PC Card (PCMCIA) Interface Switch

Features

- Single SO-16 Package
- CMOS Inputs with Hysteresis
- Extremely Low R_{ON}
- Reverse Blocking Switches
- HiZ Outputs in the Off-State
- Low Power Consumption
- Safe Power-Up

Description

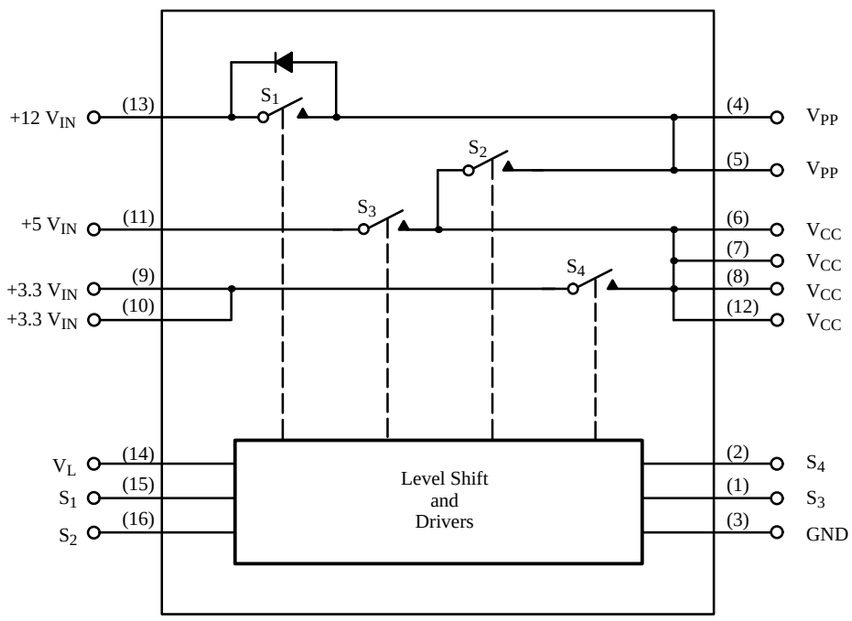
The Si9711CY is a monolithic switch designed to meet the needs of the PC Card interface. The inputs are fully CMOS compatible and incorporate all the level shift and interface required to be driven by any CMOS driver. The external inputs can be driven to 3.3-V or 5-V by setting V_L at the appropriate level. The switches are low R_{ON} and can carry the maximum currents found on the PC Card interface.

The 5-V and 3.3-V switches do not have the parasitic diode found in vertical DMOS power switches.

Low R_{ON} is achieved by using MOSFETs driven off the +12-V_{IN} input. All level shifting is built into the Si9711CY.

The Si9711CY is packaged in an SO-16 package and is rated over the commercial temperature range 0 to 70°C.

Functional Block Diagram



Truth Table – S_1 through S_4

Logic	Switch
0	OFF
1	ON

Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70022.

Absolute Maximum Ratings

Voltages Referenced to Ground
V_L . . . . . 7 V
+12 V_{IN} . . . . . 15 V
+5 V_{IN} . . . . . 7 V
+3.3 V_{IN} . . . . . 7 V
S_1 through S_4 (CMOS Inputs) . . . . . V_L + 0.5 V
I_{OUT} V_{PP} . . . . . 300 mA
V_{CC} . . . . . 7 V
V_{PP} . . . . . 15 V
All Pins . . . . . –0.5 V
I_{OUT} V_{CC} . . . . . 1.5 A
PD Max: (T_A = 25°C) . . . . . 710 mW
(T_A = 70°C) . . . . . 390 mW
Junction Temperature . . . . . 125°C
Thermal Ratings
$R_{\Theta JA}$ . . . . . 140 °C/W

Recommended Operating Conditions

+12 V_{IN} . . . . . 12 V ± 10%
+5 V_{IN} . . . . . 5 V ± 10%
+3.3 V_{IN} . . . . . 3.3 V ± 10%
I_{OUT} V_{CC} . . . . . 1 A
I_{OUT} V_{PP} . . . . . 150 mA
V_L . . . . . 5.0 V ± 10%

