

## 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.

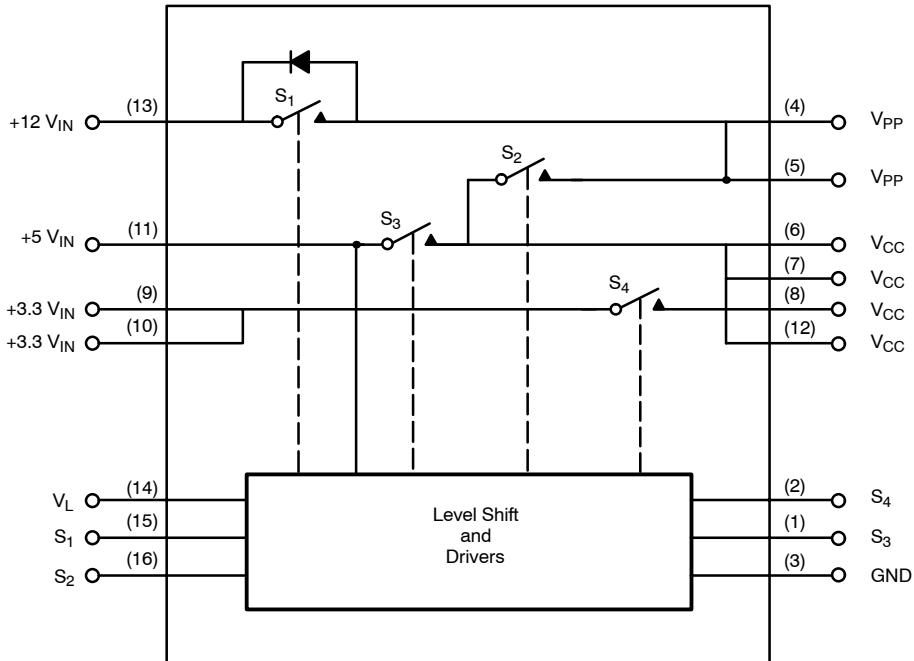
The 5-V and 3.3-V switches do not have the parasitic diode found in vertical DMOS power switches.

Low  $R_{ON}$  is achieved by using MOSFETs driven off the +12-V<sub>IN</sub> 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 <b>S<sub>1</sub> THROUGH S<sub>4</sub></b>	
Logic	Switch
0	OFF
1	ON

## ABSOLUTE MAXIMUM RATINGS

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

## RECOMMENDED OPERATING CONDITIONS

+12 $V_{IN}$	.....	12 V ± 10%	$I_{OUT} V_{CC}$	.....	1 A
+5 $V_{IN}$ (must be present)	.....	5 V ± 10%	$I_{OUT} V_{PP}$	.....	150 mA
+3.3 $V_{IN}$	.....	3.3 V ± 10%	$V_L$	.....	5.0 V ± 10%

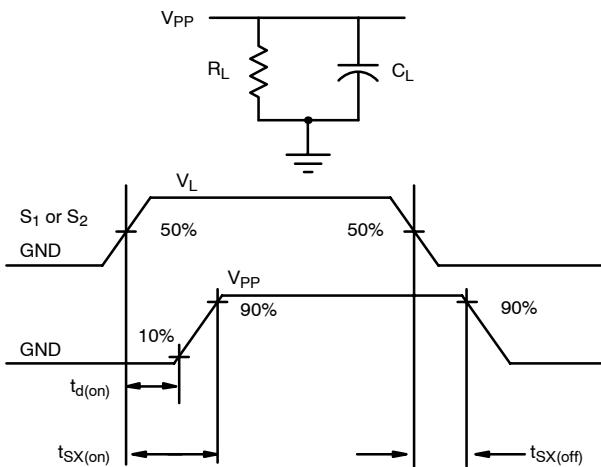
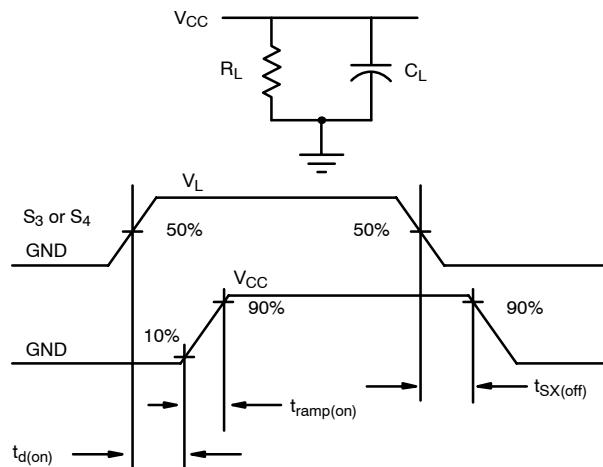
## SPECIFICATIONS

