



**PI5L200**

**Precision Wide Bandwidth LanSwitch Quad 2:1 Mux/DeMux**

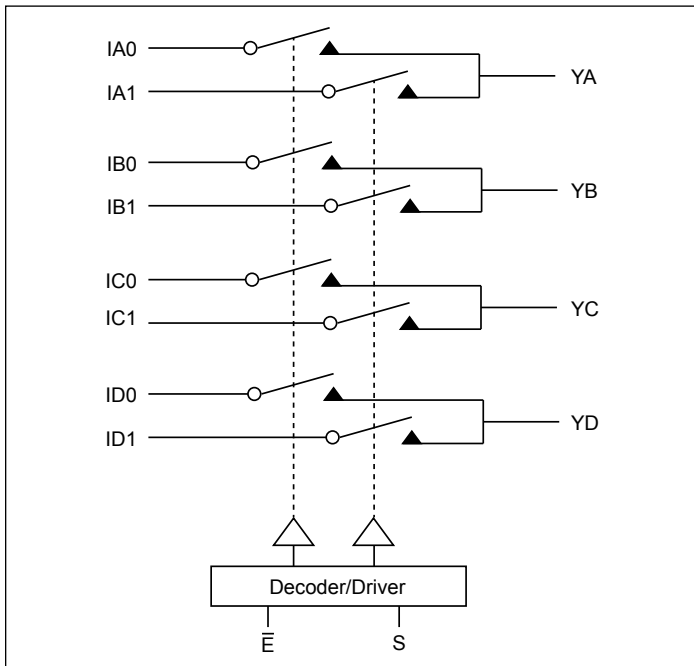
**Features**

- Single 3.3V/5V supply operation
- Rail-To-Rail Operation
- Very Low Distortion: 2%
- Replaces mechanical relays
- High-performance, low-cost solution for switching between different LAN signals
- Low crosstalk: -70dB @ 30 Mbps
- Low insertion loss and On-Resistance: 6-ohms typical
- Off isolation: -55dB @ 30 Mbps
- Wide bandwidth data rates >135 Mbps
- Low Quiescent Supply Current (100nA typical)
- Packaging (Pb-free & Green available):
  - 16-pin 150-mil wide plastic QSOP (Q)
  - 16-pin 150-mil wide plastic SOIC (W)
  - 16-pin 173-mil wide plastic TSSOP (L)

**Applications**

- 10/100 Base-TX/T4
- 100VG-AnyLAN
- Token Ring 4/16 Mbps
- ATM25
- NIC Adapter and Hubs
- SONET OCI 51.8Mbps
- T1/E1

**Block Diagram**

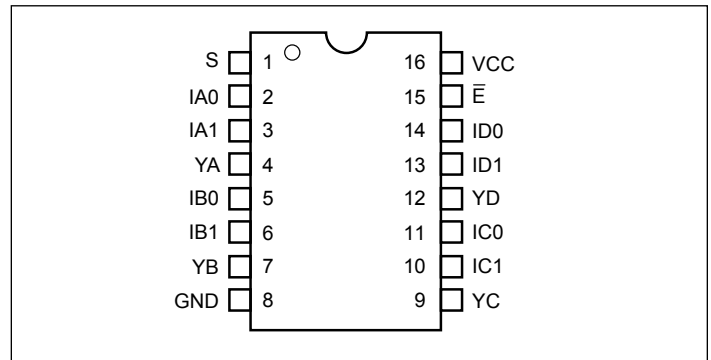


**Description**

Diodes' PI5L200 is a Rail-to-Rail Quad 2:1 multiplexer/demultiplexer LanSwitch with 3-state outputs. The On-Resistance typically varies from 5 ohms to 7 ohms with data inputs of 0V to 5V. Generally, this part can be used to replace mechanical relays in low voltage (3.3V/5V systems) LAN applications.

With a wide bandwidth of 135 MHz, the PI5L200 can switch Fast Ethernet and ATM25 signals. Into 100-ohm UTP cables, the switch distortion is typically less than two percent. Crosstalk @30 MHz is -70dB. The PI5L200 operates from a single 3.3V/5V supply and interface to TTL logic.

