

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 Si9711 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.

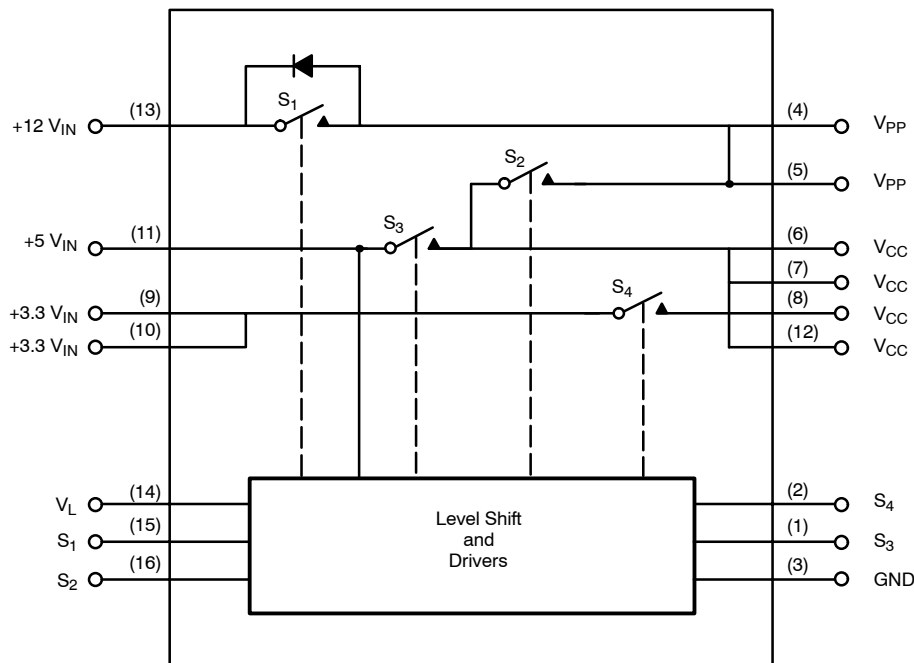
The 5-V and 3.3-V switches do not have the parasitic diode found in vertical DMOS power switches.

Low R_{ON} is achieved by using MOSFETs driven off the +12- V_{IN} input. All level shifting is built into the Si9711.

The Si9711 is packaged in an SO-16 package and is rated over the commercial temperature range 0 to 70°C.

The Si9711 is available in both standard and lead (Pb)-free packages.

FUNCTIONAL BLOCK DIAGRAM



TRUTH TABLE S₁ THROUGH S₄	
Logic	Switch
0	OFF
1	ON



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: ($T_A = 25^\circ\text{C}$)	710 mW
($T_A = 70^\circ\text{C}$)	390 mW
Junction Temperature	125°C
Thermal Ratings	
$R_{\theta JA}$	140 °C/W

RECOMMENDED OPERATING CONDITIONS

+12 V_{IN}	12 V \pm 10%
+5 V_{IN} (must be present)	5 V \pm 10%
+3.3 V_{IN}	3.3 V \pm 10%

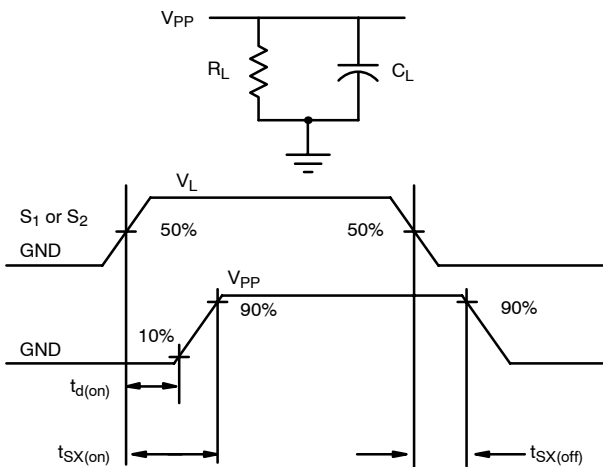
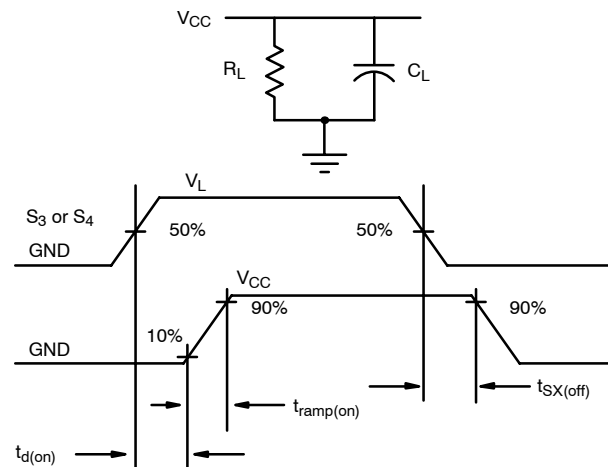
$I_{OUT} V_{CC}$	1 A
$I_{OUT} V_{PP}$	150 mA
V_L	5.0 V \pm 10%