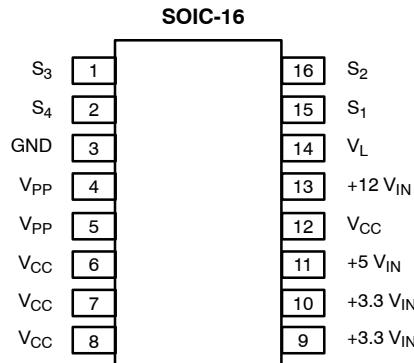
Parameter	Symbol	Test Conditions Unless Otherwise Specified  +5 $V_{IN}$ = 5 V, +3.3 $V_{IN}$ = 3.3 V +12 $V_{IN}$ = 12 V, $V_L$ = 5.0 V, GND = 0 V	Limits			Unit
			Min <sup>a</sup>	Typ	Max <sup>a</sup>	
<b>Switch 1</b>						
On-Resistance	$R_{ON}$	$I = 120$ mA, +12 $V_{IN}$ = 10.8 V $S_1 = V_L$ , $S_2 = GND$	$T_A = 25^\circ C$			200
			$T_A = 70^\circ C$			250
Off Current (+12 $V_{IN}$ to $V_{PP}$ )	$I_{OFF}$	+12 $V_{IN}$ = 13.2 V, $V_{PP} = 0$ V $S_1 = GND$	$T_A = 25^\circ C$			1
			$T_A = 70^\circ C$			10
Switching Time	$t_{S1(on)}$	$C_L = 0.1 \mu F$ , $S_2 = Low$ , $R_L = 100 \Omega$ , See Figure 1		0.1		1
	$t_{S1(off)}$			0.5		4
<b>Switch 2</b>						
On-Resistance	$R_{ON}$	$I = 120$ mA, +12 $V_{IN}$ = 10.8 V $S_2 = S_3 = V_L$	$T_A = 25^\circ C$			300
			$T_A = 70^\circ C$			350
Off Current	$I_{OFF}$	$V_{PP} = 13.2$ V, $V_{CC} = 0$ V +12 $V_{IN}$ = 13.2 V	$T_A = 25^\circ C$			1
			$T_A = 70^\circ C$			10
Switching Time	$t_{S2(on)}$	$C_L = 0.1 \mu F$ , $R_L = 100 \Omega$ , $S_1 = S_4 = GND$ , $S_3 = V_L$ , See Figure 1		0.1		1
	$t_{S2(off)}$			0.5		4
<b>Switch 3</b>						
On-Resistance	$R_{ON}$	$I = 500$ mA, +12 $V_{IN}$ = 10.8 V $S_3 = V_L$	$T_A = 25^\circ C$			200
			$T_A = 70^\circ C$			250
Off Current	$I_{OFF}$	+5 $V_{IN}$ = 5.5 V, $V_{CC} = 0$ V	$T_A = 25^\circ C$			1
			$T_A = 70^\circ C$			10
Switching Time	$t_d(on)$	+5 $V_{IN}$ = 5 V, $C_L = 0.1 \mu F$ , $V_{CC}$ to GND $R_L = 100 \Omega$ , $V_{CC}$ to GND, See Figure 2		1		
	$t_{ramp(on)}$			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			Unit
			Min <sup>a</sup>	Typ	Max <sup>a</sup>	
<b>Switch 4</b>						
On-Resistance	$R_{ON}$	$I = 500 \text{ mA}$ , $+12 V_{IN} = 10.8 V$ $S_4 = V_L$	$T_A = 25^\circ C$			150
			$T_A = 70^\circ C$			185
Off Current	$I_{OFF}$	$+3.3 V_{IN} = 3.6 V$ , $V_{CC} = 0 V$ $S_2 = S_3 = S_4 = \text{GND}$	$T_A = 25^\circ C$			1
			$T_A = 70^\circ C$			10
Switching Time	$t_{d(on)}$	$+3.3 V_{IN} = 3.3 V$ , $C_L = 0.1 \mu F$ , $S_3 = \text{GND}$ $R_L = 100 \Omega$ , See Figure 2		1		
	$t_{ramp(on)}$			200		
	$t_{S4(off)}$			0.5		4
<b>Power Supply</b>						
$+12 V_{IN}$ Current	$I_{+12VIN(1)}$	$S_1 = S_4 = \text{GND}$ , $S_2 = S_3 = V_L$				10
	$I_{+12VIN(2)}$	$S_1 = S_4 = V_L$ , $S_2 = S_3 = \text{GND}$				10
$V_L$ Current	$I_{VL(1)}$	$S_1 = S_4 = \text{GND}$ , $S_2 = S_3 = V_L$				10
	$I_{VL(2)}$	$S_1 = S_4 = V_L$ , $S_2 = S_3 = \text{GND}$				10
<b>Switch Control Inputs</b>						
Input Voltage High	$V_{I(H)}$		$V_L = 3.3 V$	2.8	2.4	
			$V_L = 5 V$	4.0	3.3	
			$V_L = 3.3 V$		1.1	0.4
			$V_L = 5 V$		1.5	0.8
			$V_L = 3.3 V$	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
Input Current Low	$I_{I(L)}$	$S_1$ through $S_4 = \text{GND}$ , $V_L = 5 V$	-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.  $t_{ramp(on)}$

