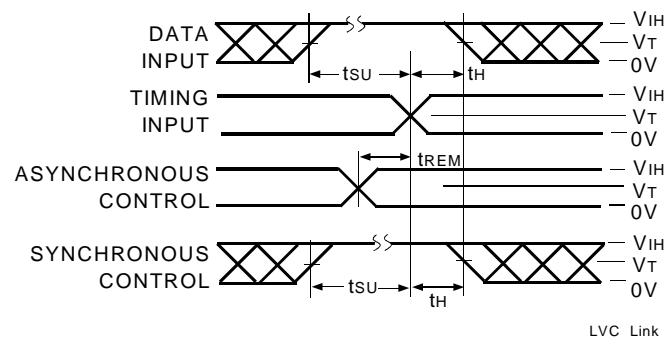
ENABLE AND DISABLE TIMES



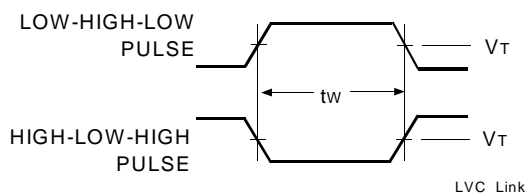
NOTE:

1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.

SET-UP, HOLD, AND RELEASE TIMES



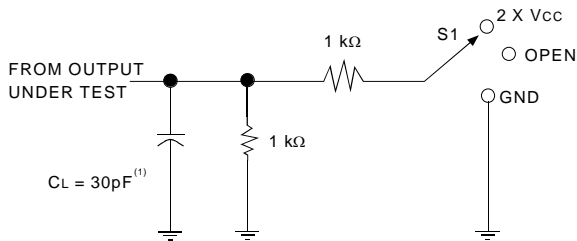
PULSE WIDTH



PARAMETER MEASUREMENT INFORMATION

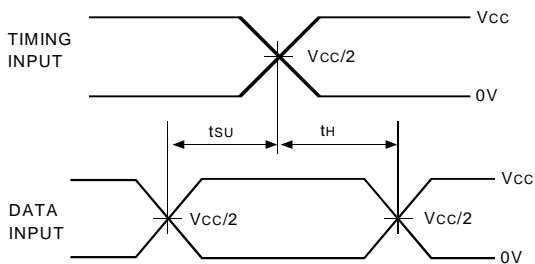
$V_{CC} = 1.8V$

LOAD CIRCUIT

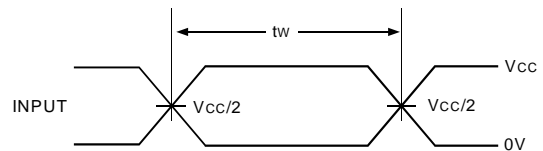


TEST	S1
t_{PD}	Open
t_{PLZ}/t_{PZL}	$2 \times V_{CC}$
t_{PHZ}/t_{PZH}	GND

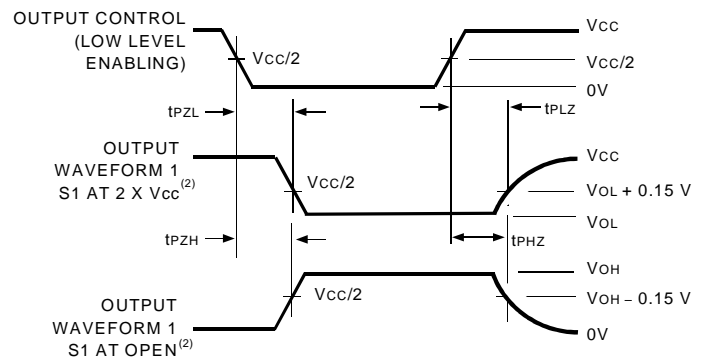
VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



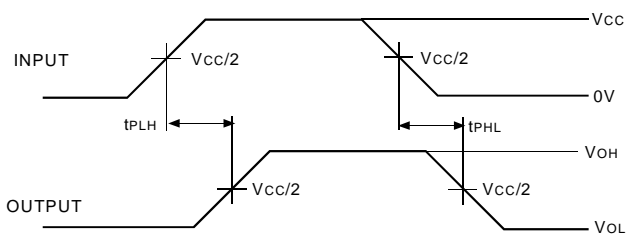
VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES



