

Absolute Maximum Ratings

Supply Voltage (V_{CC})	−0.3V to +4V
Input Voltage ($R_{IN+} - R_{IN-}$)	−0.3V to 3.9V
Enable Input Voltage ($EN, \overline{EN}$)	−0.3V to ($V_{CC} + 0.3V$)
Output Voltage (R_{OUT})	−0.3V to ($V_{CC} + 0.3V$)
Maximum Package Power Dissipation: +25°C	
M Package	1088mW
MTC Package	866mW
Derate M Package	8.5 mW/°C above +25°C
Derate MTC Package	6.9 mW/°C above +25°C
Storage Temperature Range	−65°C to +150°C

Lead Temperature Range	
Soldering (4 seconds)	+260°C
Maximum Junction Temperature	+150°C
ESD Rating ⁽¹⁰⁾	
(HBM, 1.5kW, 100pF)	≥10kV
(EIAJ, 0W, 200pF)	≥1200V

Recommended Operating Conditions

	Min	Typ	Max	Units
Supply Voltage (V_{CC})	+3.0	+3.3	+3.6	V
Receiver Input Voltage	GND		+3.0	V
Operating Free Air Temperature (T_A)	−40	+25	+85	°C

Electrical Characteristics

Over supply voltage and operating temperature ranges, unless otherwise specified^(2, 3).

Symbol	Parameter	Test Conditions	Pin	Min.	Typ.	Max.	Units
V_{TH}	Differential input high threshold	$V_{CM} = +1.2V, 0.05V, 2.95V^{(13)}$				+100	mV
V_{TL}	Differential input low threshold			−100			
V_{CMR}	Common-mode voltage range	$V_{ID} = 200mV$ peak-to-peak ⁽⁵⁾	R_{IN+}, R_{IN-}	0.1		2.6	V
I_{IN}	Input Current	$V_{IN} = +2.8V$		−10	±5	+10	μA
		$V_{IN} = 0V$		−10	±1	+10	
		$V_{IN} = +3.6V$		−20	±1	+20	
V_{OH}	Output High Voltage	$I_{OH} = -0.4mA, V_{ID} = +200mV$	R_{OUT}	2.7	3.3		V
		$I_{OH} = -0.4mA$, Input terminated		2.7	3.3		
		$I_{OH} = -0.4mA$, Input shorted		2.7	3.3		
V_{OL}	Output low voltage	$I_{OL} = 2mA, V_{ID} = -200mV$			0.05	0.25	mA
I_{OS}	Output short circuit current	Enabled, $V_{OUT} = 0V^{(11)}$		−15	−47	−100	
I_{OZ}	Output 3-State current	Disabled, $V_{OUT} = 0V$ or V_{CC}		−10	±1	+10	μA
V_{IH}	Input high voltage		$EN, \overline{EN}$	2.0		V_{CC}	V
V_{IL}	Input low voltage			GND		0.8	
I_I	Input current	$V_{IN} = 0V$ or V_{CC} , Other Input = V_{CC} or GND		−20	±5	+20	μA
V_{CL}	Input clamp voltage	$I_{CL} = -18mA$		−1.5	−0.8		V
I_{CC}	No load supply current Receivers enabled	$EN = V_{CC}$, One Differential Input = V_{CC} other Differential Input = GND	V_{CC}		9	15	mA
I_{CCZ}	No load supply current Receivers disabled	$EN = GND$, One Differential Input = V_{CC} other Differential Input = GND			1	5	
R_{TERM}	Termination input resistance (PI90LVT048A)	$V_{IN} = V_{CC}$ or 0		90	110	132	Ω
C_W	Input capacitance				5	10	pF