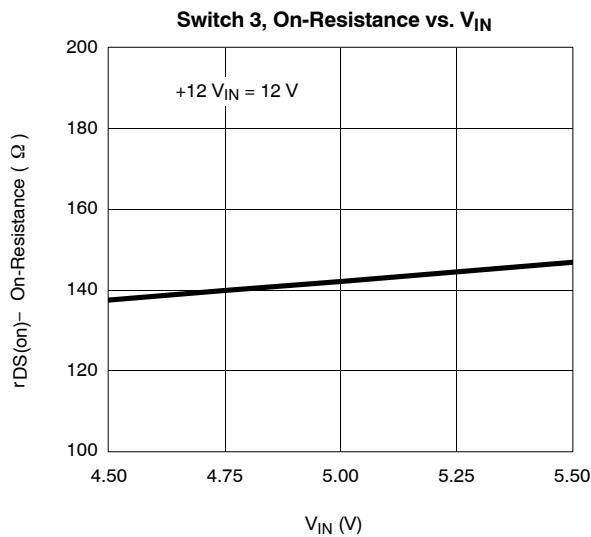
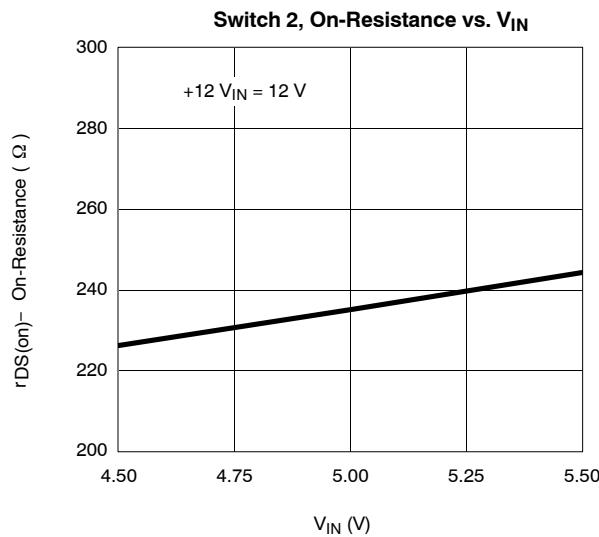
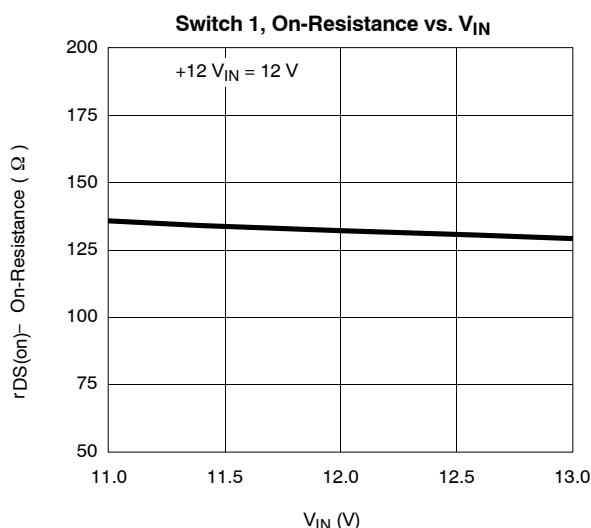
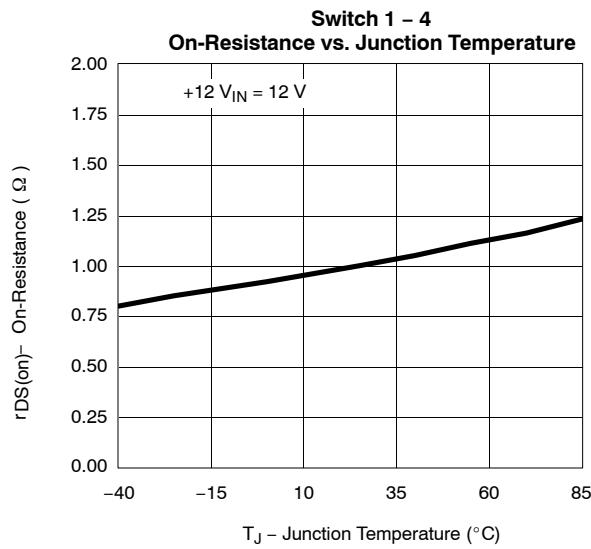