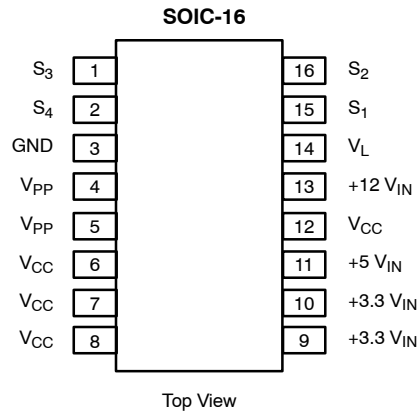
SPECIFICATIONS						
Parameter	Symbol	Test Conditions Unless Otherwise Specified +5 $V_{IN} = 5$ V, +3.3 $V_{IN} = 3.3$ V +12 $V_{IN} = 12$ V, $V_L = 5.0$ V, GND = 0 V	Limits C Suffix, 0 to 70°C			Unit
			Min ^a	Typ	Max ^a	
Switch 1						
On-Resistance	R_{ON}	$I = 120$ mA, +12 $V_{IN} = 10.8$ V $S_1 = V_L$, $S_2 = \text{GND}$	$T_A = 25^\circ\text{C}$		200	m Ω
			$T_A = 70^\circ\text{C}$		250	
Off Current (+12 V_{IN} to V_{PP})	I_{OFF}	+12 $V_{IN} = 13.2$ V, $V_{PP} = 0$ V $S_1 = \text{GND}$	$T_A = 25^\circ\text{C}$		1	μA
			$T_A = 70^\circ\text{C}$		10	
Switching Time	$t_{S1(on)}$	$C_L = 0.1$ μF , $S_2 = \text{Low}$, $R_L = 100$ 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 $S_2 = S_3 = V_L$	$T_A = 25^\circ\text{C}$		300	m Ω
			$T_A = 70^\circ\text{C}$		350	
Off Current	I_{OFF}	$V_{PP} = 13.2$ V, $V_{CC} = 0$ V +12 $V_{IN} = 13.2$ V	$T_A = 25^\circ\text{C}$		1	μA
			$T_A = 70^\circ\text{C}$		10	
Switching Time	$t_{S2(on)}$	$C_L = 0.1$ μF , $R_L = 100$ Ω , $S_1 = S_4 = \text{GND}$, $S_3 = V_L$, 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 $S_3 = V_L$	$T_A = 25^\circ\text{C}$		200	m Ω
			$T_A = 70^\circ\text{C}$		250	
Off Current	I_{OFF}	+5 $V_{IN} = 5.5$ V, $V_{CC} = 0$ V	$T_A = 25^\circ\text{C}$		1	μA
			$T_A = 70^\circ\text{C}$		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	

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			Unit
			Min ^a	Typ	Max ^a	
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 _{V_L(1)}	S ₁ = S ₄ = GND, S ₂ = S ₃ = V _L			10	μA
	I _{V_L(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)}