Specifications

Parameter	Symbol	Test Conditions Unless Otherwise Specified +5 V_{IN} = 5 V, +3.3 V_{IN} = 3.3 V +12 V_{IN} = 12 V, V_L = 5.0 V, GND = 0 V		Limits C Suffix, 0 to 70°C Min[a]	Typ	Max[a]	Unit
Switch 1							
On-Resistance	R_{ON}	I = 120 mA, +12 V_{IN} = 10.8 V S_1 = V_L, S_2 = GND	T_A = 25°C			200	mΩ
			T_A = 70°C			250	
Off Current (+12 V_{IN} to V_{PP})	I_{OFF}	+12 V_{IN} = 13.2 V, V_{PP} = 0 V S_1 = GND	T_A = 25°C			1	µA
			T_A = 70°C			10	
Switching Time	$t_{S1(on)}$	C_L = 0.1 µF, S_2 = Low, R_L = 100 Ω, See Figure 1		0.1		1	µs
	$t_{S1(off)}$			0.5		4	
Switch 2							
On-Resistance	R_{ON}	I = 120 mA, +12 V_{IN} = 10.8 V S_2 = S_3 = V_L	T_A = 25°C			300	mΩ
			T_A = 70°C			350	
Off Current	I_{OFF}	V_{PP} = 13.2 V, V_{CC} = 0 V +12 V_{IN} = 13.2 V	T_A = 25°C			1	µA
			T_A = 70°C			10	
Switching Time	$t_{S2(on)}$	C_L = 0.1 µF, R_L = 100 Ω, S_1 = S_4 = GND, S_3 = V_L , See Figure 1		0.1		1	µs
	$t_{S2(off)}$			0.5		4	
Switch 3							
On-Resistance	R_{ON}	I = 500 mA, +12 V_{IN} = 10.8 V S3 = V_L	T_A = 25°C			200	mΩ
			T_A = 70°C			250	
Off Current	I_{OFF}	+5 V_{IN} = 5.5 V, V_{CC} = 0 V	T_A = 25°C			1	µA
			T_A = 70°C			10	
Switching Time	$t_{d(on)}$	+5 V_{IN} = 5 V, C_L = 0.1 µF, V_{CC} to GND R_L = 100 Ω, V_{CC} to GND, See Figure 2		1			µs
	$t_{ramp(on)}$			200			
	$t_{S3(off)}$			0.5		4	

Specifications

Parameter	Symbol	Test Conditions Unless Otherwise Specified +5 V_{IN} = 5 V, +3.3 V_{IN} = 3.3 V +12 V_{IN} = 12 V, V_L = 5.0 V, GND = 0 V		Limits C Suffix, 0 to 70°C Min[a]	Typ	Max[a]	Unit
Switch 4							
On-Resistance	R_{ON}	I = 500 mA, +12 V_{IN} = 10.8 V $S_4 = V_L$	T_A = 25°C			150	mΩ
			T_A = 70°C			185	
Off Current	I_{OFF}	+3.3 V_{IN} = 3.6 V, V_{CC} = 0 V $S_2 = S_3 = S_4$ = GND	T_A = 25°C			1	µA
			T_A = 70°C			10	
Switching Time	$t_{d(on)}$	+3.3 V_{IN} = 3.3 V, C_L = 0.1 µF, S_3 = GND R_L = 100 Ω, See Figure 2		1			µs
	$t_{ramp(on)}$			200			
	$t_{S4(off)}$			0.5		4	
Power Supply							
+12 V_{IN} Current	$I_{+12VIN(1)}$	$S_1 = S_4$ = GND, $S_2 = S_3 = V_L$				10	µA
	$I_{+12VIN(2)}$	$S_1 = S_4 = V_L$, $S_2 = S_3$ = GND				10	
V_L Current	$I_{VL(1)}$	$S_1 = S_4$ = GND, $S_2 = S_3 = V_L$				10	
	$I_{VL(2)}$	$S_1 = S_4 = V_L$, $S_2 = S_3$ = GND				10	
Switch Control Inputs							
Input Voltage High	$V_{I(H)}$		V_L = 3.3 V	2.8	2.4		V
			V_L = 5 V	4.0	3.3		
Input Voltage Low	$V_{I(L)}$		V_L = 3.3 V		1.1	0.4	
			V_L = 5 V		1.5	0.8	
Input Hysteresis[b]	$V_{I(H)} - V_{I(L)}$		V_L = 3.3 V	0.5	1.3		
			V_L = 5 V	0.8	1.8		
Input Current High	$I_{I(H)}$	S_1 through $S_4 = V_L$, V_L = 5 V				1.0	µA
Input Current Low	$I_{I(L)}$	S_1 through S_4 = GND, V_L = 5 V		−1.0			

Notes
a. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
b. Guaranteed by design, not subject to production testing.