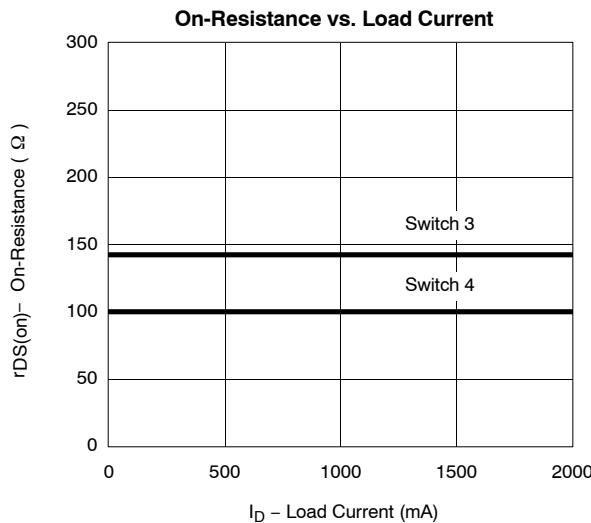
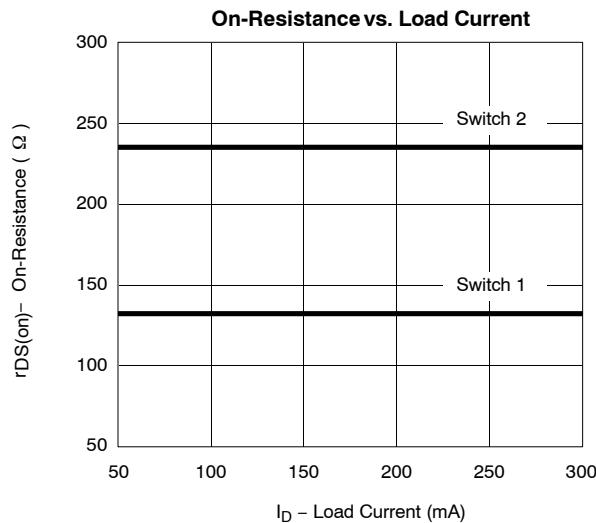
**PIN CONFIGURATION AND ORDERING INFORMATION**


