PI5L102

CompactPCI™ Hot Swap Pull-up Switch

Features

- Supports CompactPCI™ precharge voltage selection
- 3.3V/2.7kΩ, 5V/1ohm line termination selection
- Ultra-low quiescent current: 0.1µA typical
- Low On-Resistance: 7Ω maximum
- Single supply operation up to 6.2V ±5%
- Wide bandwidth data rates: >200 Mbps
- Mechanical relay replacement
- Packaging (Pb-free & Green available):
  - -Compact 20-pin TSSOP (L)

Description

The PI5L102L CompactPCI Hot Swap Pull-up switch is a Quad 1:2 multiplexer. It is designed to switch the 1V precharge bias voltage and 10kΩ pull-up resistor connected to the CompactPCI bus signals during Hot Swap. Each switch can connect eight inputs (I_{An} to I_{Dn}) to a given pull-up voltage level.

In addition, the PI5L102 can be used to select 2.7 kΩ/3.3V or 1.0 kohm/5V pull-ups for the system card PCI signal lines.

ON resistance is a low 7Ω maximum and all eight switches are selected or disabled with a single CMOS/TTL compatible signal. For general-purpose applications, the PI5L102 can replace mechanical relays. In network systems, physical layer signals can be switched.

To reduce the insertion loss, the PI5L102 can be powered by a 6.2V Zener diode.

Block Diagram
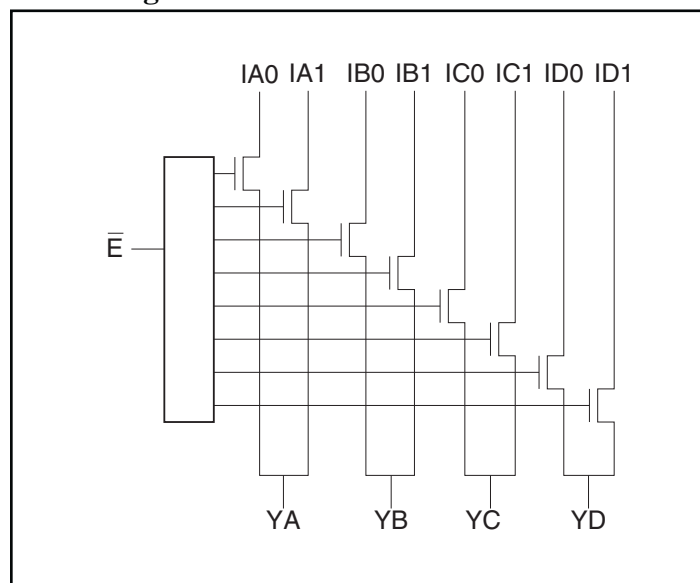
Pin Configuration
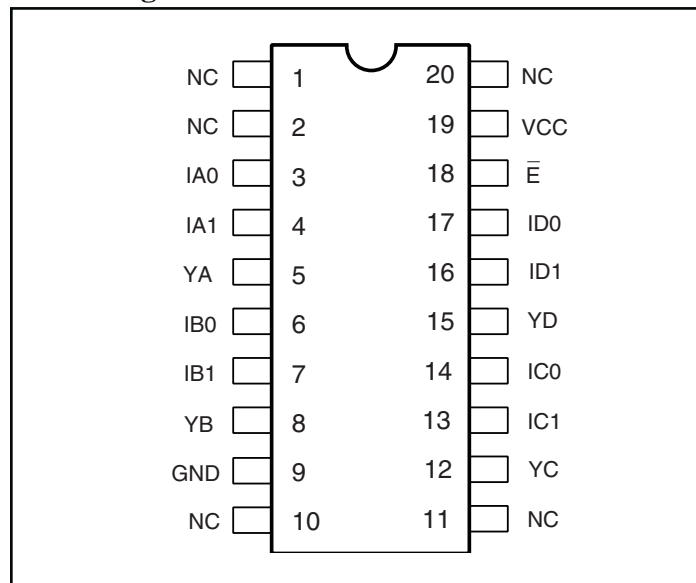
Truth Table[1]

