



PI5L102

CompactPCI® Hot Swap Pull-up Switch

Product Features

- Supports CompactPCI precharge voltage selection
- 3.3V/2.7kohms, 5V/1ohm line termination selection
- Ultra-low quiescent current: 0.1µA typical
- Low ON resistance: 7ohms maximum
- Single supply operation up to 6.2V ±5%
- Wide bandwidth data rates: >200 Mbps
- Compact 20-pin TSSOP package
- Mechanical relay replacement

Product Description

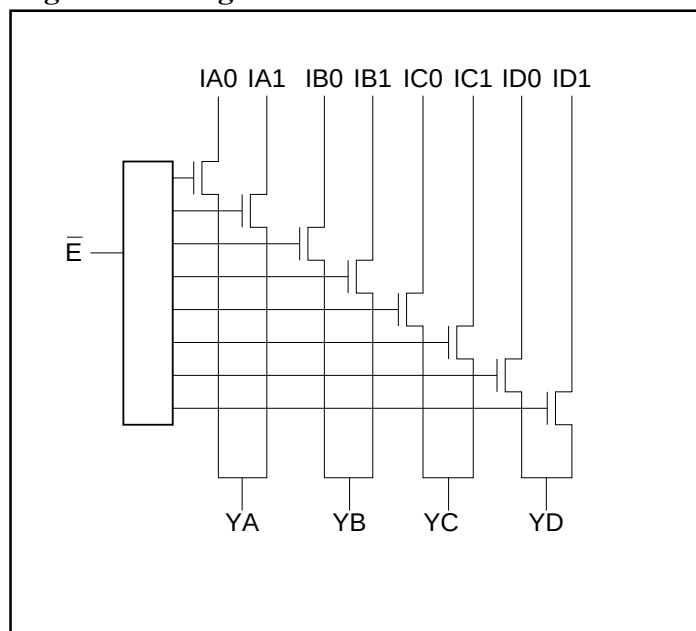
The PI5L102L CompactPCI Hot Swap Pull-up switch is a Quad 1:2 multiplexer. It is designed to switch the 1V precharge bias voltage and 10-kohm pull-up resistor connected to the CompactPCI bus signals during Hot Swap. Each switch can connect eight inputs (I_{An} to I_{Dn}) to a given pull-up voltage level.

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

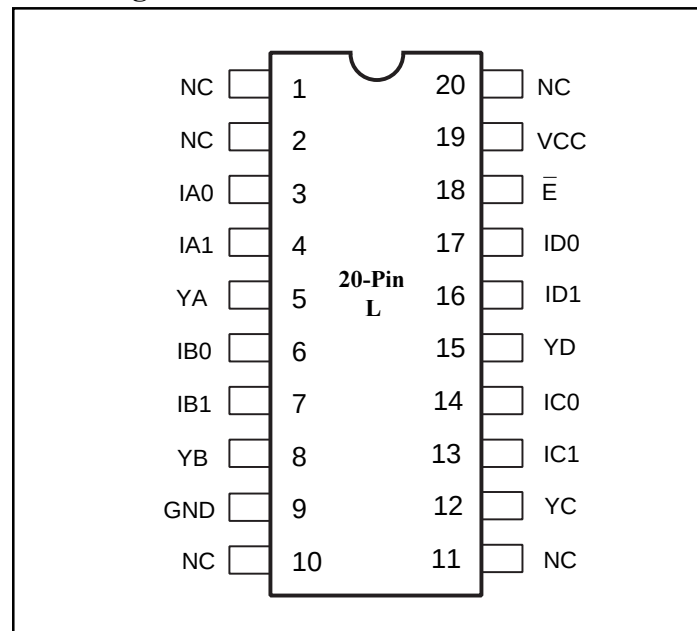
ON resistance is a low 7 ohms maximum and all eight switches are selected or disabled with a single CMOS/TTL compatible signal. For general-purpose applications, the PI5L102 can replace mechanical relays. In network systems, physical layer signals can be switched.