**Pin Configuration**



**Pin Description**

Pin Name	Description
IAn-IDn	Data Inputs
S	Select Inputs
$\bar{E}$	Enable
YA-YD	Data Outputs
GND	Ground
Vcc	Power

**Truth Table**

$\bar{E}$	S	YA	YB	YC	YD	Function
H	X	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Disable
L	L	$I_{A0}$	$I_{B0}$	$I_{C0}$	$I_{D0}$	S = 0
L	H	$I_{A1}$	$I_{B1}$	$I_{C1}$	$I_{D1}$	S = 1

**Note:**

H = High Voltage Level,  
L = Low Voltage Level, S  
witches are shown with logic "0" input (Select and Enable)

## Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature .....	-65°C to +150°C
Ambient Temperature with Power Applied .....	-40°C to +85°C
Supply Voltage to Ground Potential .....	-0.5V to +7.0V
DC Input Voltage .....	-0.5V to $V_{CC}+0.5V$
DC Output Current.....	120 mA
Power Dissipation .....	0.5W

**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.

## Single 5.0V Supply

**DC Electrical Characteristics** (Over the Operating Range,  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{CC} = 5V \pm 10\%$ ,  $GND = 0V$ )

Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
$V_{ANALOG}$	Analog Signal Range		0	—	$V_{CC}$	V
$R_{ON}$	ON-Resistance	$I_{ON} = 10\text{mA}$ to $30\text{mA}$	—	6	12	$\Omega$
$\Delta R_{ON}$	Match Between Channels		—	0.4	2	
$R_{FLAT(ON)}$	$R_{ON}$ Flatness	$I_{ON} = 1\text{mA}$ , $V_{NO}$ , $V_{NC} = 0V$ to $5V$	—	3	5	
$I_{NO(OFF)}$ , $I_{NO(ON)}$	On/Off Leakage Current	$V_{NO}$ , $V_{NC} = 4.5V$	-100	—	100	nA
$I_{CC}$	Quiescent Supply Current	$V_{CC} = 5.5V$ , $V_{IN} = 0V$ or $V_{CC}$	—	—	1	$\mu\text{A}$
$I_O$	Output Current	$V_{NO}$ , $V_{NC}$ or $V_{COM} = 0V$ to $5V$	100	—	—	mA
$V_{IH}$	Input HIGH Voltage	Guaranteed Logic HIGH Level	2.0	—	—	V
$V_{IL}$	Input LOW Voltage	Guaranteed Logic LOW Level	-0.5	—	0.8	
$I_{IH}$	Input HIGH Current	$V_{CC} = \text{Max.}$ , $V_{IN} = V_{CC}$	—	—	$\pm 1$	$\mu\text{A}$
$I_{IL}$	Input LOW Current	$V_{CC} = \text{Max.}$ , $V_{IN} = GND$	—	—	$\pm 1$	

**Dynamic Electrical Characteristics** (Over the Operating Range,  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{CC} = 5V \pm 10\%$ ,  $GND = 0V$ )

Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
$t_{ON}$	Turn-on Time	$V_{ON}$ or $V_{NC} = 3.0V$ , see Fig. 2	—	10	20	ns
$t_{OFF}$	Turn-off Time	$V_{ON}$ or $V_{NC} = 3.0V$ , see Fig. 2	—	5	10	
$X_{TALK}$	Crosstalk	$R_L = 100$ ohms, $f = 30$ MHz, see Fig. 4	—	-70	—	dB
$C_{(OFF)}$	NC or NO Capacitance	$f = 1$ kHz	—	13	—	pF
$O_{IRR}$	Off Isolation	$R_L = 100$ ohms, $f = 30$ MHz, see Fig. 5	—	-55	—	dB
BW	Bandwidth -3dB	$R_L = 100$ ohms, see Fig. 3	—	137	—	MHz
D	Distortion $DR_{ON/RL}$	$R_L = 100$ ohms	—	2	—	%

**Note:**

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for applicable device type.
- Guaranteed by design.

**PI5L200**

### Single 3.3V Supply

**DC Electrical Characteristics** (Over the Operating Range,  $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{CC} = 3.3\text{V} \pm 10\%$ ,  $\text{GND} = 0\text{V}$ )

Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
$V_{\text{ANALOG}}$	Analog Signal Range		0	–	$V_{CC}$	V
$R_{\text{ON}}$	ON-Resistance	$I_{\text{ON}} = 10\text{mA}$ to $30\text{mA}$	–	15	22	Ω
$\Delta R_{\text{ON}}$	Match Between Channels		–	1	3	
$R_{\text{FLAT(ON)}}$	$R_{\text{ON}}$ Flatness	$I_{\text{ON}} = 1\text{mA}$ , $V_{\text{NO}}$ , $V_{\text{NC}} = 0\text{V}$ to $5\text{V}$	–	7	12	
$I_{\text{NO(OFF)}}$ , $I_{\text{NO(ON)}}$	On/Off Leakage Current	$V_{\text{NO}}$ , $V_{\text{NC}} = 3.0\text{V}$	–100	–	100	nA
$I_{\text{COM(ON)}}$	On Leakage Current	$V_{\text{NO}}$ , $V_{\text{NC}} = 3.0\text{V}$	–100	–	100	μA
$I_{\text{O}}$	Output Current	$V_{\text{NO}}$ , $V_{\text{NC}}$ or $V_{\text{COM}} = 0\text{V}$	80	–	–	mA
$V_{\text{IH}}$	Input HIGH Voltage	Guaranteed Logic HIGH Level	2.0	–	–	V
$V_{\text{IL}}$	Input LOW Voltage	Guaranteed Logic LOW Level	–0.5	–	0.8	
$I_{\text{IH}}$	Input HIGH Current	$V_{CC} = \text{Max.}$ , $V_{\text{IN}} = V_{CC}$	–	–	±1	μA
$I_{\text{IL}}$	Input LOW Current	$V_{CC} = \text{Max.}$ , $V_{\text{IN}} = \text{GND}$	–	–	±1	

**Dynamic Electrical Characteristics** (Over the Operating Range,  $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{CC} = 3.3\text{V} \pm 10\%$ ,  $\text{GND} = 0\text{V}$ )

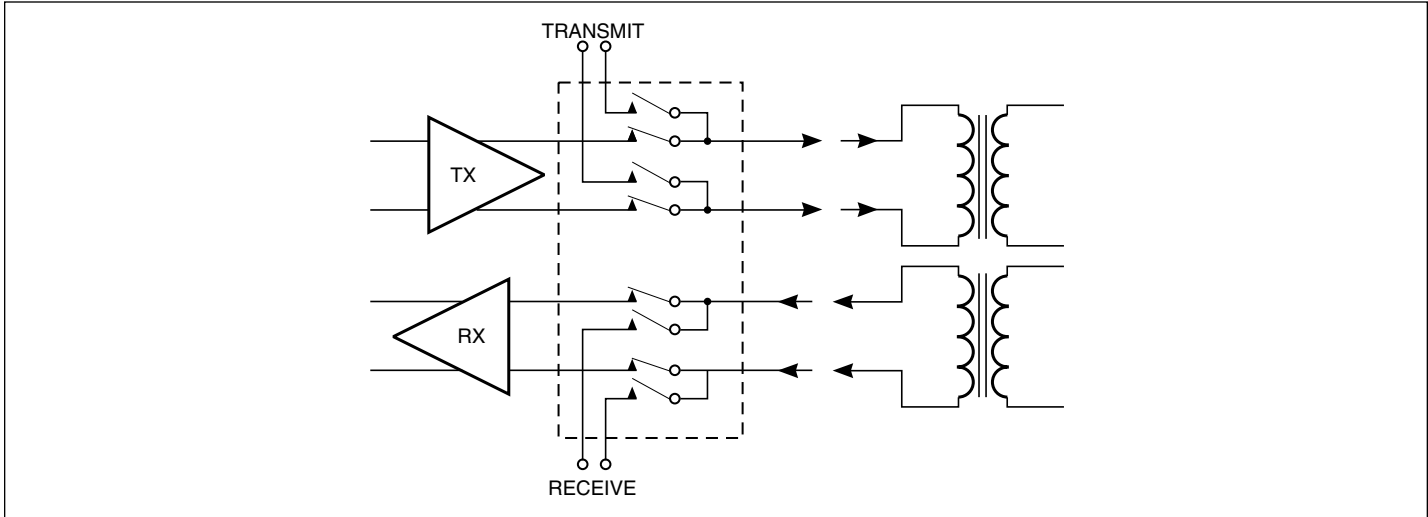
Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
$t_{\text{ON}}$	Turn-on Time	$V_{\text{ON}}$ or $V_{\text{NC}} = 1.5\text{V}$ , see Fig. 2	–	28	40	ns
$t_{\text{OFF}}$	Turn-off Time	$V_{\text{ON}}$ or $V_{\text{NC}} = 1.5\text{V}$ , see Fig. 2	–	4	20	
$X_{\text{TALK}}$	Crosstalk	$R_L = 50$ ohms, $f = 1$ MHz, see Fig. 4	–	–75	–	dB
$C_{\text{(OFF)}}$	NC or NO Capacitance	$f = 1$ kHz	–	15	–	pF
$C_{\text{COM(OFF)}}$	COM Off Capacitance	$f = 1$ kHz	–	30	–	
$O_{\text{IRR}}$	Off Isolation	$R_L = 50$ ohms, $f = 1$ MHz, see Fig. 5	–	–75	–	dB
BW	Bandwidth -3dB	$R_L = 50$ ohms, see Fig. 3	–	110	–	MHz
D	Distortion	$R_L = 100$ ohms	–	4	–	%