$\overline{E}$	YA	YB	YC	YD	Function
H	Hi-Z	HI-Z	Hi-Z	HI-Z	Disable
L	IA0, IA1	IB0, IB2	IC0, IC1,	ID0, ID1	Enable

Note:
1. H = High Voltage Level, L = Low Voltage Level

Pin Description

Pin Name	Description
IAn-IDn	Data Inputs
$\overline{E}$	Enable
YA-YD	Data Outputs
GND	Ground
V_{CC}	Power

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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 .... 0°C to +70°C
Supply Voltage to Ground Potential (Inputs & V_{CC} Only)... −0.5V to +7.0V
Supply Voltage to Ground Potential (Outputs & D/O Only) −0.5V to +7.0V
DC Input Voltage .... −0.5V to +7.0V
DC Output Current.. 120mA
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.

DC Electrical Characteristics (Over the Operating Range, T_A = 0°C to +70°C, V_{CC} = 6.2V, +5%, − 2%)

Parameters	Description	Test Conditions[1]	Min.	Typ[2]	Max.	Units
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level	2.4	—	—	V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW Level	−0.5	—	0.8	
I_{IH}	Input HIGH Current	V_{CC} = Max., V_{IN} = V_{CC}	—	—	±1	
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = GND	—	—	±1	μA
I_{OZH}	High Impedance Output Current	$0 \leq A, B \leq V_{CC}$	—	—	±1	
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = −18mA	—	−0.7	−1.2	V
I_{OS}	Short Circuit Current[3]	A (B) = 0V, B (A) = V_{CC}	100	—	—	mA
V_H	Input Hysteresis at Control Pins		—	150	—	mV
R_{ON}	Switch On-Resistance[4]	V_{CC} = Min.,V_{IN} = 0.0V, I_{ON} = 48mA	5	7		Ω
		V_{CC} = Min.,V_{IN} = 2.4V, I_{ON} = 15mA	10	15		

Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 6.2V, T_A = 25°C ambient temperature.
3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
4. Measured by voltage drop between I and Y pins at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the two (I,Y) pins.

Capacitance (T_A = 25°C, f = 1 MHz)

Parameters	Description	Test Conditions	Typ.	Max.	Units
C_{IN}	Input Capacitance		4	6	
$C_{OFF\ (Yx)}$	Y_X Capacitance Switch OFF	$V_{IN} = 0V$	6	8	pF
$C_{OFF\ (IXN)}$	I_{XN} Capacitance, Switch OFF		6	8	
$C_{ON(YX)}^{(1,\ 2)}$	YX Capacitance, Switch ON		24	32	

Note:
1. This parameter is determined by device characterization, but not production tested.
2. Switch ON Capacitance accounts for capacitance of both switch channels (I_{X0} & I_{X1}) ON at one time.
3. X = A, B, C, or D; N = 0 or 1

Power Supply Characteristics

Parameters	Description	Test Conditions[1]		Min.	Typ[2]	Max.	Units
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max.	V_{IN} = GND or V_{CC}	—	0.1	3.0	µA
ΔI_{CC}	Supply Current per Input @ TTL HIGH	V_{CC} = 5.5V	V_{IN} = 3.4V[3]	—	—	2.5	mA
I_{CCD}	Supply Current per Input per MHz[4]	V_{CC} = Max., Input Pins Open $\overline{E}$ = GND Control Input Toggling 50% Duty Cycle		—	—	0.25	mA/ MHz

Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at V_{CC} = 6.2V, T_A = 25°C ambient temperature.
3. Per TTL driven input (V_{IN} = 3.4V, control inputs only); A and B pins do not contribute to I_{CC}.
4. This current applies to the control inputs only and represent the current required to switch internal capacitance at the specified frequency. The A and B inputs generate no significant AC or DC currents as they transition. This parameter is not tested, but is guaranteed by design.