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

Logic Block Diagram



Pin Configuration



Truth Table⁽¹⁾

$\bar{E}$	YA	YB	YC	YD	Function
H	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Disable
L	IA0, IA1	IB0, IB1	IC0, IC1	ID0, ID1	Enable

Note:

1. H = High Voltage Level
L = Low Voltage Level

Product Pin Description

Pin Name	Description
IA _n -ID _n	Data Inputs
$\bar{E}$	Enable
YA-YD	Data Outputs
GND	Ground
VCC	Power



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	V
I _{IH}	Input HIGH Current	V _{CC} = Max., V _{IN} = V _{CC}	—	—	±1	μA
I _{IL}	Input LOW Current	V _{CC} = Max., V _{IN} = GND	—	—	±1	μA
I _{OZH}	High Impedance Output Current	0 ≤ A, B ≤ V _{CC}	—	—	±1	μA
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	ohm
		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 ($T_A = 25^\circ\text{C}$, $f = 1\text{ MHz}$)

Parameters ⁽¹⁾	Description	Test Conditions	Typ.	Max.	Units
C_{IN}	Input Capacitance	$V_{IN} = 0\text{V}$	4	6	pF
$C_{OFF(YX)}$	Y_X Capacitance, Switch OFF		6	8	
$C_{OFF(I_{XN})}$	I_{XN} Capacitance, Switch OFF		6	8	
$C_{ON(YX)}^{(1,2)}$	Y_X 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	$V_{CC} = \text{Max.}$	$V_{IN} = \text{GND or } V_{CC}$	—	0.1	3.0	μA
ΔI_{CC}	Supply Current per Input @ TTL HIGH	$V_{CC} = \text{Max.}$	$V_{IN} = 3.4\text{V}^{(3)}$	—	—	2.5	mA
I_{CCD}	Supply Current per Input per MHz ⁽⁴⁾	$V_{CC} = \text{Max.}$, Input Pins Open $\bar{E} = \text{GND}$ 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 $V_{CC} = 6.2\text{V}$, $T_A = 25^\circ\text{C}$ ambient temperature.
3. Per TTL driven input ($V_{IN} = 3.4\text{V}$, 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⁾	PI5L102			Units
			Com.			
			Min.	Typ	Max.	
t _{PHZ} t _{PLZ}	Bus Disable Time E̅ to Y	C _L = 50pF R _L = 500ohm	0.5	—	6.0	ns
t _{PZH} t _{PZL}	Bus Enable Time E̅ to Y		0.5	—	5.8	ns

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, $\bar{E}$ may be driven low to 0V and high to 5.5V. Driving $\bar{E}$ 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).

