

PC Card (PCMCIA) Interface Switch

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.

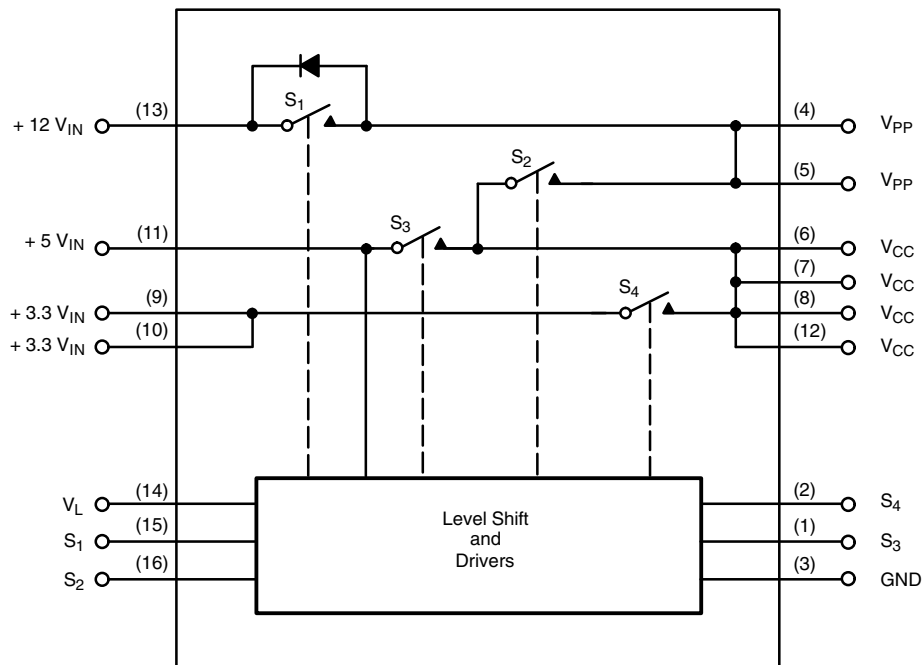
The Si9711 is packaged in an SO-16 package and is rated over the commercial temperature range 0 to 70 °C.

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

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

FUNCTIONAL BLOCK DIAGRAM



TRUTH TABLE - S_1 THROUGH S_4

Logic	Switch
0	OFF
1	ON

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

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS			
Parameter		Limit	Unit
+ 12 V_{IN}		12 V \pm 10 %	V
+ 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 %	V

SPECIFICATIONS						
Parameter	Symbol	Test Conditions Unless Otherwise Specified + 5 $V_{IN} = 5\text{ V}$, + 3.3 $V_{IN} = 3.3\text{ V}$ + 12 $V_{IN} = 12\text{ V}$, $V_L = 5.0\text{ V}$, GND = 0 V	Limits C Suffix, 0 to 70 $^\circ\text{C}$			Unit
			Min ^a	Typ	Max ^a	
Switch 1						
On Resistance	R_{ON}	$I = 120\text{ mA}$, + 12 $V_{IN} = 10.8\text{ V}$ $S_1 = V_L$, $S_2 = \text{GND}$	$T_A = 25\text{ }^\circ\text{C}$		200	m Ω
			$T_A = 70\text{ }^\circ\text{C}$		250	
Off Current (+ 12 V_{IN} to V_{PP})	I_{OFF}	+ 12 $V_{IN} = 13.2\text{ V}$, $V_{PP} = 0\text{ V}$ $S_1 = \text{GND}$	$T_A = 25\text{ }^\circ\text{C}$		1	μA
			$T_A = 70\text{ }^\circ\text{C}$		10	
Switching Time	$t_{S1(on)}$	$C_L = 0.1\text{ }\mu\text{F}$, $S_2 = \text{Low}$, $R_L = 100\text{ }\Omega$, See Figure 1		0.1	1	μs
	$t_{S1(off)}$			0.5	4	
Switch 2						
On Resistance	R_{ON}	$I = 120\text{ mA}$, + 12 $V_{IN} = 10.8\text{ V}$ $S_2 = S_3 = V_L$	$T_A = 25\text{ }^\circ\text{C}$		300	m Ω
			$T_A = 70\text{ }^\circ\text{C}$		350	
Off Current	I_{OFF}	$V_{PP} = 13.2\text{ V}$, $V_{CC} = 0\text{ V}$ + 12 $V_{IN} = 13.2\text{ V}$	$T_A = 25\text{ }^\circ\text{C}$		1	μA
			$T_A = 70\text{ }^\circ\text{C}$		10	
Switching Time	$t_{S2(on)}$	$C_L = 0.1\text{ }\mu\text{F}$, $R_L = 100\text{ }\Omega$, $S_1 = S_4 = \text{GND}$, $S_3 = V_L$, See Figure 1		0.1	1	μs
	$t_{S2(off)}$			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			Unit
				Min ^a	Typ	Max ^a	
Switch 3							
On Resistance	R _{ON}	I = 500 mA, + 12 V _{IN} = 10.8 V S ₃ = V _L	T _A = 25 °C			200	mΩ
			T _A = 70 °C			250	
Off Current	I _{OFF}	+ 5 V _{IN} = 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	
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