**Dynamic Electrical Characteristics** (Over the Operating Range,  $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{CC} = 3.3\text{V} \pm 10\%$ ,  $\text{GND} = 0\text{V}$ )

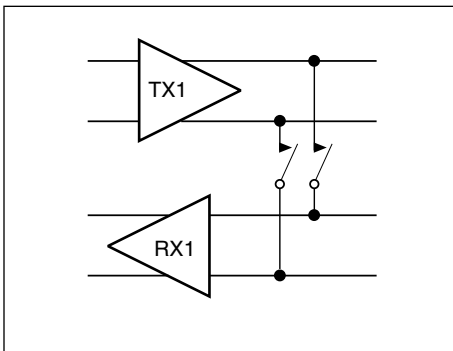
Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Units
$I_{\text{CC}}$	Quiescent Positive Power Supply Current	$V_{CC} = 3.6\text{V}$ , $V_{\text{IN}} = 0\text{V}$ or $V_{CC}$ All Channels ON or OFF	–	–	1	μA

**Note:**

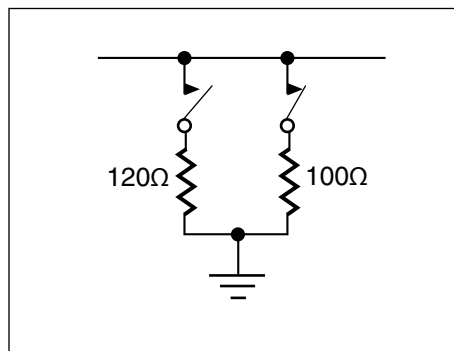
- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for applicable device type.
- Guaranteed by design.