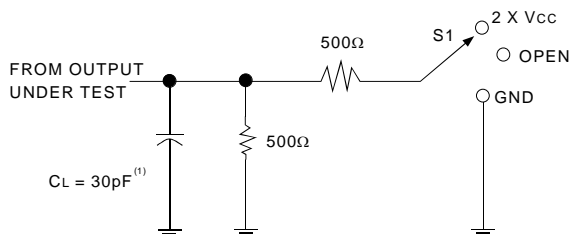
NOTES:

1. C_L includes probe and jig capacitance.
2. 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.
3. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10\text{ MHz}$, $Z_o = 50\Omega$, $t_r \leq 2\text{ ns}$, $t_f \leq 2\text{ ns}$.
4. The outputs are measured one at a time with one transition per measurement.
5. t_{PLZ} and t_{PHZ} are the same as t_{DIS} .
6. t_{PZL} and t_{PZH} are the same as t_{EN} .
7. t_{PLH} and t_{PHL} are the same as t_{PD} .

PARAMETER MEASUREMENT INFORMATION

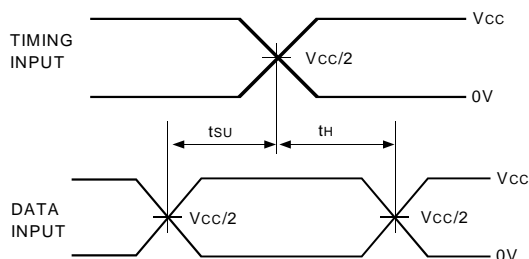
$$V_{CC} = 2.5V \pm 0.2V$$

LOAD CIRCUIT

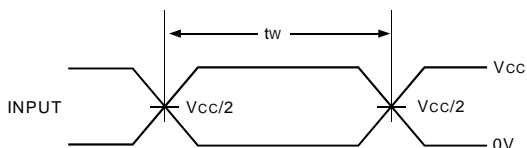


TEST	S1
t_{PD}	Open
t_{PLZ}/t_{PZL}	2 x Vcc
t_{PHZ}/t_{PZH}	GND

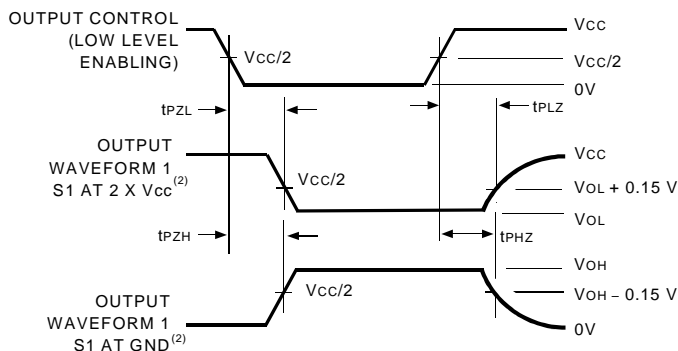
VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES



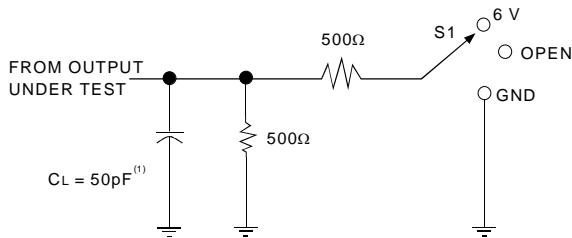
NOTES:

1. C_L includes probe and jig capacitance.
2. 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.
3. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10MHz$, $Z_o = 50\Omega$, $t_r \leq 2ns$, $t_f \leq 2ns$.
4. The outputs are measured one at a time with one transition per measurement.
5. t_{PLZ} and t_{PHZ} are the same as t_{DIS} .
6. t_{PZL} and t_{PZH} are the same as t_{EN} .
7. t_{PLH} and t_{PHL} are the same as t_{PD} .