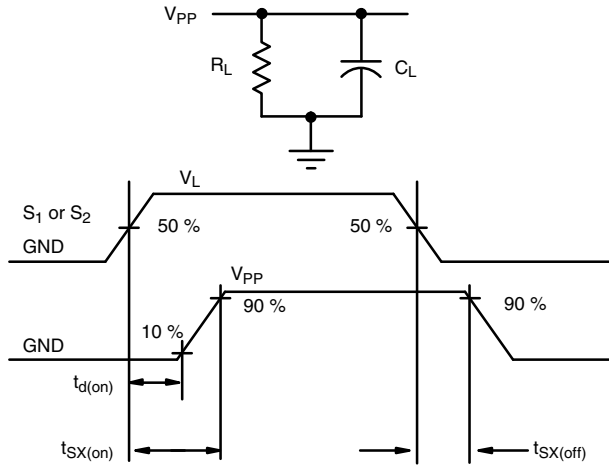


Figure 1. $t_{d(on)}$ and $t_{sx(on)}$

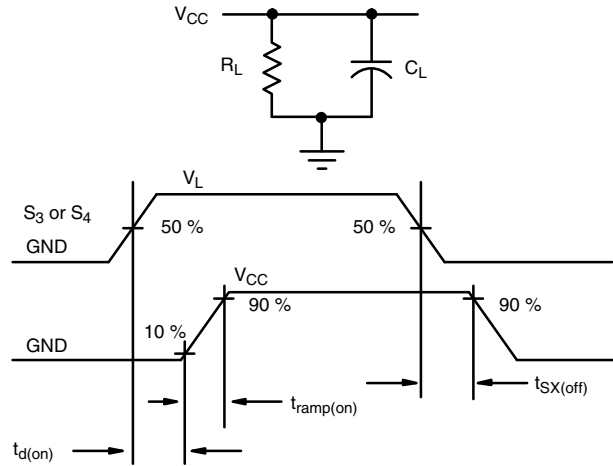
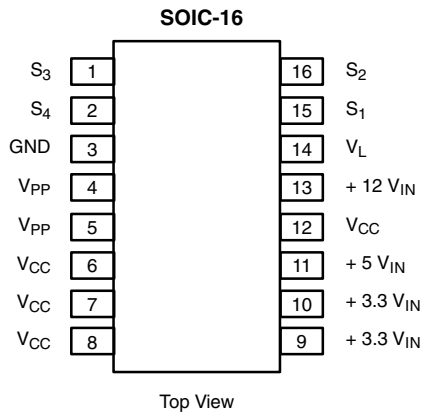


Figure 2. $t_{ramp(on)}$

PIN CONFIGURATION AND ORDERING INFORMATION

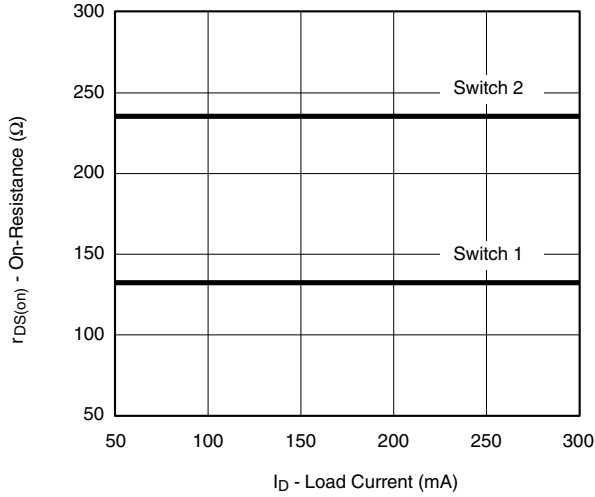


ORDERING INFORMATION		
Part Number	Temperature Range	Package
Si9711CY	0 to 70 °C	SOIC-16
Si9711CY-T1		
Si9711CY-T1-E3		