Timing Waveforms

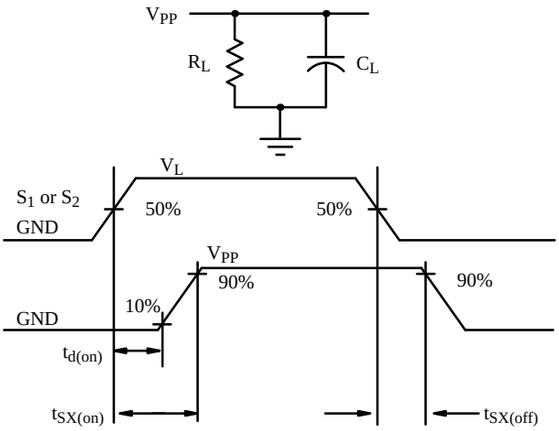


Figure 1. $t_{d(on)}$ and $t_{SX(on)}$

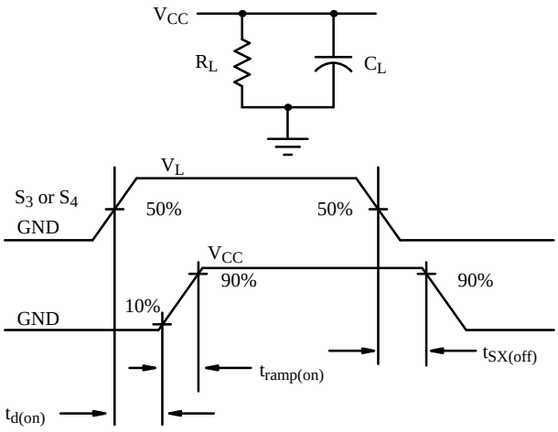
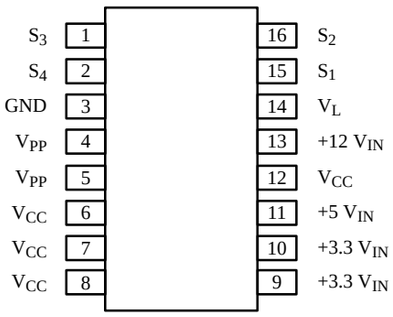