Switching Characteristics over Operating Range

Parameters	Description	Conditions[1]	Com.			Units
			Min.	Typ	Max.	
t_{PHZ}	Bus Disable Time $\overline{E}$ to Y	C_L = 50pF R_L = 500Ω	0.5	—	6.0	ns
t_{PZH}	Bus Enable Time $\overline{E}$ to Y		0.5	—	5.8	

Notes:
1. See test circuit and waveforms (Figure 2).

Applications

Logic Inputs

The logic control inputs can be driven up to +5.5V regardless of the supply voltage. For example, given a +5.0V supply, $\overline{E}$ may be driven low to 0V and high to 5.5V. Driving $\overline{E}$ Rail-to-Rail® minimizes power consumption.

Power-Supply Sequencing

Proper power-supply sequencing is recommended for all CMOS devices. Always apply V_{CC} before applying signals to the input/output or control pins.

V_{CC} Bias Voltage vs R_{ON}

To keep R_{ON} to a minimum, it is recommended that the V_{CC} voltage be increased to a voltage between +6.0V and +6.5V (see Figure 5). The R_{ON} vs V_{IN} curve shows the effect of On-Resistance and input voltage which is exponential. Ideally an input voltage between 0.2V and 3.6V will keep R_{ON} in the flat part of the curve (ΔR_{ON} or flatness is ~2ohm).
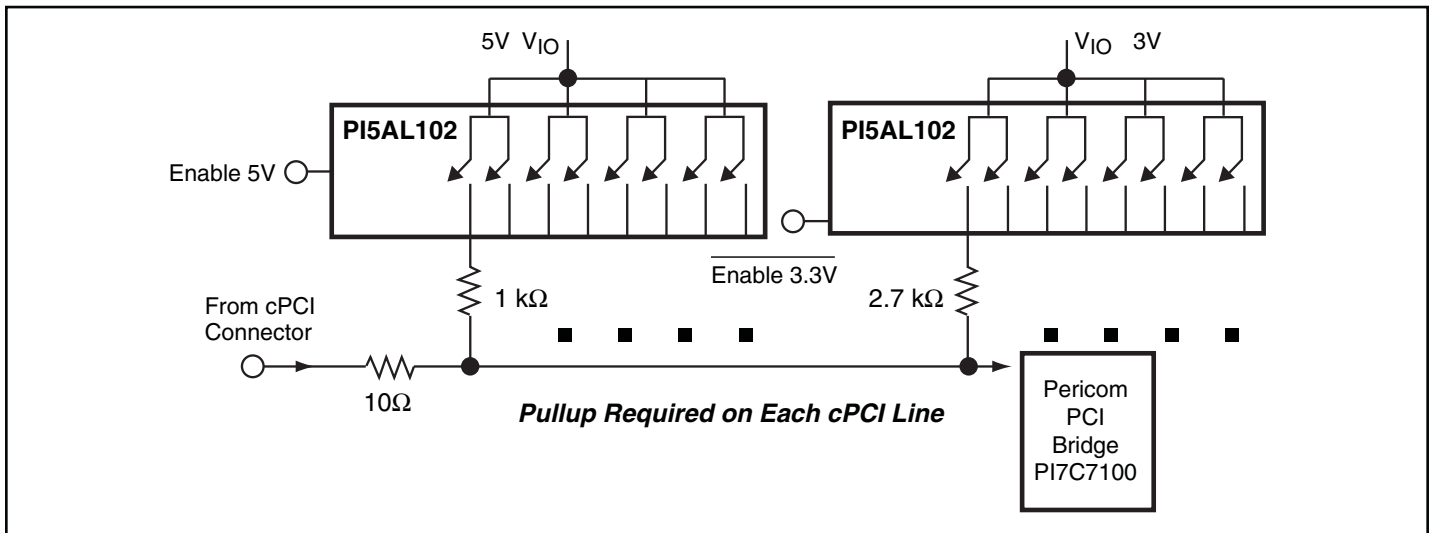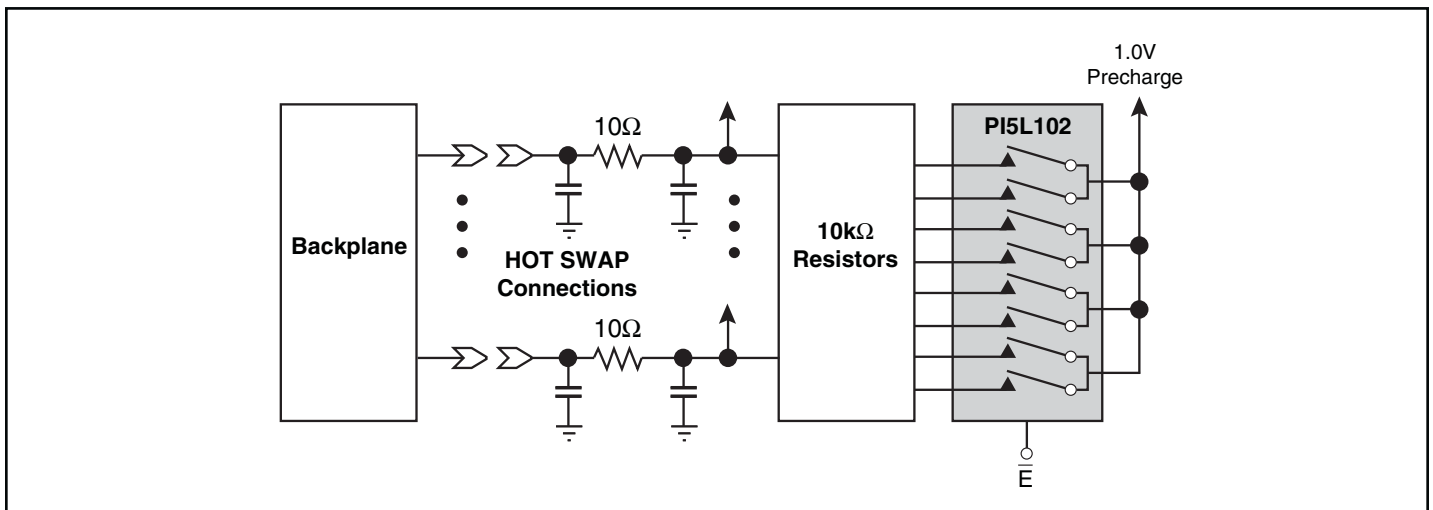
Figure 1. V_{IO} Voltage Selection