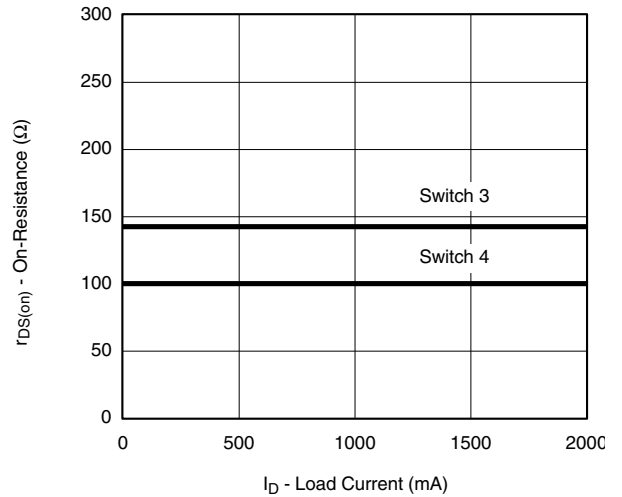
Pin Number	Symbol	Description
1	S ₃	Control input for selecting + 5 V _{IN} to V _{CC} . The PC Card terminology for this pin is V _{CC} _EN ₁ .
2	S ₄	Control input for selecting + 3.3 V _{IN} to V _{CC} . The PC Card terminology for this pin is V _{CC} _EN ₀ .
3	GND	Ground connection.
4, 5	V _{PP}	Program 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 .



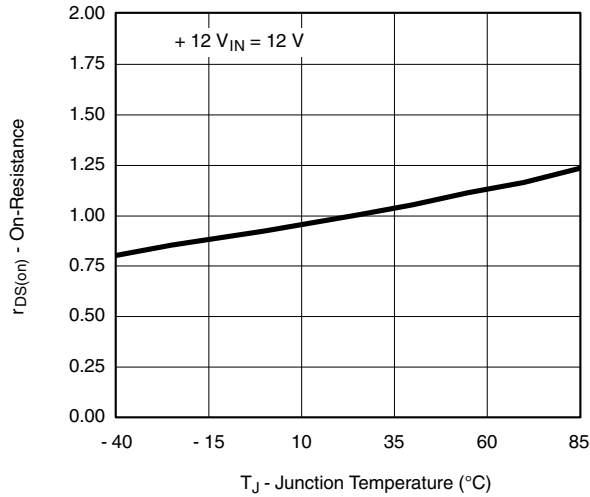
TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