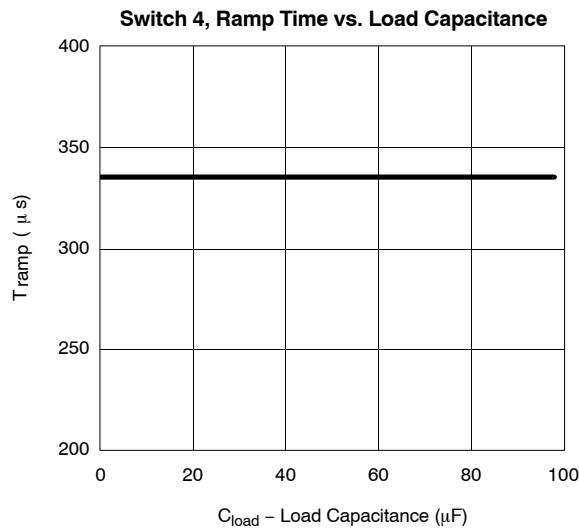
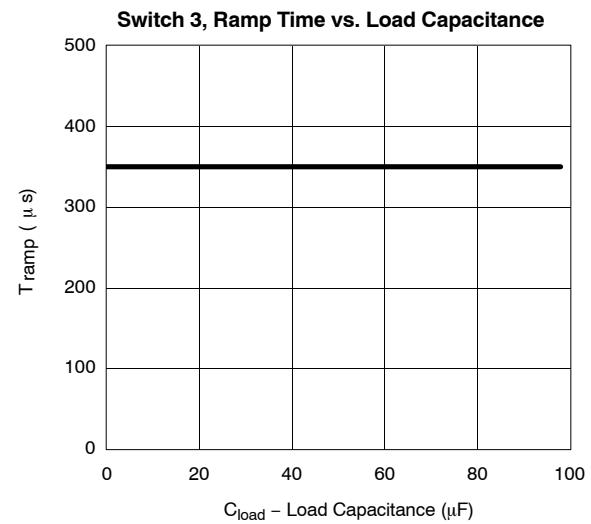
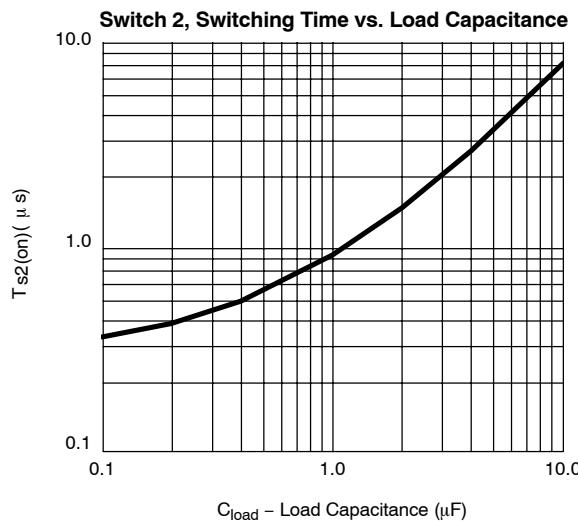
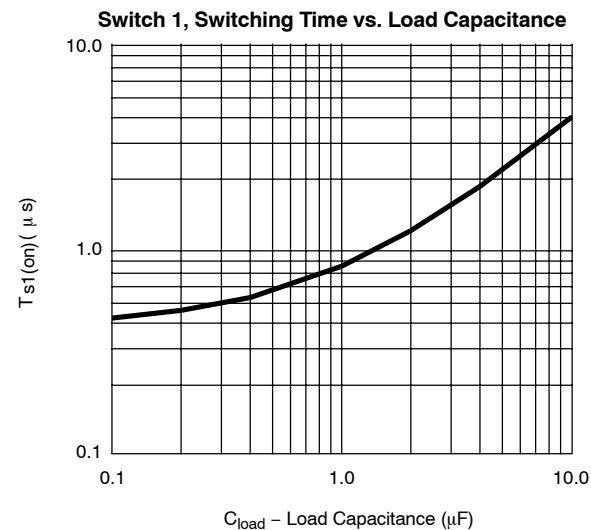
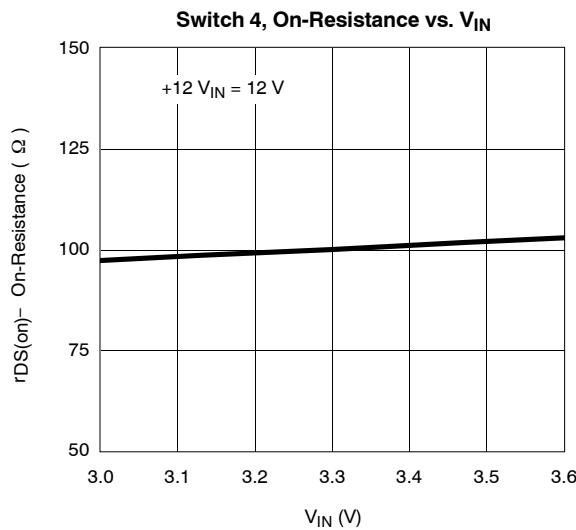
Top View