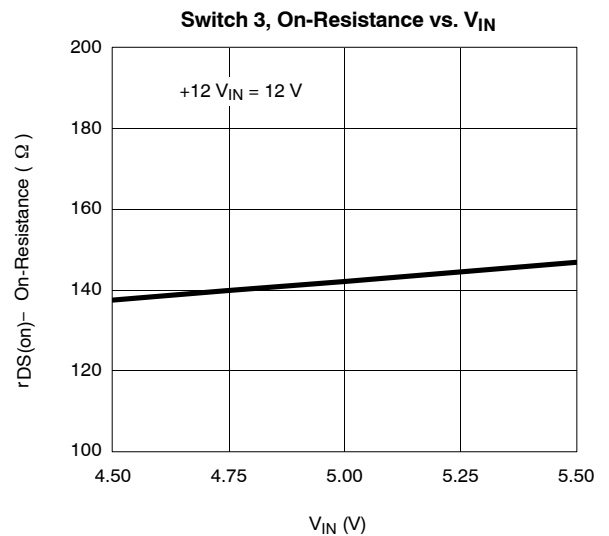
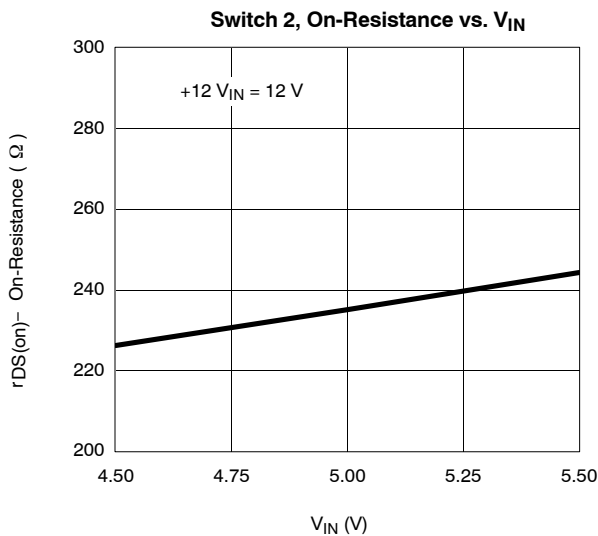
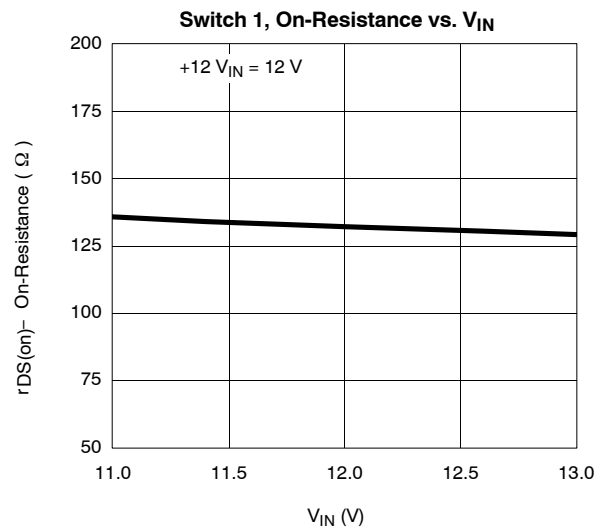
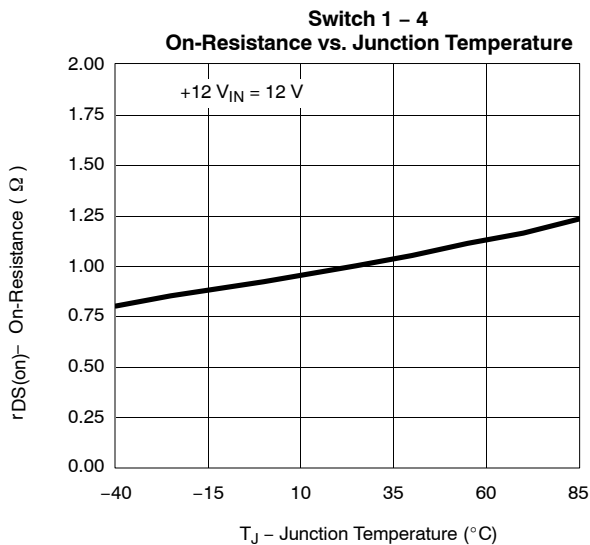