Figure 2. Hot Swap Precharge Voltage Selection
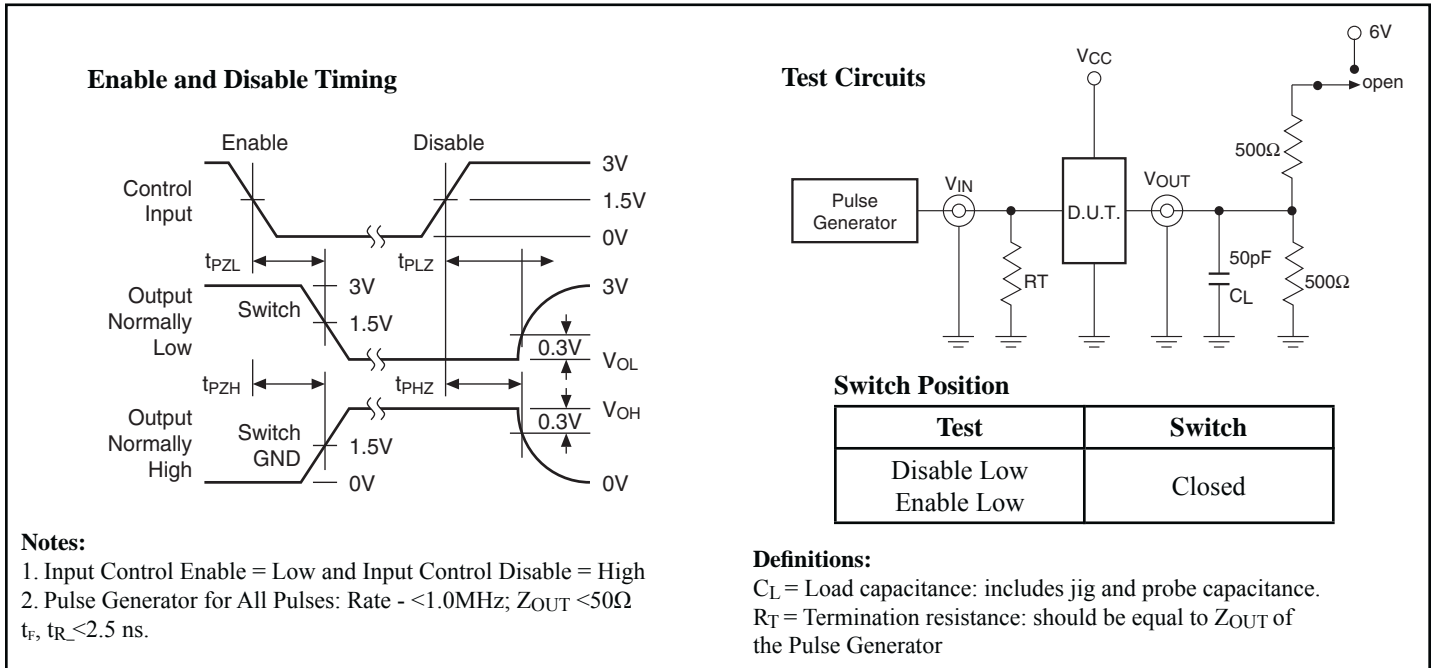
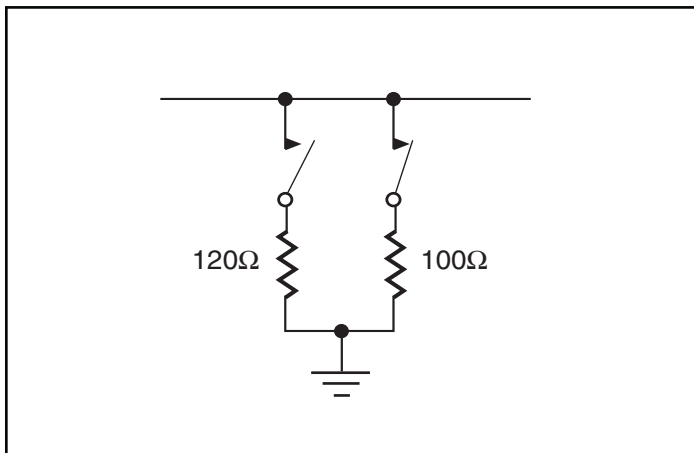## Test Circuits and Waveforms