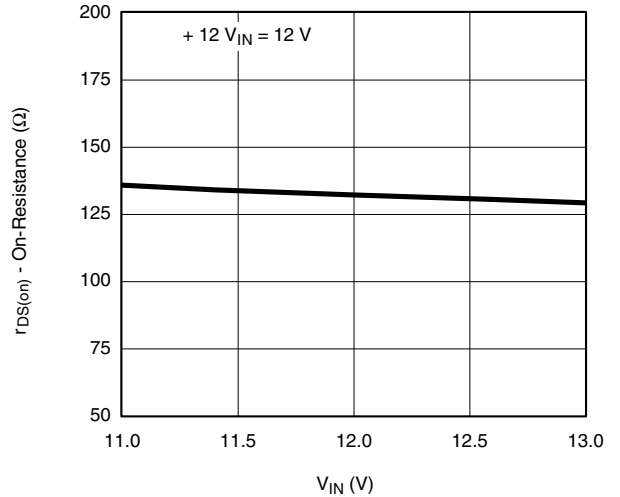
On-Resistance vs. Load Current



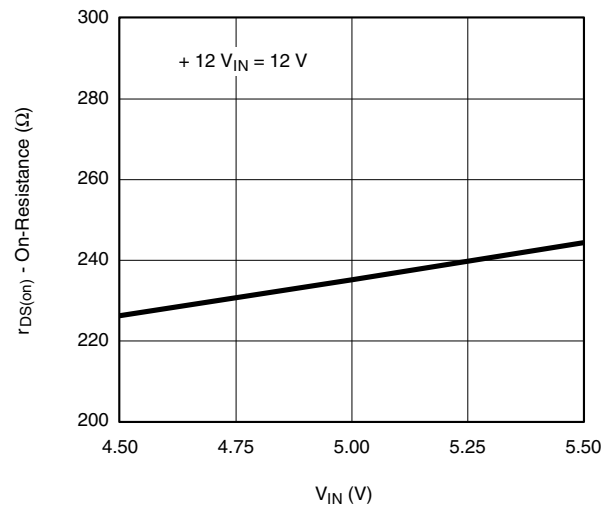
On-Resistance vs. Load Current



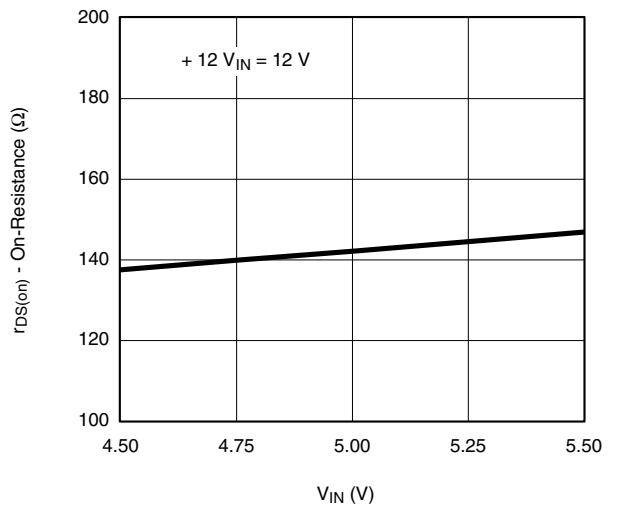
**Switch 1-4
On-Resistance vs. Junction Temperature**



Switch 1, On-Resistance vs. V_{IN}



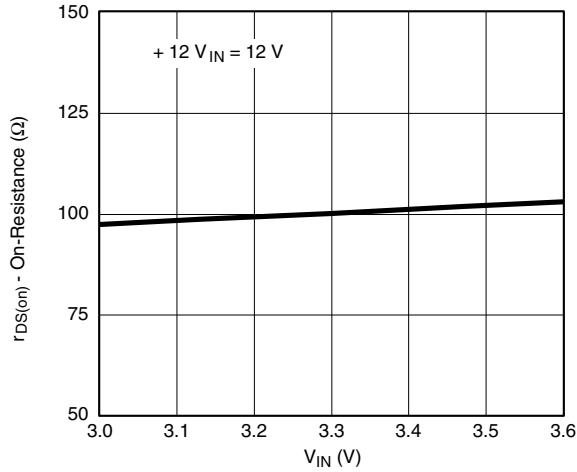
Switch 2, On-Resistance vs. V_{IN}



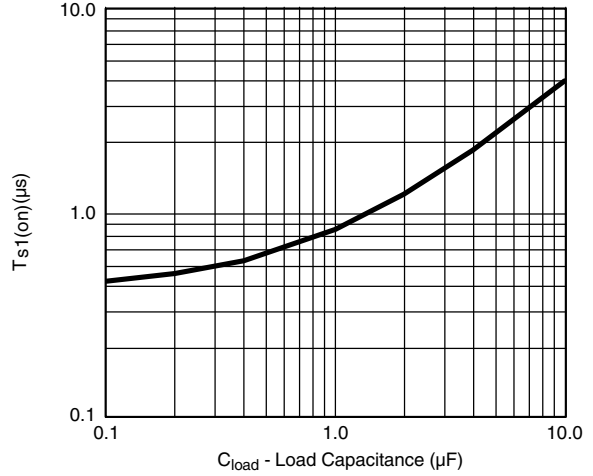
Switch 3, On-Resistance vs. V_{IN}



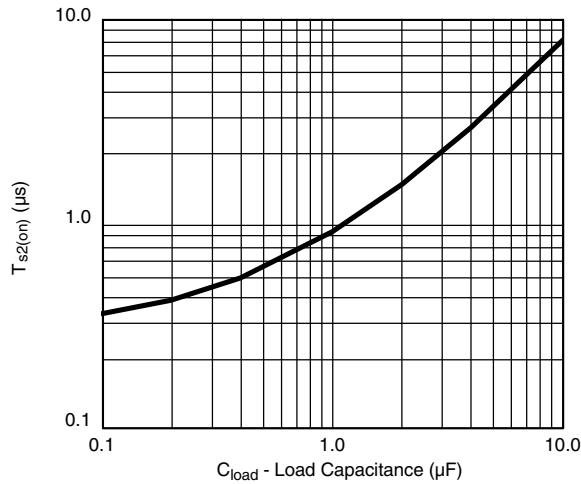
TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