Switching Characteristics

Over supply voltage and operating temperature ranges, unless otherwise specified.^(2,3)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
t _{PHLD}	Differential Propagation Delay High to Low	C _L = 15pF V _{ID} = 200mV (Figures 1 & 2)	1.2	2.0	3.2	ns
t _{PLHD}	Differential Propagation Delay Low to High		1.2	1.9	3.2	
t _{SKD1}	Differential Pulse Skew, t _{PHLD} – t _{PLHD} ⁽⁶⁾		0	0.1	0.4	
t _{SKD2}	Channel-to-Channel Skew ⁽⁷⁾		0	0.15	0.5	
t _{SKD3}	Differential Part-to-Part Skew ⁽⁸⁾				1.0	
t _{SKD4}	Differential Part-to-Part Skew ⁽⁹⁾				1.5	
t _{TLH}	Rise Time			0.5	1.0	
t _{THL}	Fall Time			0.35	1.0	
t _{PHZ}	Disable Time High to Z	R _L = 2 kohms, C _L = 15pF (Figures 3 & 4)		8	14	
t _{PLZ}	Disable Time Low to Z			8	15	
t _{PZH}	Enable Time Z to High			9	14	
t _{PZL}	Enable Time Z to Low			9	14	
f _{MAX}	Maximum Operating Frequency ⁽¹⁴⁾	All Channels switching		250		MHz

Notes

- “Absolute Maximum Ratings” are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The table of “Electrical Characteristics” specifies conditions of device operation.
- Current into device pins is defined as positive. Current out of device pins is defined as negative. All voltages are referenced to ground unless otherwise specified.
- All typicals are given for: V_{CC} = +3.3V, T_A = +25°C.
- Generator waveform for all tests unless otherwise specified: f = 1 MHz, Z_O = 50 ohms, t_r and t_f (0% to 100%) ≤ 3ns for R_{IN}.
- The VCMR range is reduced for larger V_{ID}. Example: if V_{ID} = 400mV, the VCMR is 0.2V to 2.2V. The fail-safe condition with inputs shorted is not supported over the common-mode range of 0V to 2.4V, but is supported only with inputs shorted and no external common-mode voltage applied. A V_{ID} up to V_{CC} – 0V may be applied to the R_{IN+}/R_{IN-} inputs with the Common-Mode voltage set to V_{CC}/2. Propagation delay and Differential Pulse skew decrease when V_{ID} is increased from 200mV to 400mV. Skew specifications apply for 200mV ≤ V_{ID} ≤ 800mV over the common-mode range.
- t_{SKD1} is the magnitude difference in differential propagation delay time between the positive going edge and the negative going edge of the same channel
- t_{SKD2}, Channel-to-Channel Skew is defined as the difference between the propagation delay of one channel and that of the others on the same chip with any event on the inputs.
- t_{SKD3}, part to part skew, is the differential channel-to-channel skew of any event between devices. This specification applies to devices at the same V_{CC}, and within 5°C of each other within the operating temperature range.
- t_{SKD4}, part to part skew, is the differential channel-to-channel skew of any event between devices. This specification applies to devices over recommended operating temperature and voltage ranges, and across process distribution. t_{SKD4} is defined as |Max–Min| differential propagation delay.
- ESD Ratings: HBM (1.5 kohms, 100pF) ≥ 10kV
EIAJ (0 ohm, 200pF) ≥ 1200V
- Output short circuit current (I_{OS}) is specified as magnitude only, minus sign indicates direction only. Only one output should be shorted at a time, do not exceed maximum junction temperature specification.
- C_L includes probe and jig capacitance.
- V_{CC} is always higher than R_{IN+} and R_{IN-} voltage. R_{IN-} and R_{IN+} are allowed to have a voltage range –0.2V to V_{CC} – V_{ID}/2. However, to be compliant with AC specifications, the common voltage range is 0.1V to 2.3V
- f_{MAX} generator input conditions: t_r = t_f < 1ns (0% to 100%), 50% duty cycle, differential (1.05V to 1.35V peak to peak). Output criteria: 60/40% duty cycle, V_{OL} (max 0.4V), V_{OH} (min 2.7V), Load = 15pF (stray plus probes).