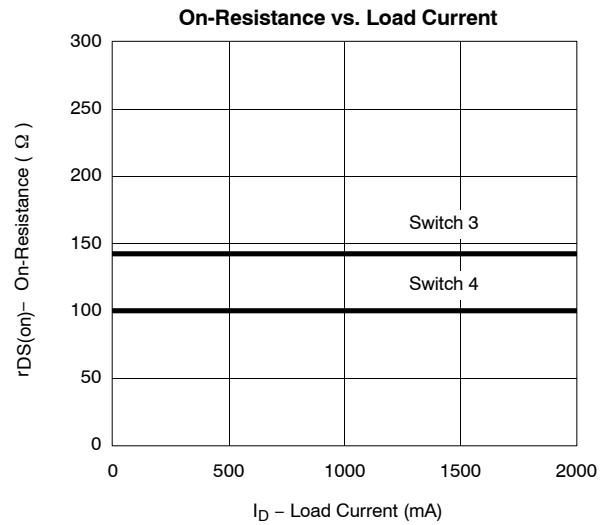
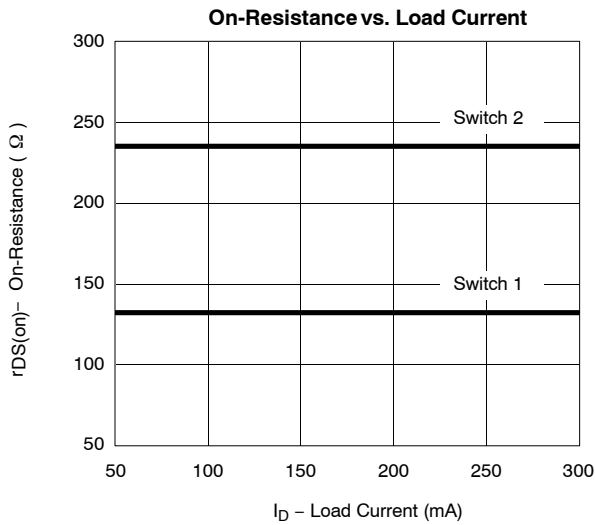
PIN CONFIGURATION AND ORDERING INFORMATION