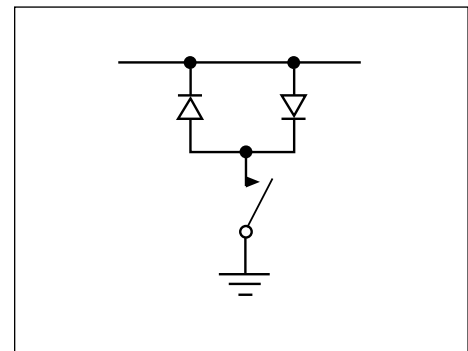
**Figure 1a. Full Duplex Transceiver**



**Figure 1b. Loop Back**

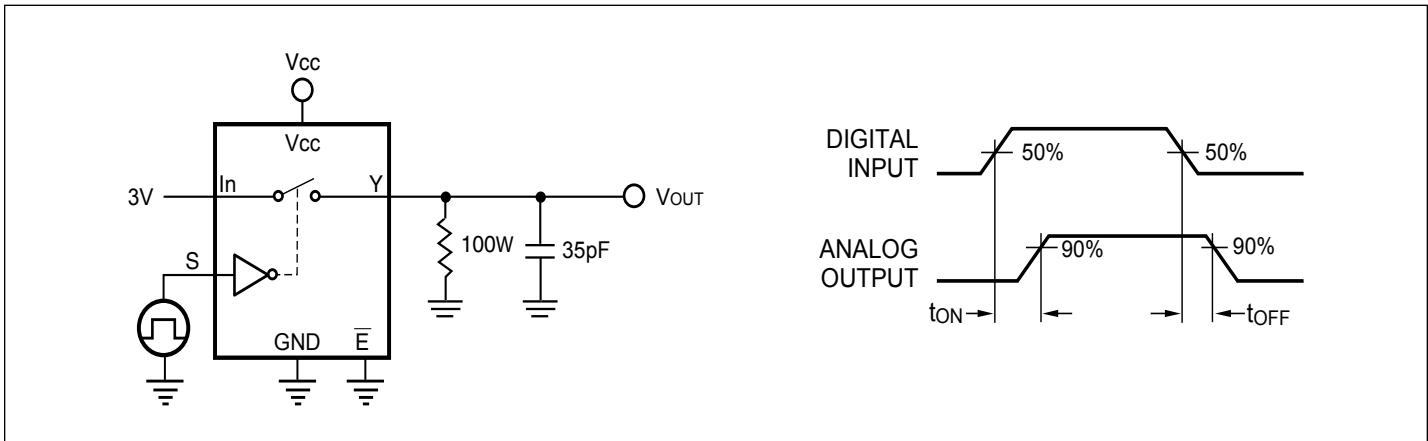


**Figure 1c. Line Termination**

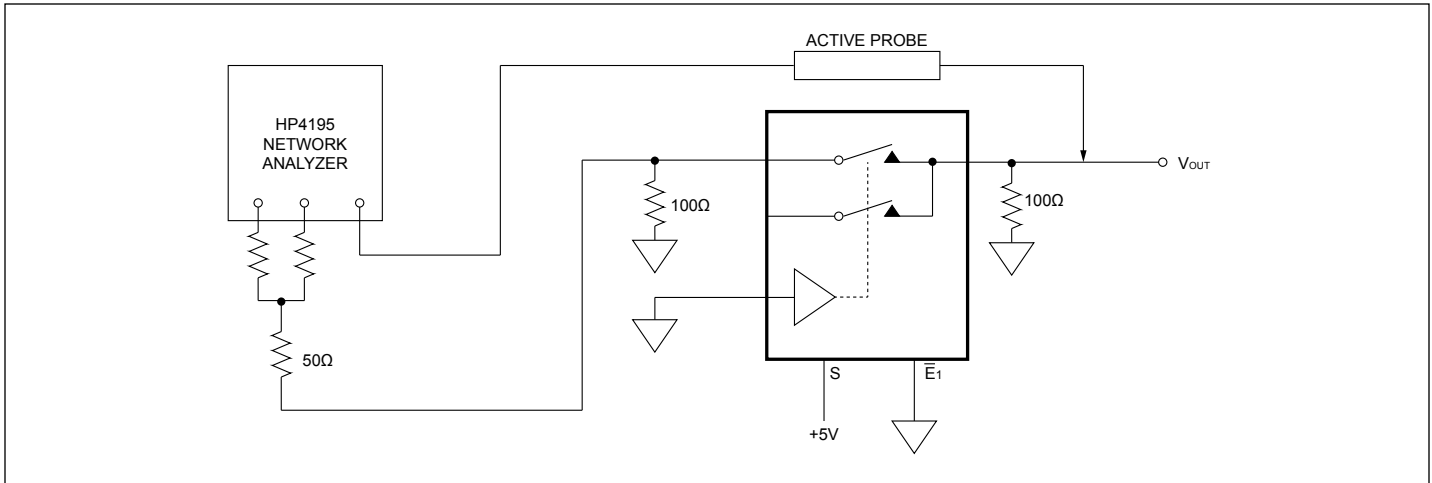