Parameter Measurement Information

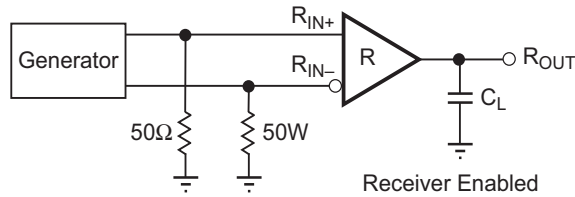


Figure 1. Receiver Propagation Delay and Transition Time Test Circuit

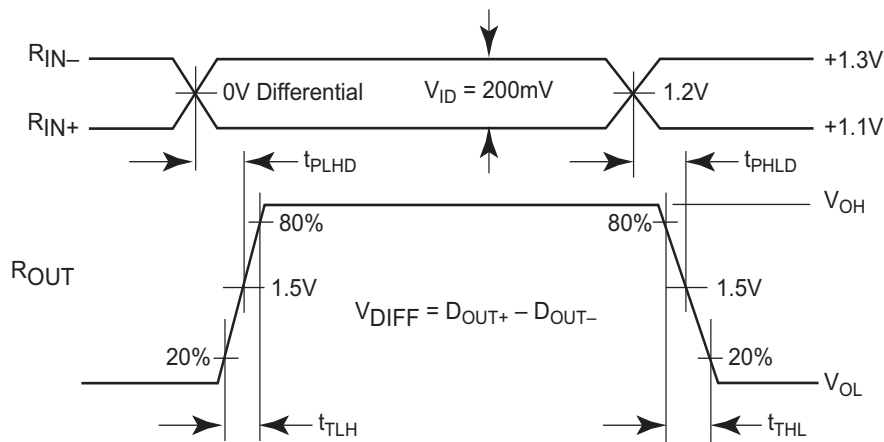


Figure 2. Driver Propagation Delay & Transition Time Waveforms

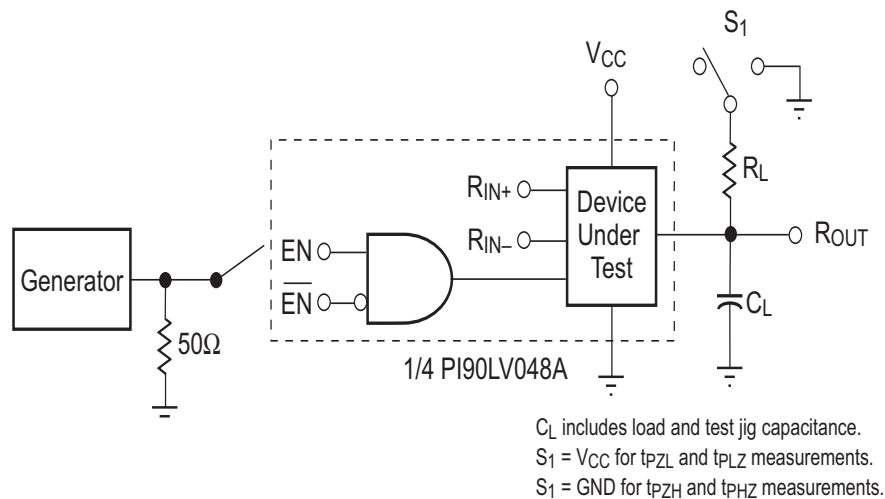


Figure 3. Receiver 3-State Delay Test Circuit

Parameter Measurement Information (continued)