Figure 2. $t_{ramp(on)}$

Pin Configuration

SO-16



Top View

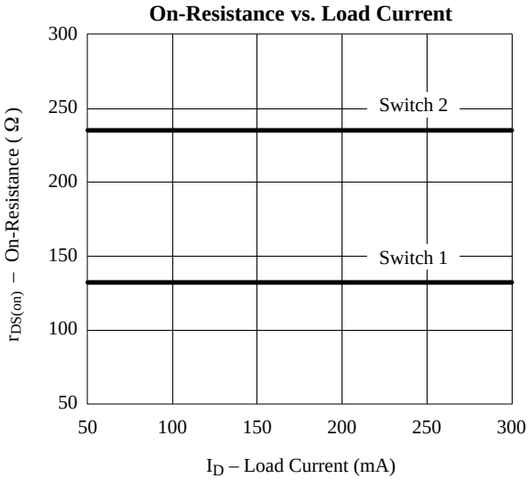
Order Number: Si9711CY

Pin Description

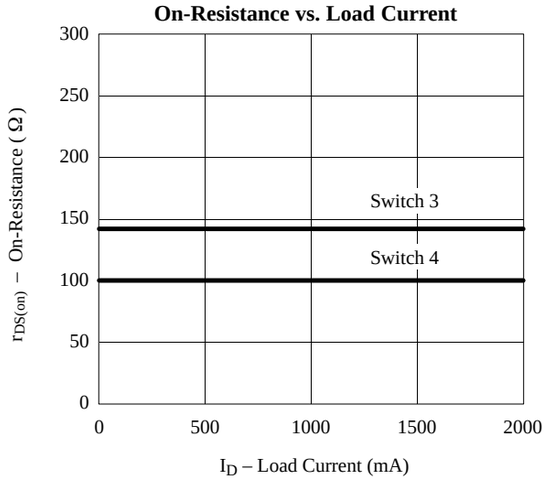
Pin Number	Symbol	Description
1	S_3	Control input for selecting +5 V_{IN} to V_{CC}. The PC Card terminology for this pin is V_{CC}_EN_1.
2	S_4	Control input for selecting +3.3 V_{IN} to V_{CC}. The PC Card terminology for this pin is V_{CC}_EN_0.
3	GND	Ground connection.
4, 5	V_{PP}	Program and peripheral voltage to PC Card slot.
6, 7, 8, 12	V_{CC}	Supply voltage to slot.
9, 10	+3.3 V_{IN}	+3.3-V supply.
11	+5 V_{IN}	+5-V supply.
13	+12 V_{IN}	+12-V supply.
14	V_L	Rail voltage for switch control inputs, selectable to 5-V or 3.3-V.
15	S_1	Control input for selecting +12 V_{IN} to V_{PP} . The PC Card terminology for this pin is V_{PP}_EN_1.
16	S_2	Control input for selecting V_{CC} to V_{PP} . The PC Card terminology for this pin is V_{PP}_EN_0.

Typical Characteristics (25°C Unless Otherwise Noted)

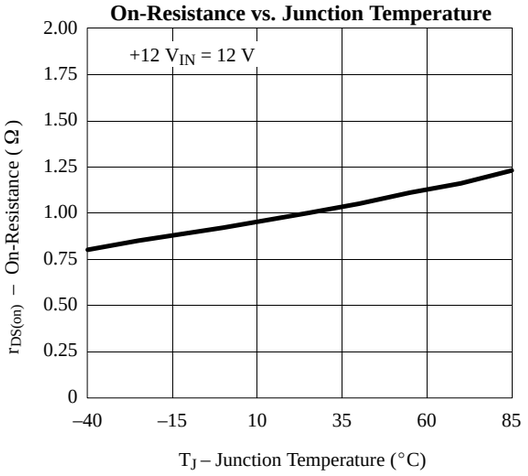
On-Resistance vs. Load Current



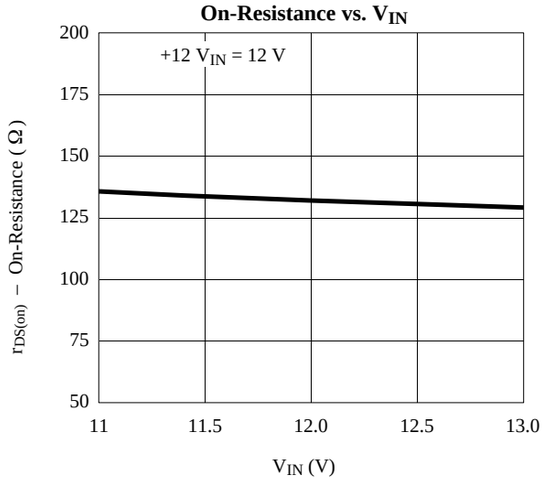
On-Resistance vs. Load Current



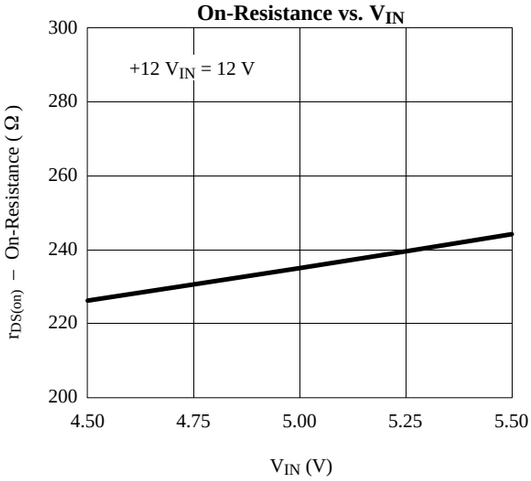
Switch 1 – 4
On-Resistance vs. Junction Temperature