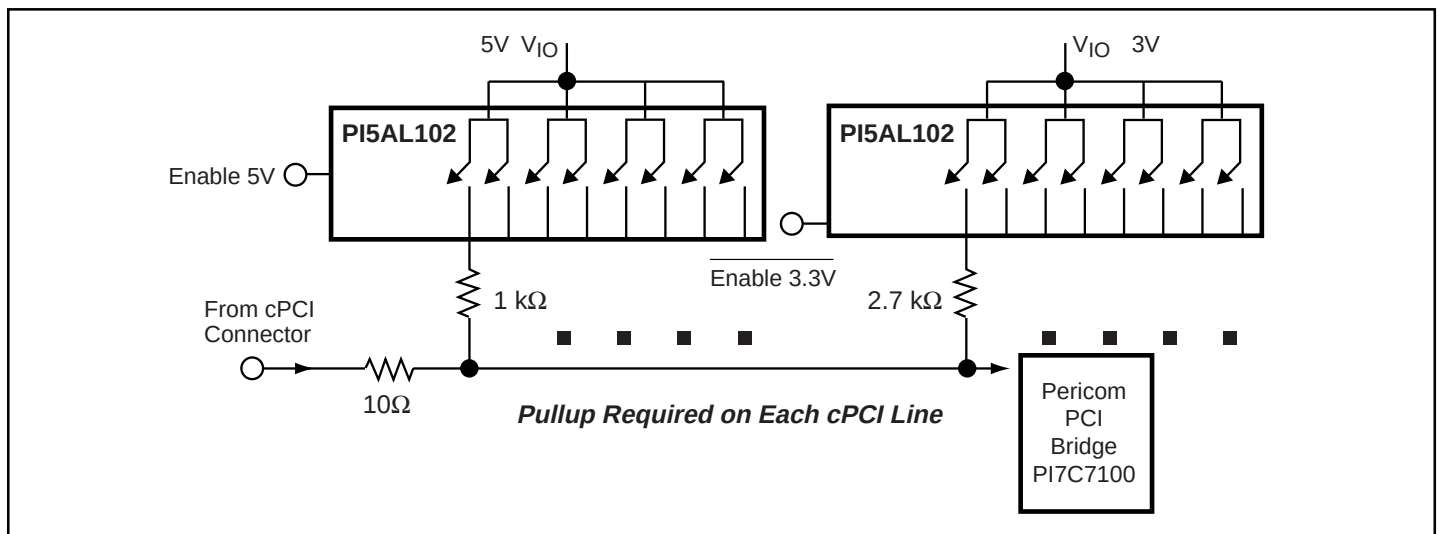


Figure 1. V_{IO} Voltage Selection

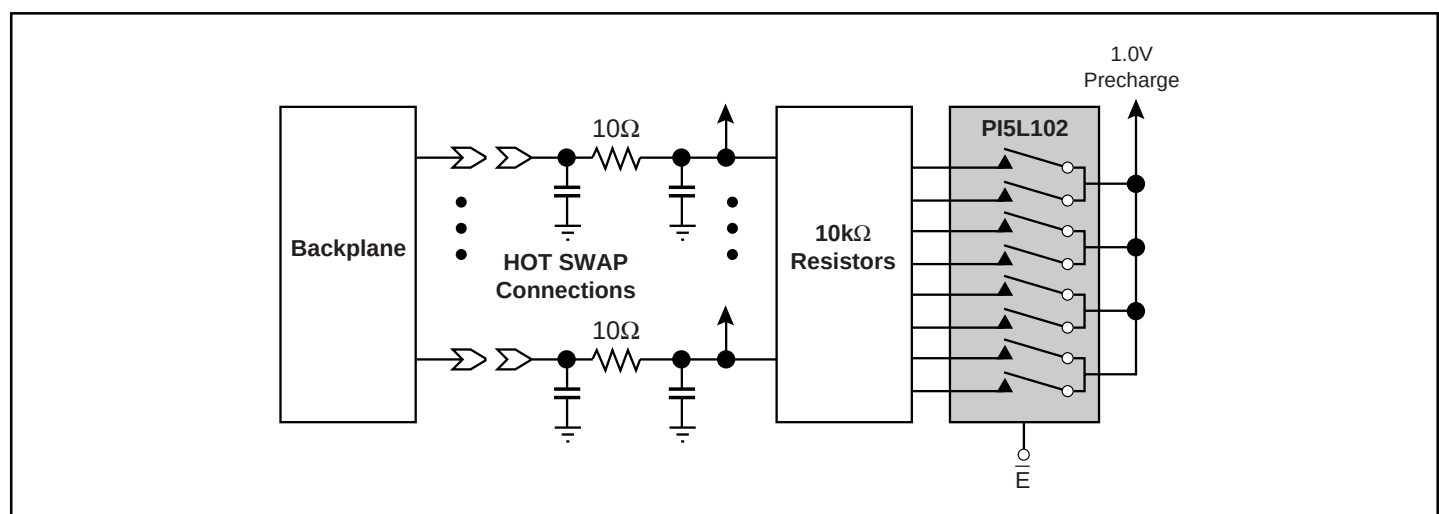
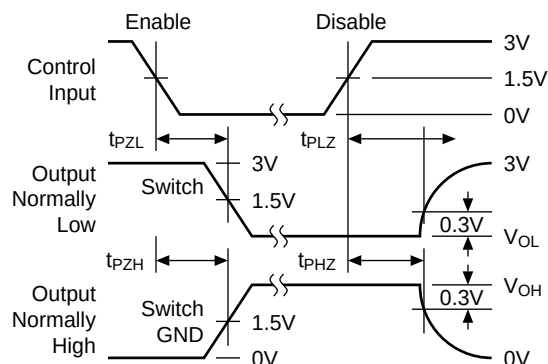