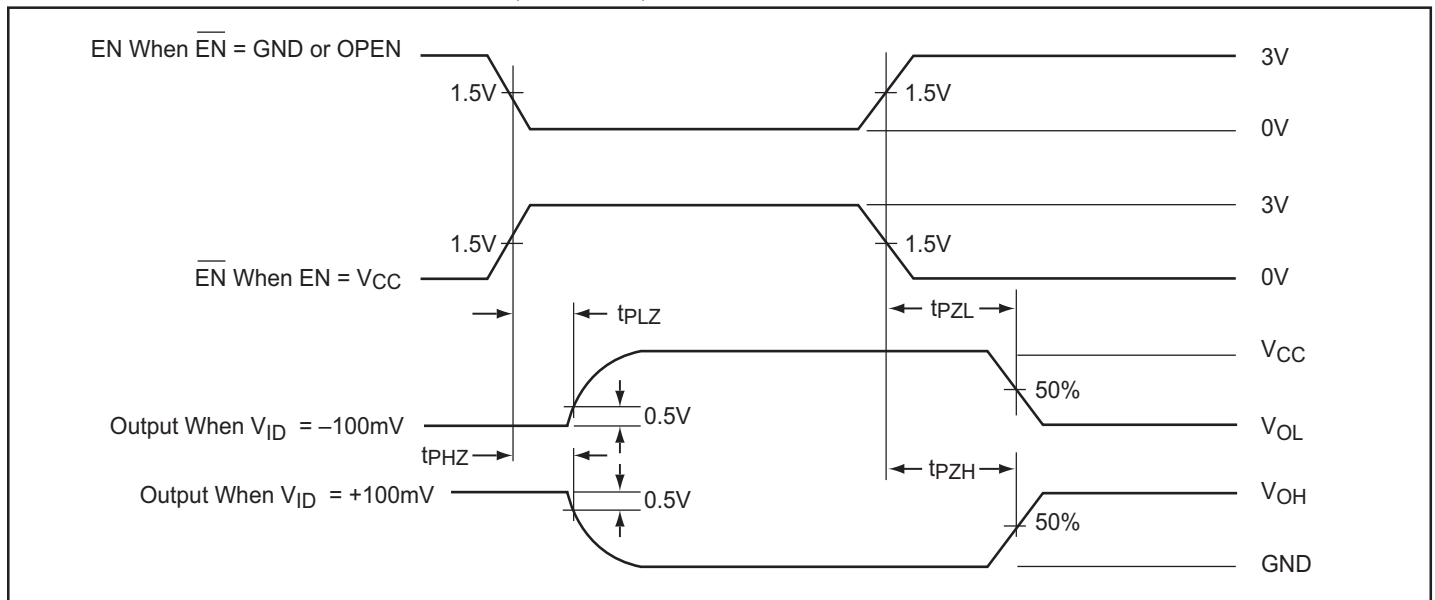


Figure 4. Receiver 3-State Delay Waveforms

Typical Application

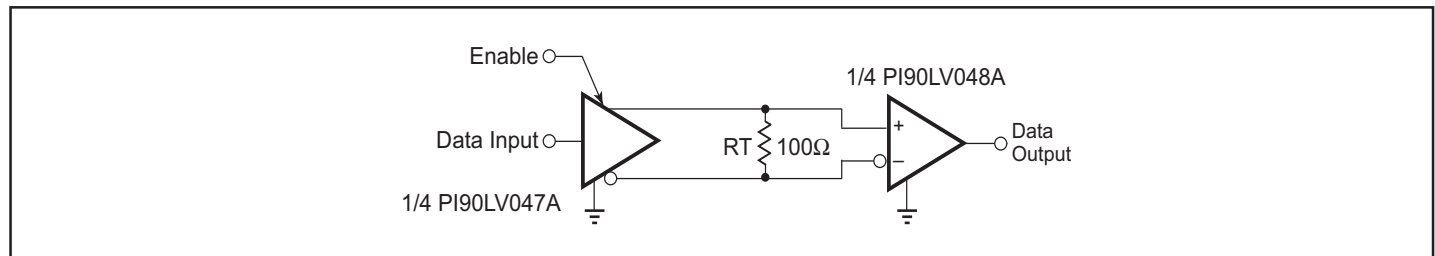
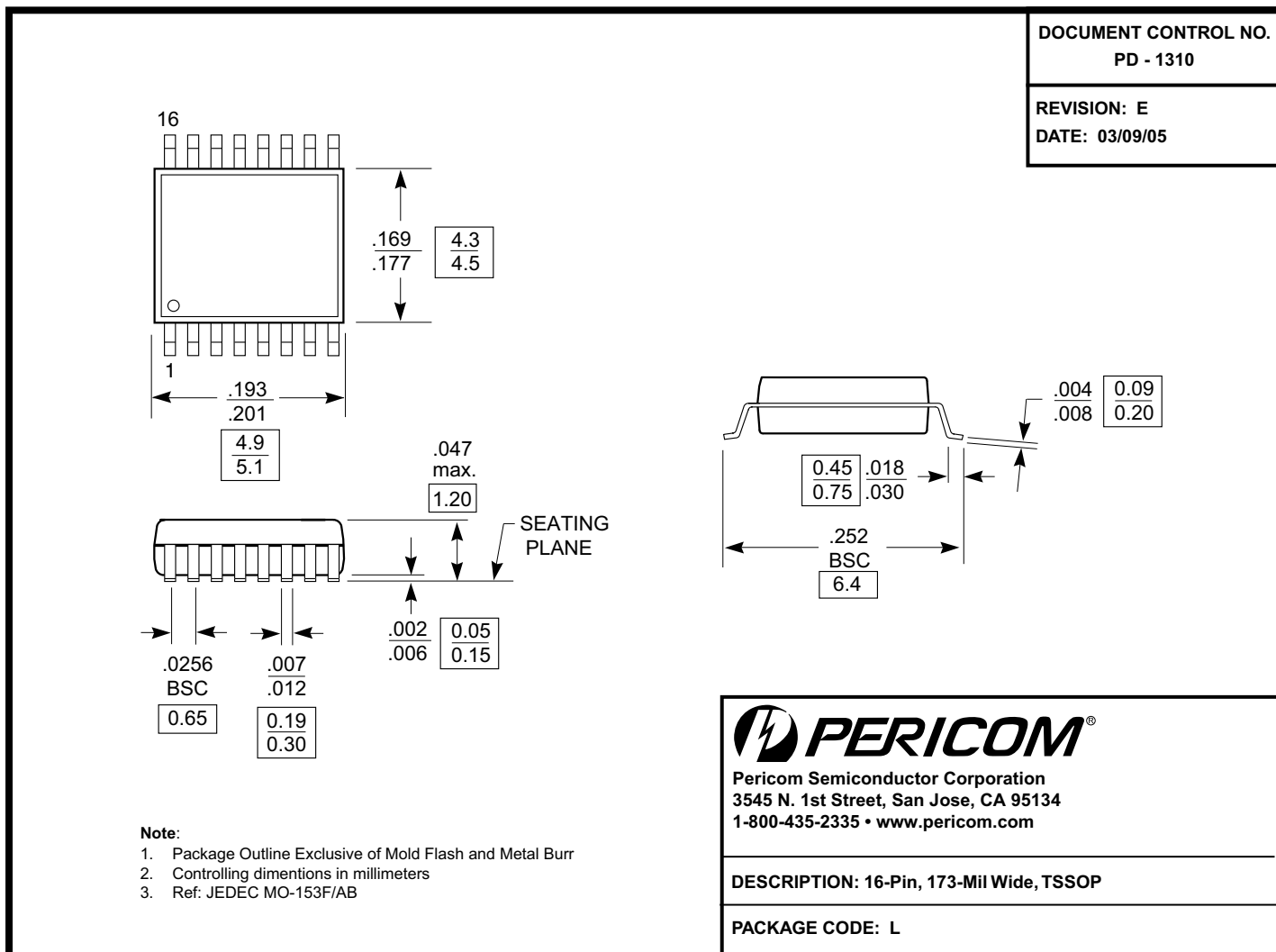


Figure 5. Point-to-Point Application



Note:

- For latest package info, please check: http://www.pericom.com/products/packaging_mechanicals.php

Ordering Information

Ordering Code	Package Code	Package Type
PI90LV048ALE	L	Pb-free & Green, 16-pin TSSOP
PI90LVT048ALE	L	Pb-free & Green, 16-pin TSSOP

Notes:

- Thermal characteristics can be found on the company web site at www.pericom.com/packaging/
- E = Pb-free and Green
- X = Tape and reel

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