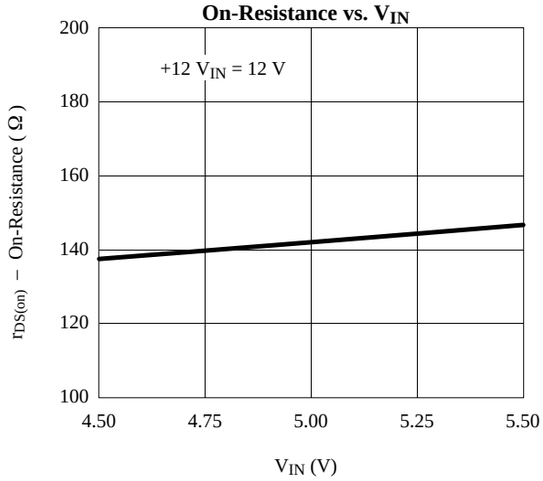
Switch 1
On-Resistance vs. V_{IN}



Switch 2
On-Resistance vs. V_{IN}

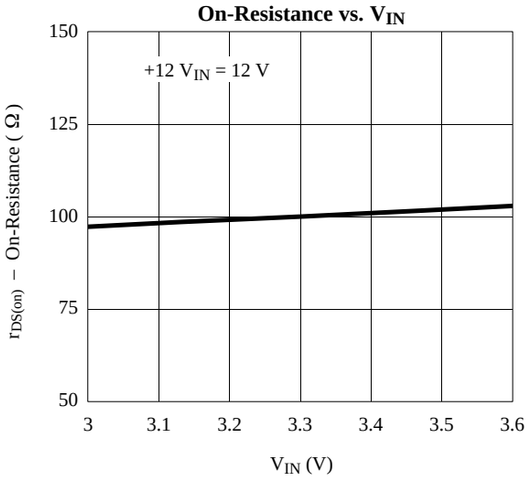


Switch 3
On-Resistance vs. V_{IN}

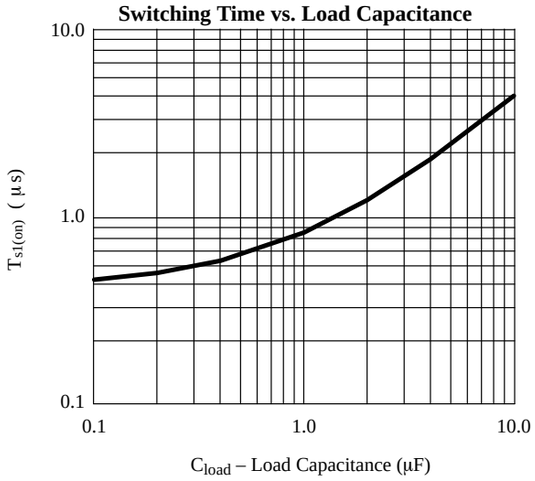


Typical Characteristics (25°C Unless Otherwise Noted)

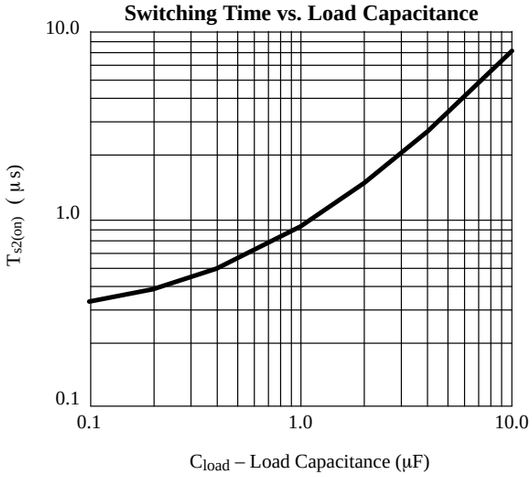
Switch 4
On-Resistance vs. V_{IN}



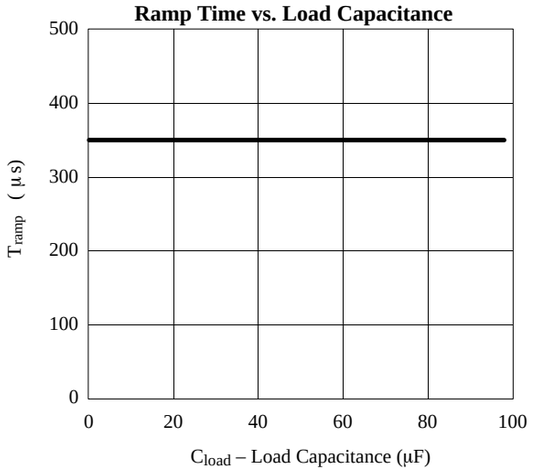
Switch 1
Switching Time vs. Load Capacitance



Switch 2
Switching Time vs. Load Capacitance



Switch 3
Ramp Time vs. Load Capacitance



Switch 4
Ramp Time vs. Load Capacitance