**ORDERING INFORMATION**

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

Pin Number	Symbol	Description
1	S <sub>3</sub>	Control input for selecting +5 V <sub>IN</sub> to V <sub>CC</sub> . The PC Card terminology for this pin is V <sub>CC_EN1</sub> .
2	S <sub>4</sub>	Control input for selecting +3.3 V <sub>IN</sub> to V <sub>CC</sub> . The PC Card terminology for this pin is V <sub>CC_EN0</sub> .
3	GND	Ground connection.
4, 5	V <sub>PP</sub>	Program and peripheral voltage to PC Card slot.
6, 7, 8, 12	V <sub>CC</sub>	Supply voltage to slot.
9, 10	+3.3 V <sub>IN</sub>	+3.3-V supply.
11	+5 V <sub>IN</sub>	+5-V supply.
13	+12 V <sub>IN</sub>	+12-V supply.
14	V <sub>L</sub>	Rail voltage for switch control inputs, selectable to 5-V or 3.3-V.
15	S <sub>1</sub>	Control input for selecting +12 V <sub>IN</sub> to V <sub>PP</sub> . The PC Card terminology for this pin is V <sub>PP_EN1</sub> .
16	S <sub>2</sub>	Control input for selecting V <sub>CC</sub> to V <sub>PP</sub> . The PC Card terminology for this pin is V <sub>PP_EN0</sub> .

**TYPICAL CHARACTERISTICS (25°C UNLESS OTHERWISE NOTED)**


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