**Figure 1d. Line Clamp**

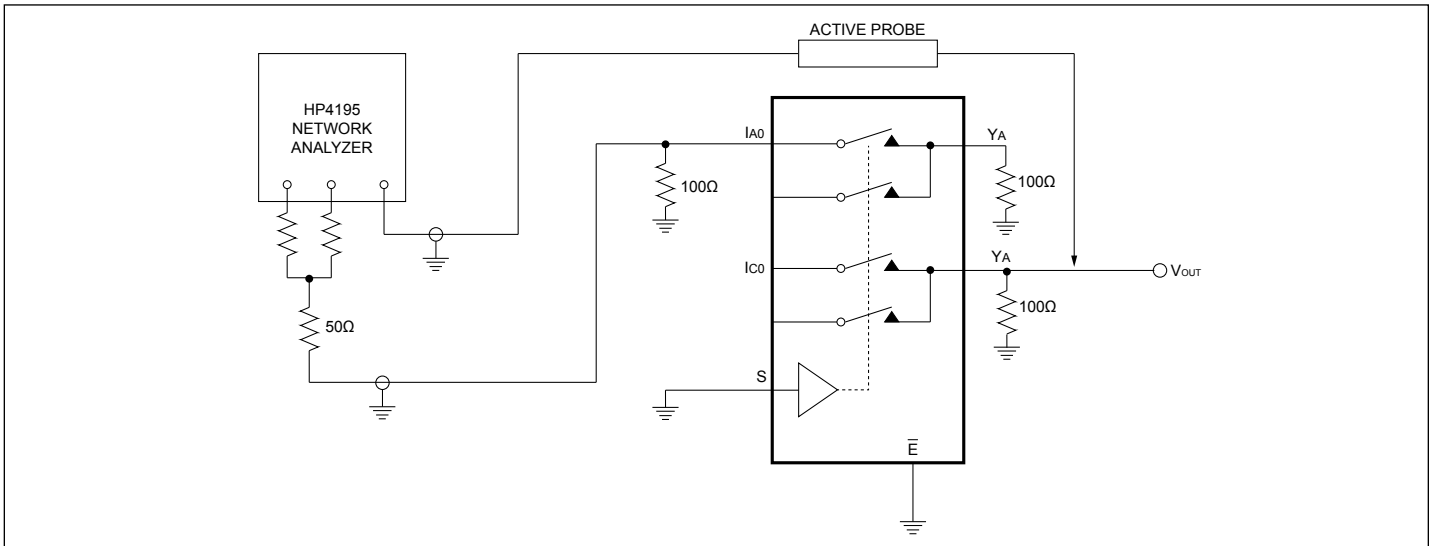
**Test Circuits**



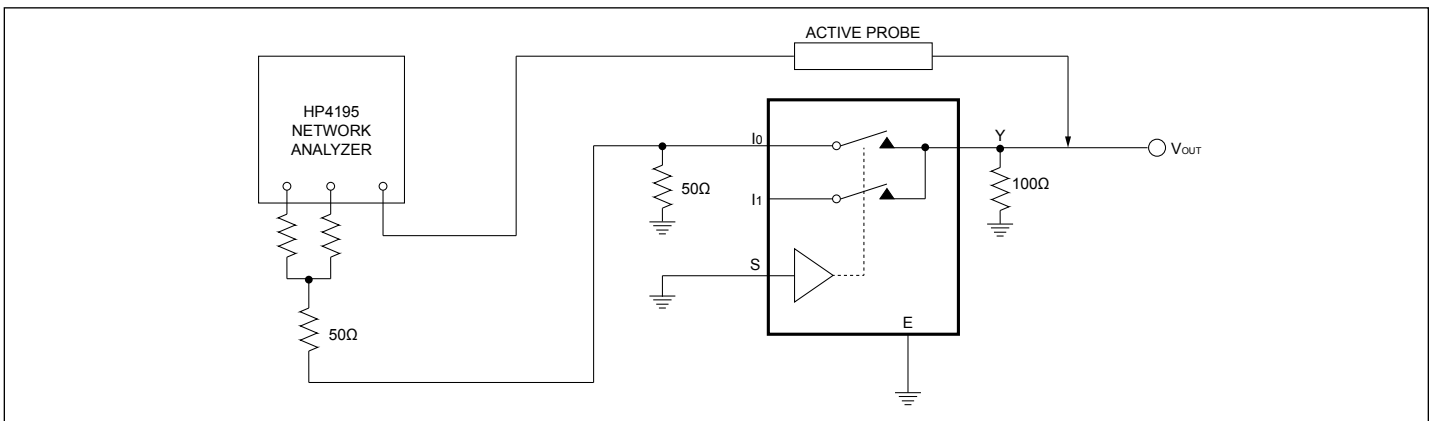
**Figure 2. Switching Time**



**Figure 3. Bandwidth**

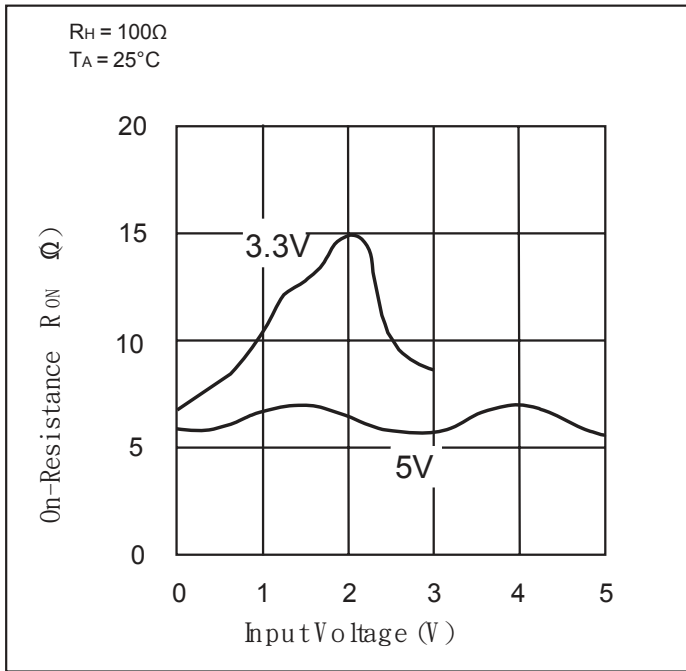