Figure 2. Hot Swap Precharge Voltage Selection

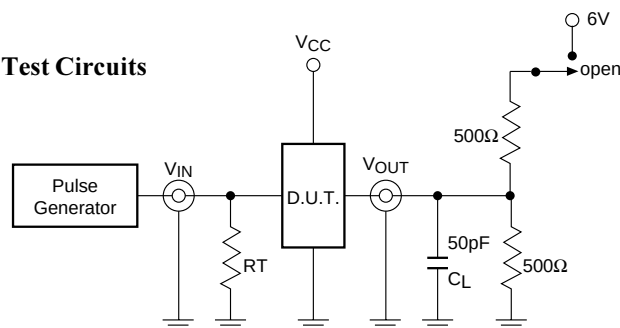
Test Circuits and Waveforms

Enable and Disable Timing



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

Test Circuits



Switch Position

Test	Switch
Disabled LOW Enabled LOW	Closed

DEFINITIONS:

C_L = Load capacitance: includes jig and probe capacitance.

R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator

Figure 3. Switching Time

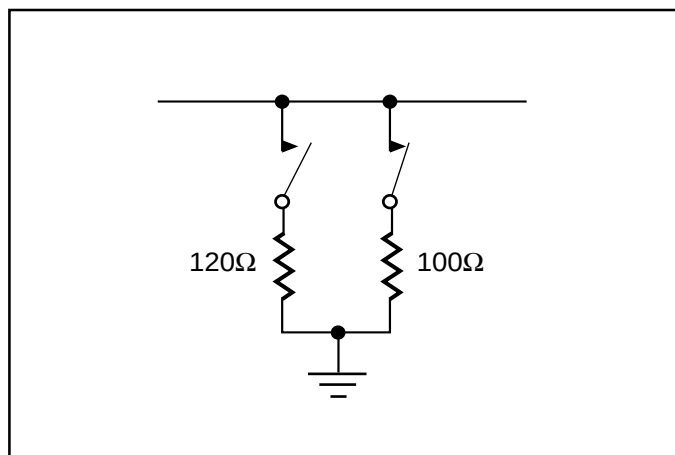


Figure 4. Line Termination

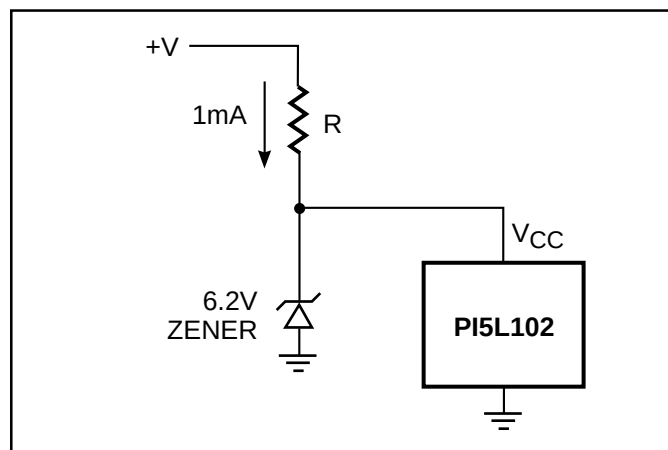


Figure 5. V_{CC} Bias Current

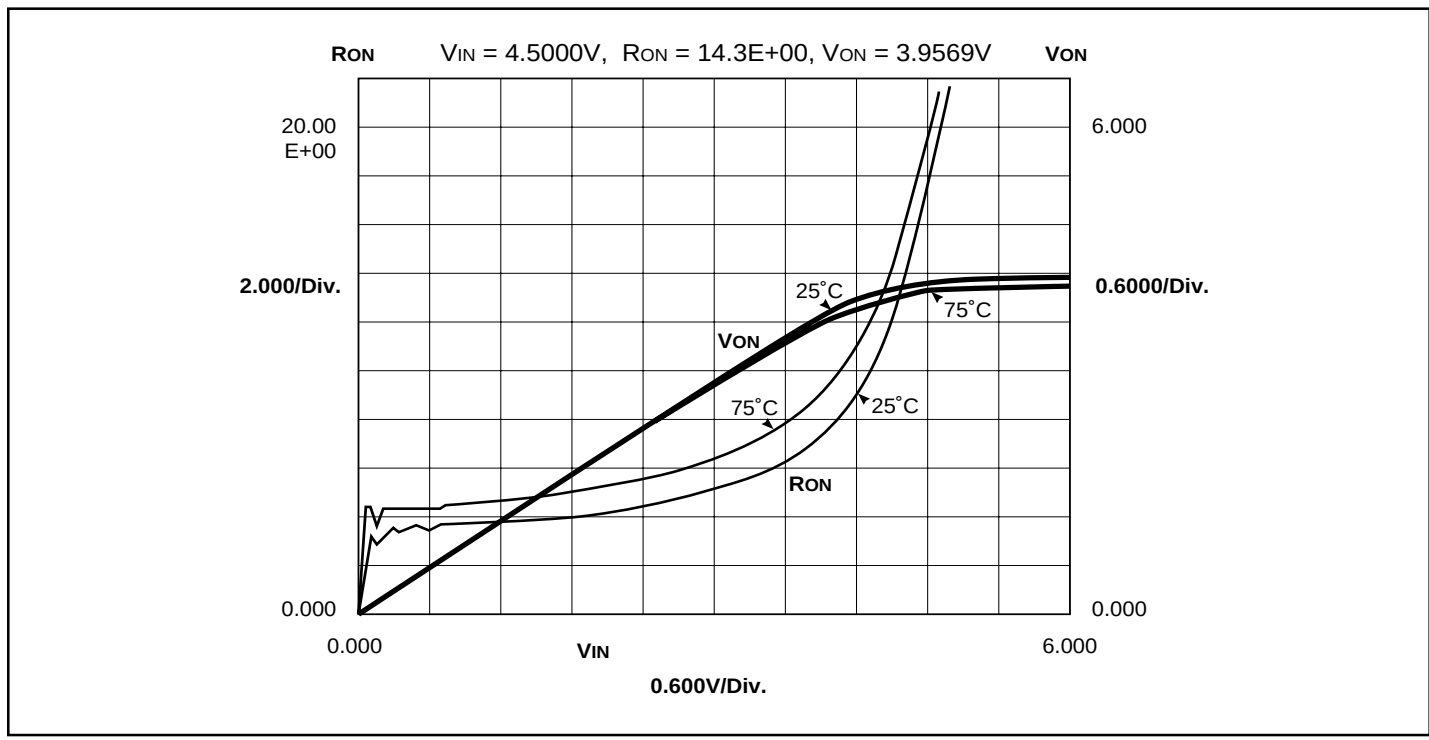


Figure 6. R_{ON} vs Input Voltage over Temperature
(R_{ON} at $V_{CC} = 6.1\text{V}$ @ 75°C)