ORDERING INFORMATION

Part Number	Temperature Range	Package
Si9711CY	0 to 70°C	SOIC-16
Si9711CY-T1		
Si9711CY-T1—E3		

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_EN1} .
2	S ₄	Control input for selecting +3.3 V _{IN} to V _{CC} . The PC Card terminology for this pin is V _{CC_EN0} .
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_EN1} .
16	S ₂	Control input for selecting V _{CC} to V _{PP} . The PC Card terminology for this pin is V _{PP_EN0} .

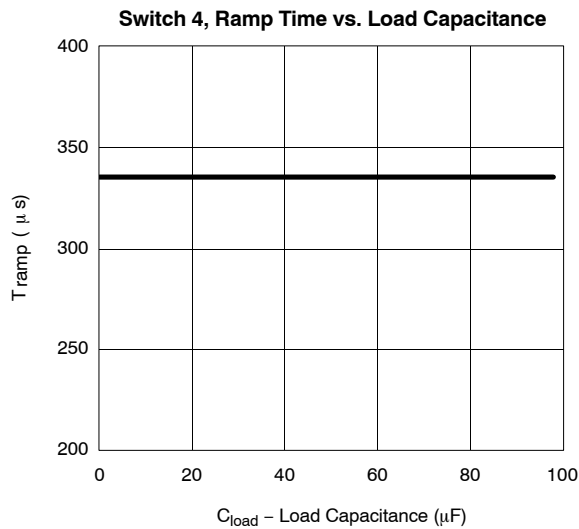
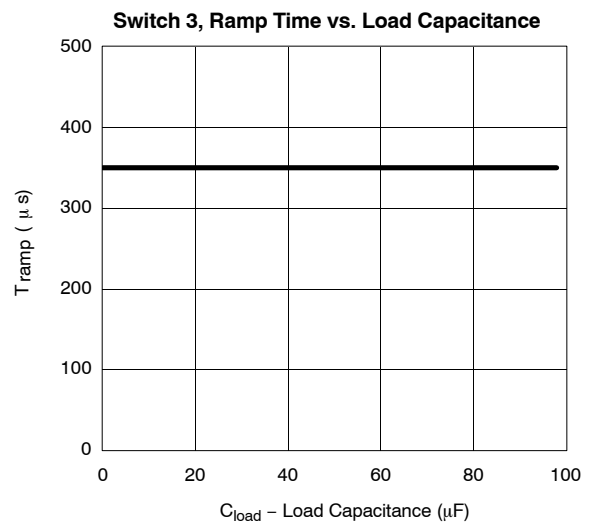
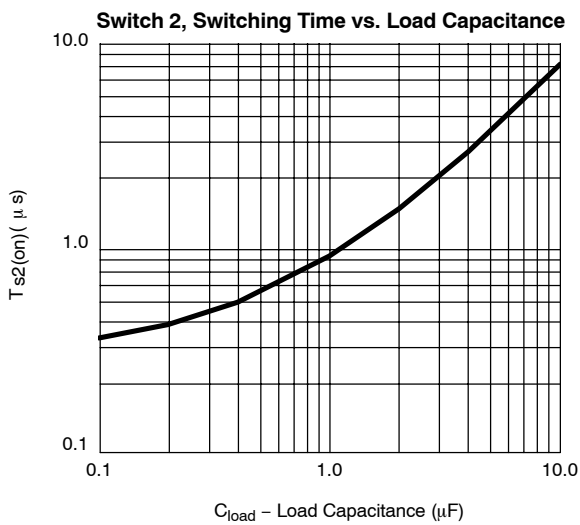
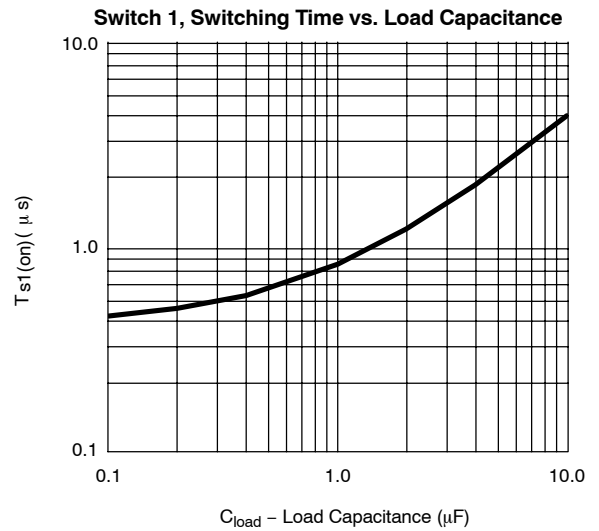
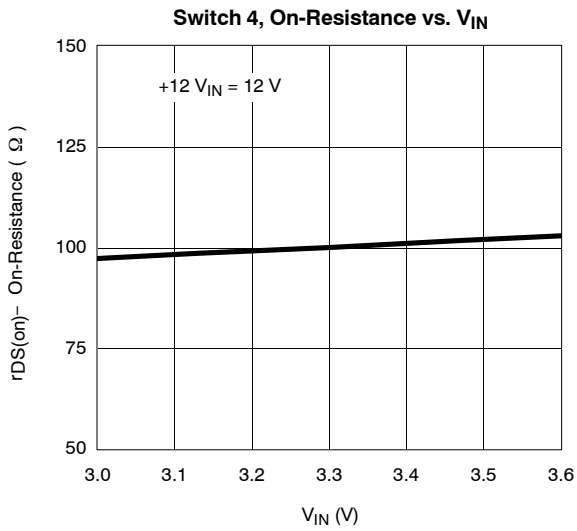


TYPICAL CHARACTERISTICS (25 °C UNLESS OTHERWISE NOTED)





TYPICAL CHARACTERISTICS (25°C UNLESS OTHERWISE NOTED)





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