PARAMETER MEASUREMENT INFORMATION

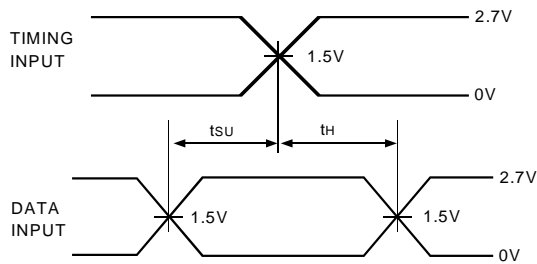
$V_{CC} = 2.7V$ and $3.3V \pm 0.3V$

LOAD CIRCUIT

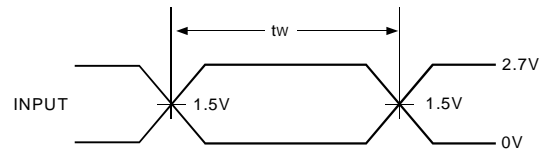


TEST	S1
t_{PD}	Open
t_{PLZ}/t_{PZL}	$2 \times V_{CC}$
t_{PHZ}/t_{PZH}	GND

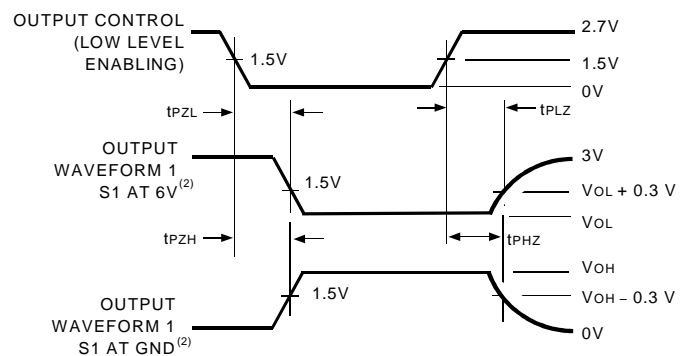
VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



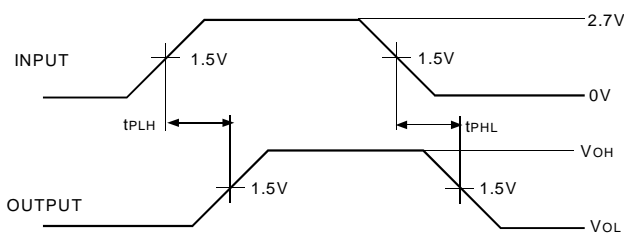
VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES



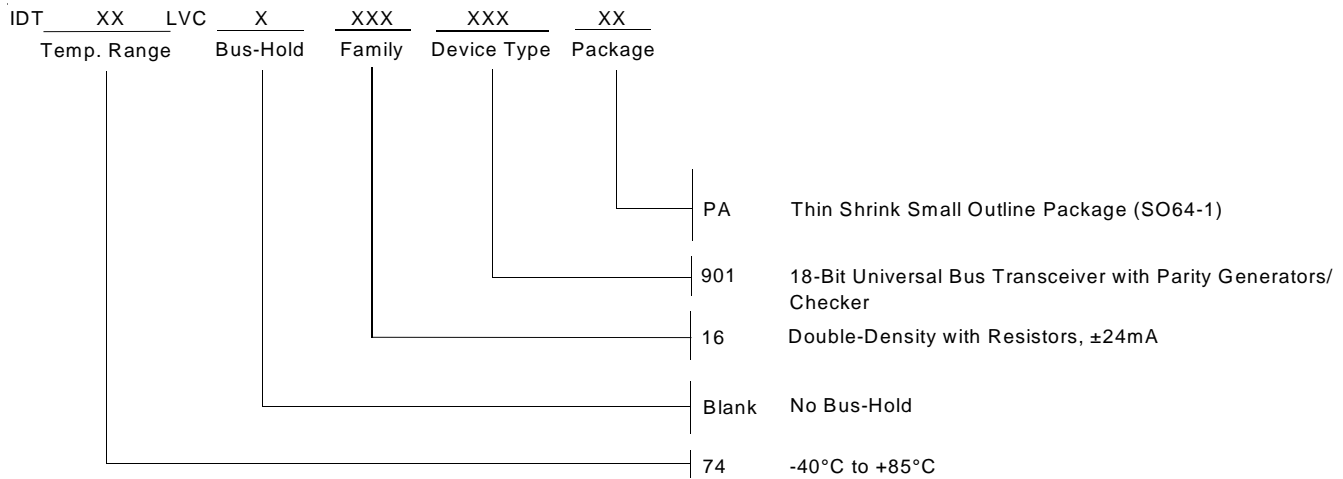
VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES



NOTES:

- CL includes probe and jig capacitance.
- 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 are supplied by generators having the following characteristics: $PRR \leq 10MHz$, $Z_o = 50\Omega$, $t_r \leq 2ns$, $t_f \leq 2ns$.
- The outputs are measured one at a time with one transition per measurement.
- t_{PLZ} and t_{PHZ} are the same as t_{DIS} .
- t_{PZL} and t_{PZH} are the same as t_{EN} .
- t_{PLH} and t_{PHL} are the same as t_{PD} .

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*

**To search for sales office near you, please click the sales button found on our home page or dial the 800# above and press 2. The IDT logo is a registered trademark of Integrated Device Technology, Inc.*