Figure 3. Switching Time

Notes:
1. Input Control Enable = Low and Input Control Disable = High
2. Pulse Generator for All Pulses: Rate - <1.0MHz; Z_{OUT} <50Ω
t_F, t_R <2.5 ns.

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

Switch Position

Test	Switch
Disable Low Enable Low	Closed

Figure 4. Line Termination
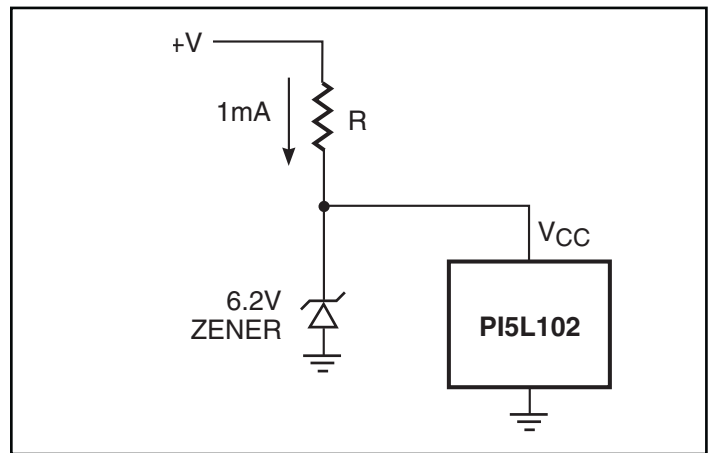
Figure 5. V_{CC} Bias Current
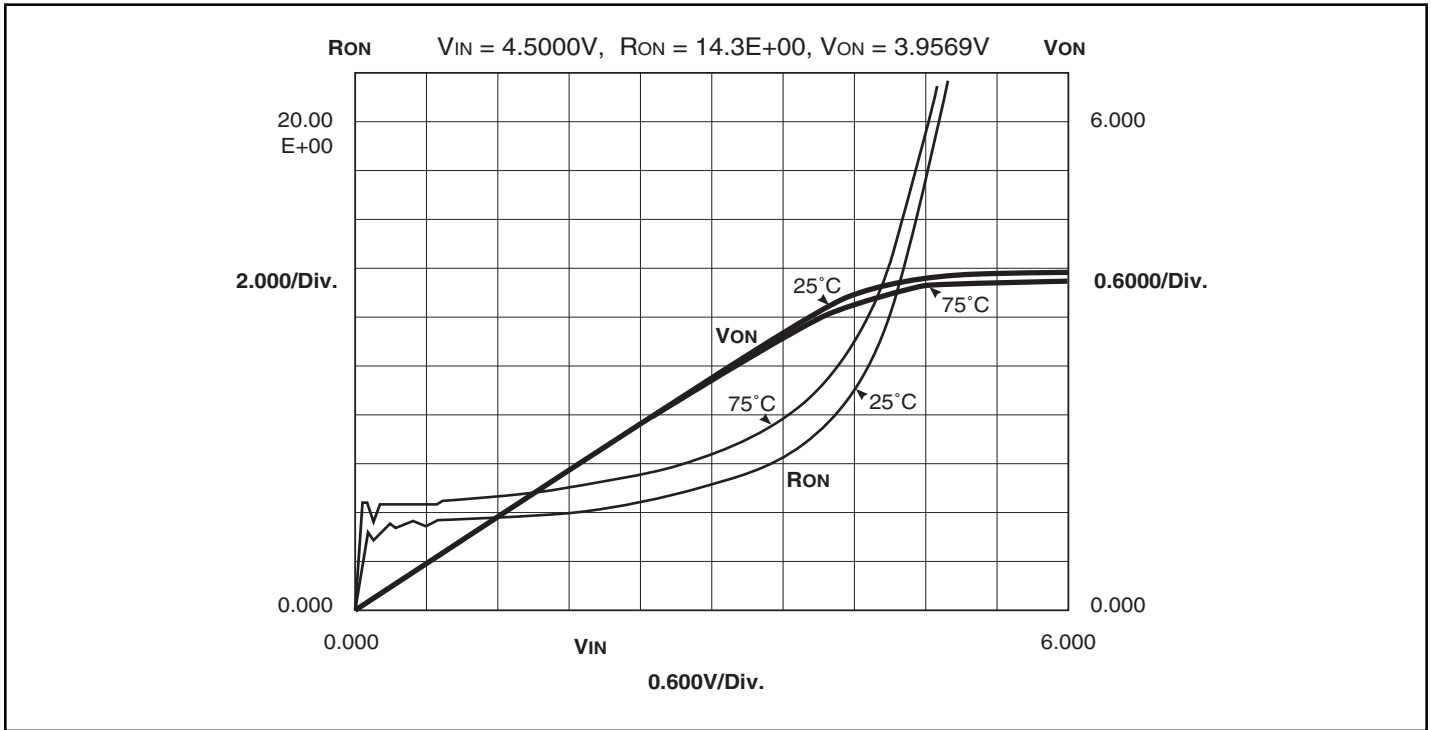
Figure 6. RON **vs Input Voltage over Temperature**
(RON **at Vcc = 6.1V @ 75°C)**
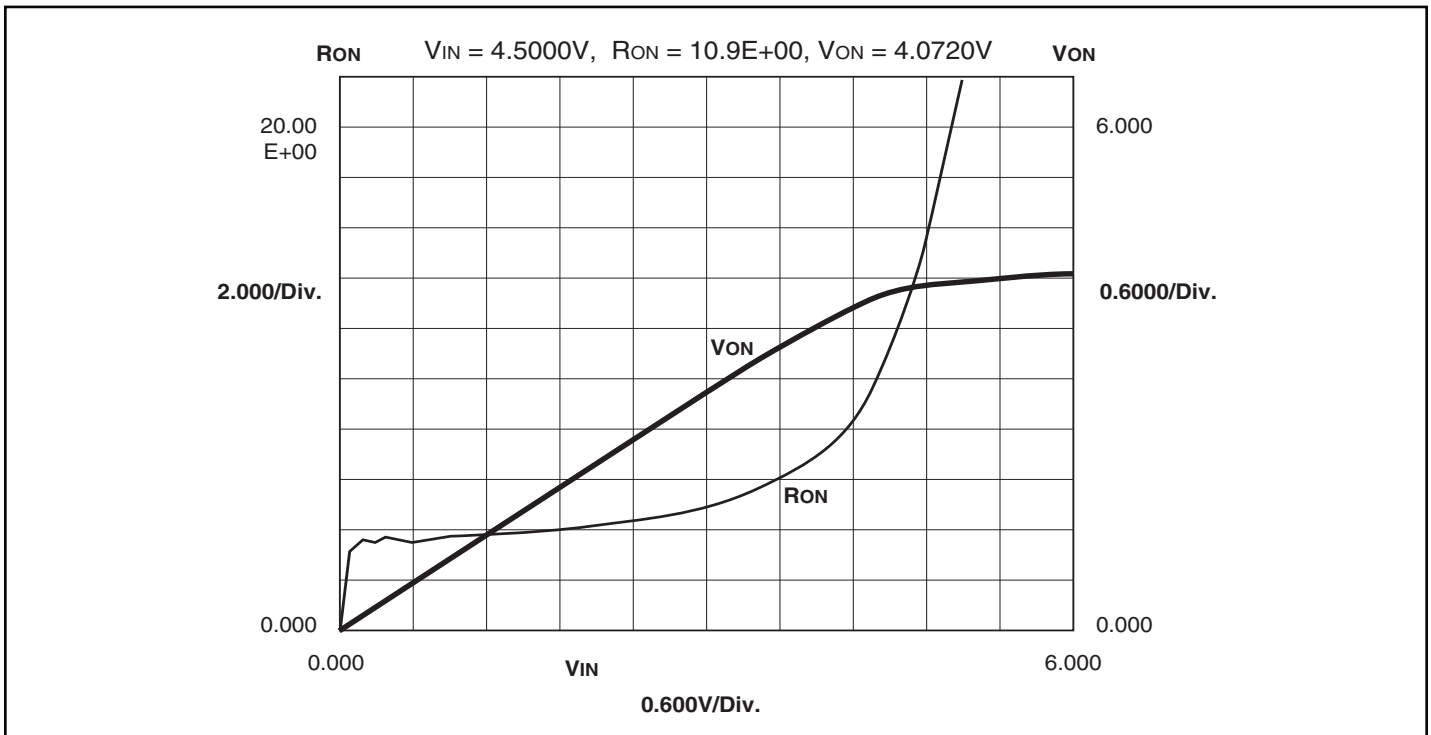
Figure 7 RON **vs Input Voltage**
(RON **at V**CC **= 6.2V @ 25°C)**