**Figure 4. Crosstalk**

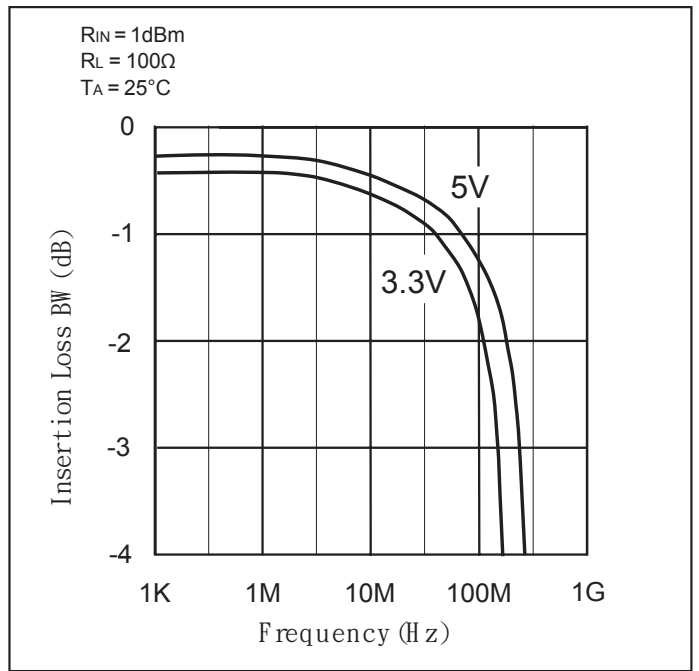


**Figure 5. Off Isolation**

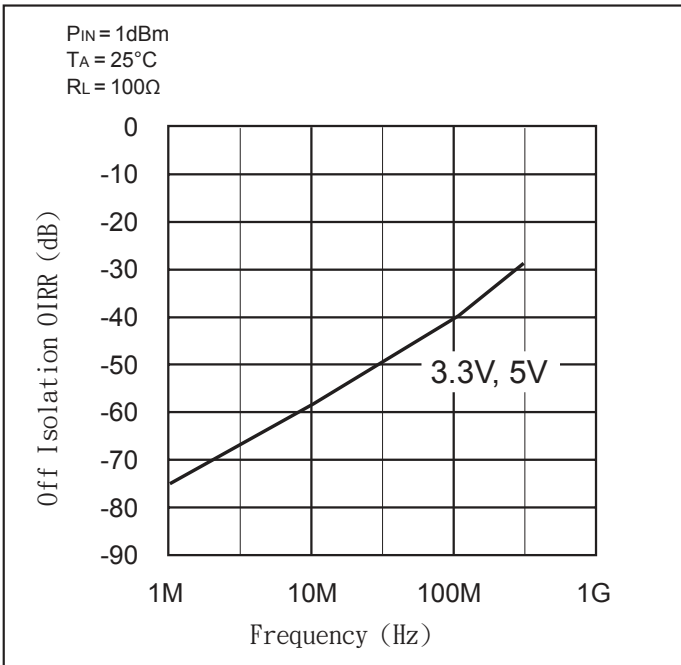
**PI5L200**



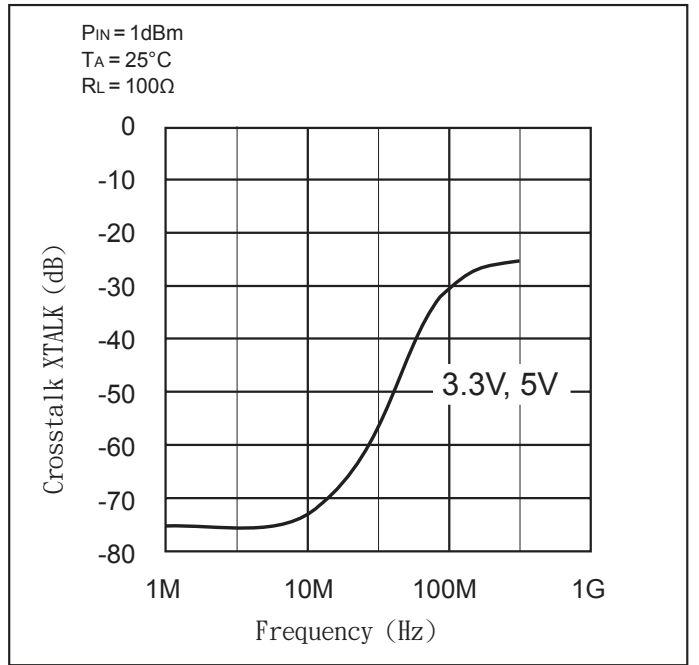
**Figure 6. On-Resistance vs. Input Voltage**