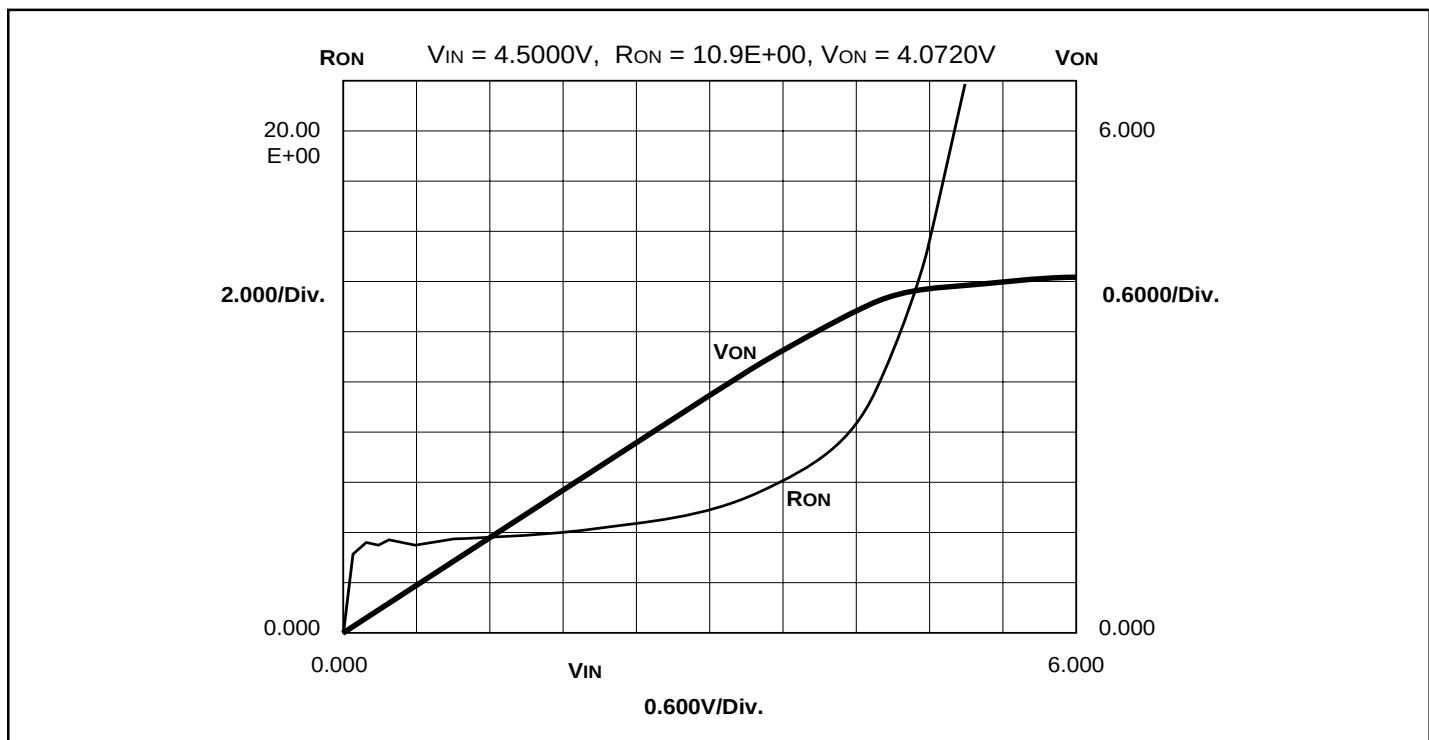
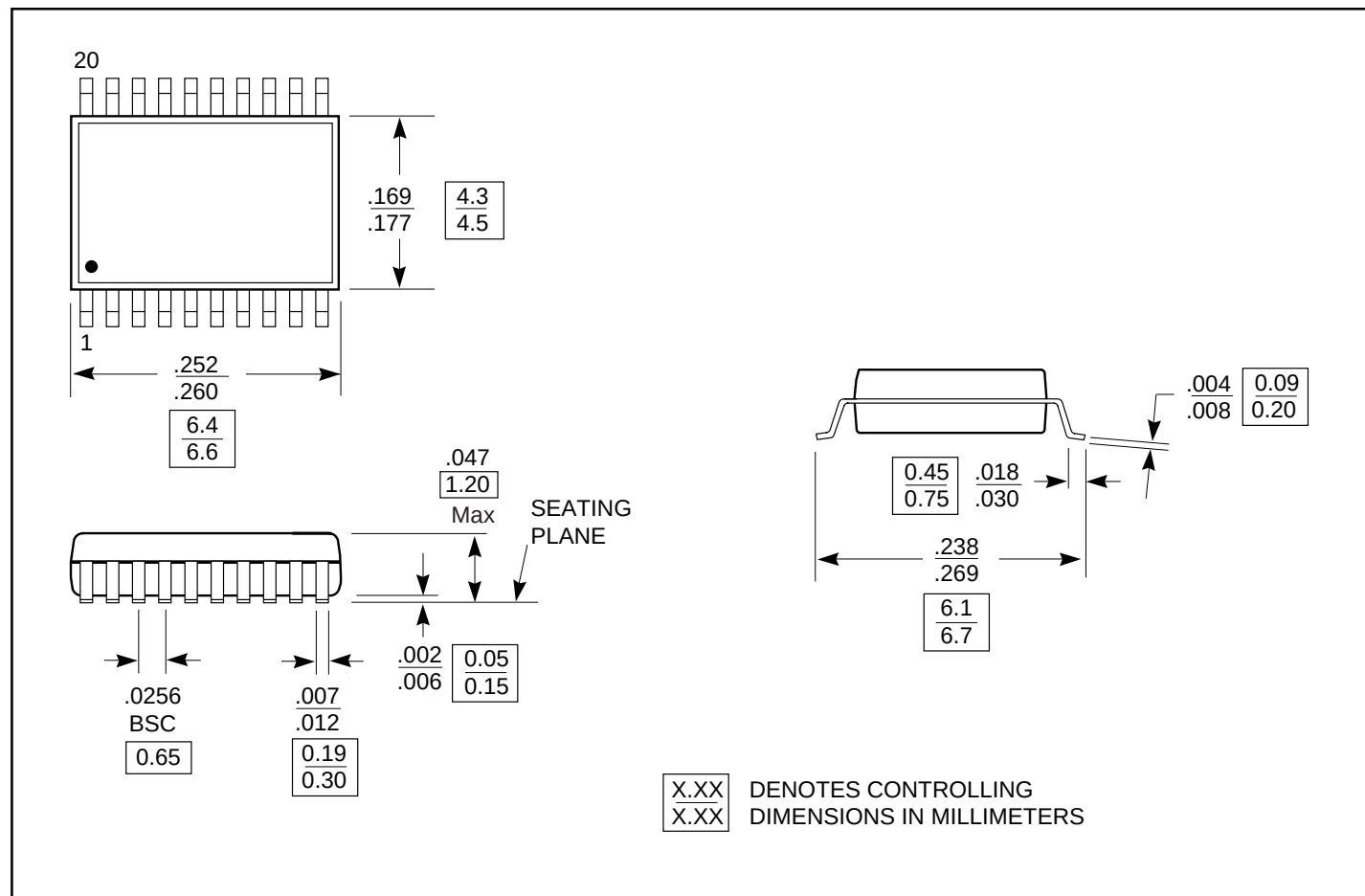


Figure 7 R_{ON} vs Input Voltage
(R_{ON} at $V_{CC} = 6.2\text{V}$ @ 25°C)


20-Pin TSSOP Package Drawing (L)

Ordering Information

Part	Pin-Package	Temperature
PI5L102L	20 - TSSOP(L)	0°C to +70°C