PERICOM®

Packaging Mechanical: 20-Pin TSSOP (L)
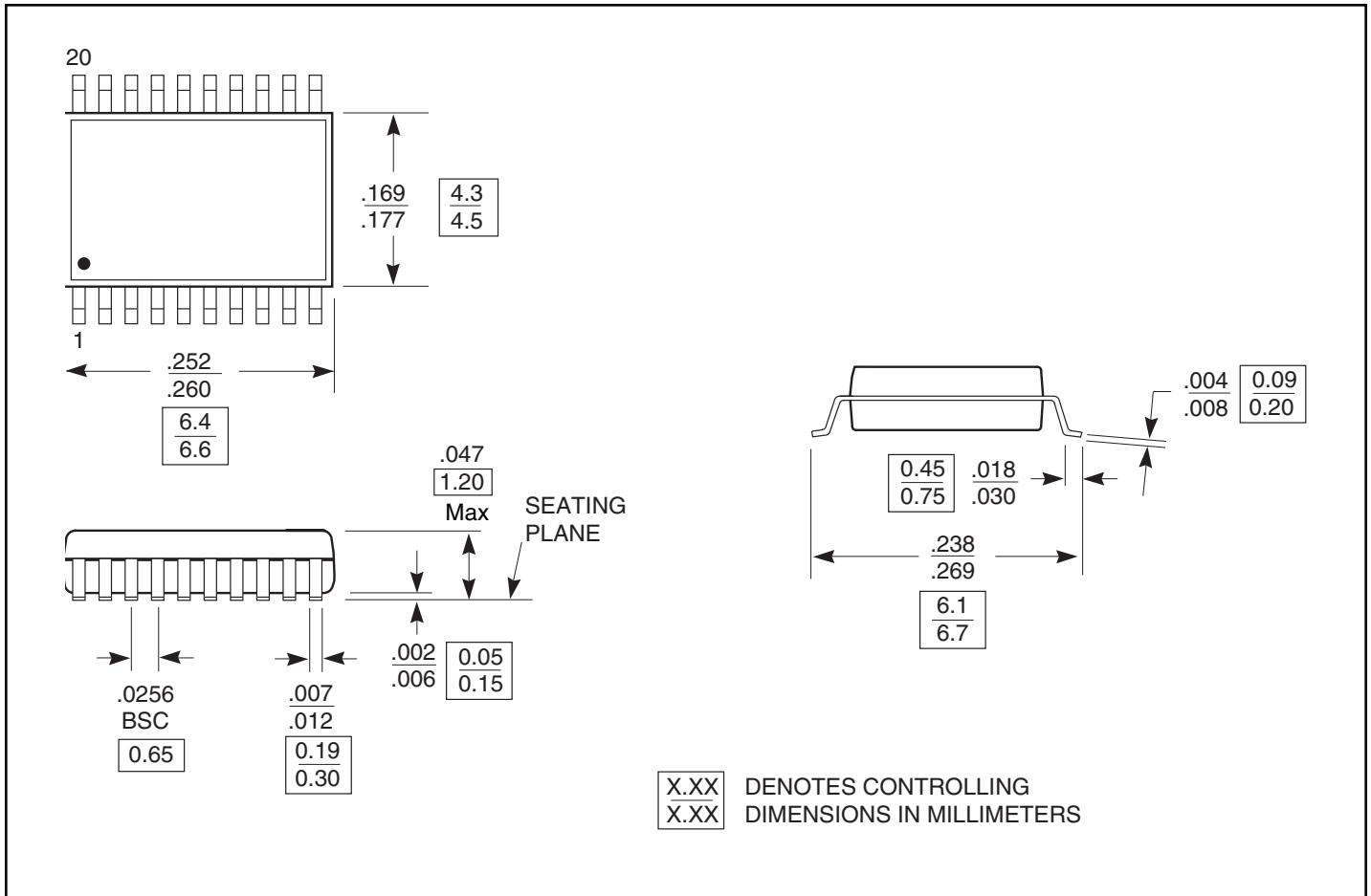
Ordering Information

Ordering Code	Package Code	Package Description
PI5L102L	L	20-pin TSSOP
PI5L102LE	L	Pb-free & Green, 20-pin TSSOP

Notes:

1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/