**Figure 7. Insertion Loss vs. Frequency**



**Figure 8. Off Isolation vs. Frequency**



**Figure 9. Crosstalk vs. Frequency**

**PI5L200**

**Part Marking**

Q Package

PI5L  
200QE  
ZYWXX

Z: Die Rev Code  
Y: Year  
W: Workweek  
1st X: Assembly Code  
2nd X: Fab Code

W Package

 PI5L  
200WE  
BZYYWWXX

B: Port Code  
Z: Die Rev  
YY: Year  
WW: Workweek  
1st X: Assembly Code  
2nd X: Fab Code

L Package

PI5L  
200LE  
ZYWXX

Z: Die Rev  
Y: Year  
W: Workweek  
1st X: Assembly Code  
2nd X: Fab Code

**PI5L200**

**Packaging Mechanical: 16-QSOP (Q)**

SYMBOLS	MIN.	NOM.	MAX.
A	—	—	0.069
A1	0.004	—	0.0098
A2	0.049	—	—
b	0.008	—	0.012
c	0.004	—	0.010
D	0.189	0.193	0.197
E1	0.150	0.154	0.158
E	0.228	0.236	0.244
L	0.016	—	0.050
L1	0.041 REF.		
e	0.025 BSC.		
θ°	0	—	8

UNIT : INCH

SEATING PLANE

GAUGE PLANE  
SEATING PLANE

DETAIL A

**PERICOM**  
Enabling Serial Connectivity

DATE: 04/08/16

DESCRIPTION: 16-Pin, 150mil Wide QSOP

PACKAGE CODE: Q (Q16)

DOCUMENT CONTROL #: PD-1201

REVISION: H

NOTES:  
1. ALL DIMENSIONS IN INCH. ANGLES IN DEGREES.  
2. JEDEC MO-137E  
3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

16-0056

**PI5L200**

**Packaging Mechanical: 16-SOIC (W)**

SYMBOLS	MIN.	NOM.	MAX.
A	—	—	1.75
A1	0.10	—	0.25
A2	1.00	—	—
b	0.31	—	0.51
c	0.10	—	0.25
D	9.80	9.90	10.0
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.40	—	1.27
h	0.15	—	0.50
θ°	0	—	8

**NOTES:**  
 1. ALL DIMENSIONS IN MILLIMETERS. ANGLES IN DEGREES.  
 2. JEDEC OUTLINE : MS-012 AC  
 3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.  
 4. THE MIN. DIMENSION OF A2 AND h ARE OUT OF JEDEC SPEC.

**DIODES** **PERICOM** A PRODUCT LINE OF DIODES INCORPORATED  
 ENABLING SERIAL CONNECTIVITY

**DATE: 06/30/16**

**DESCRIPTION: 16-Pin, 150mil Wide SOIC**

**PACKAGE CODE: W**

**DOCUMENT CONTROL #: PD-1004** **REVISION: G**

16-0145

**PI5L200**

**Packaging Mechanical: 16-TSSOP (L)**

SYMBOLS	MIN.	NOM.	MAX.
A	–	–	1.20
A1	0.05	–	0.15
A2	0.80	1.00	1.05
b	0.19	–	0.30
c	0.09	–	0.20
D	4.90	5.00	5.10
E1	4.30	4.40	4.50
E	6.20	6.40	6.60
[e]	0.65 BSC		
L1	1.00 REF		
L	0.45	0.60	0.75
S	0.20	–	–
$\theta$	0°	–	8°

**NOTES:**  
 1. ALL DIMENSIONS IN MILLIMETERS. ANGLES IN DEGREES.  
 2. JEDEC MO-153F  
 3. DIMENSIONS DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

		DATE: 03/24/16
DESCRIPTION: 16-Pin, 173mil Wide TSSOP		
PACKAGE CODE: L (L16)		
DOCUMENT CONTROL #: PD-1310	REVISION: G	

16-0061

**For latest package info.**

please check: <http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/>

**Ordering Information**

Ordering Code	Packaging Code	Package Description
PI5L200QEX	Q	16-pin, 150mil Wide (QSOP)
PI5L200WEX	W	16-pin, 150mil Wide (SOIC)
PI5L200LEX	L	16-pin, 173mil Wide (TSSOP)

**Notes:**

- EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
- See <http://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free. Thermal characteristics can be found on the company web site at [www.diodes.com/design/support/packaging/](http://www.diodes.com/design/support/packaging/)
- E = Pb-free and Green
- X suffix = Tape/Reel

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.



B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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-  Cost Control Management
-  Shortage Management
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-  Excess Inventory Management