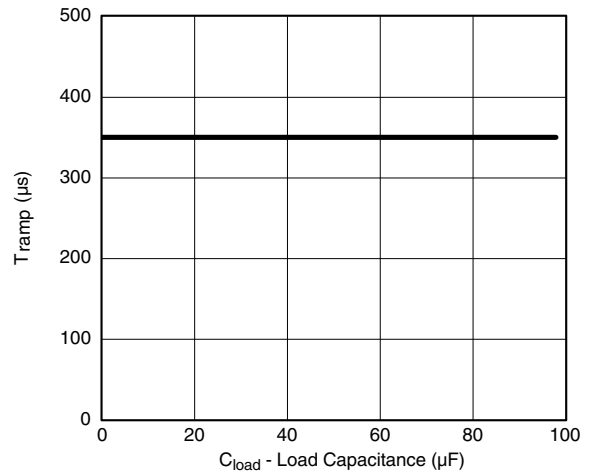
Switch 4, On-Resistance vs. V_{IN}



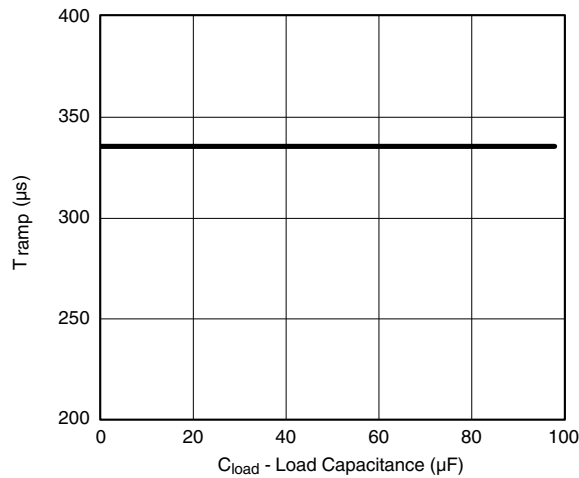
Switch 1, Switching Time vs. Load Capacitance



Switch 2, Switching Time vs. Load Capacitance



Switch 3, Ramp Time vs. Load Capacitance

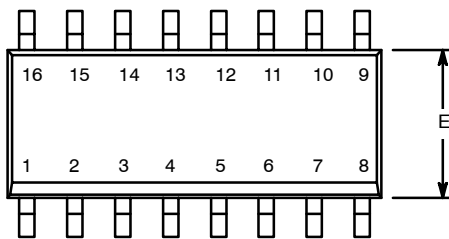


Switch 4, Ramp Time vs. Load Capacitance

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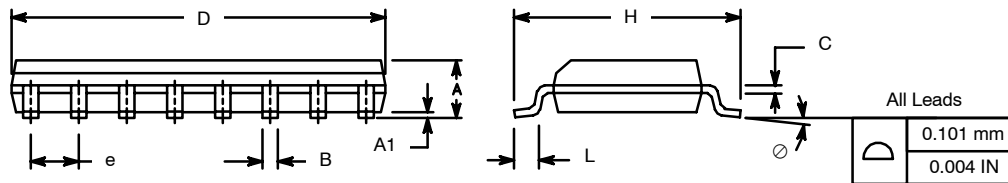


SOIC (NARROW): 16-LEAD (POWER IC ONLY)
JEDEC Part Number: MS-012



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.20	0.004	0.008
B	0.38	0.51	0.015	0.020
C	0.18	0.23	0.007	0.009
D	9.80	10.00	0.385	0.393
E	3.80	4.00	0.149	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
L	0.50	0.93	0.020	0.037
∅	0°	8°	0°	8°

ECN: S-40080—Rev. A, 02-Feb-04
DWG: 5912





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