

**PSMUX154**

**ESD-Protected, Low Capacitance, 2-Channel, 2:1 Switch, With Powered-off Protection**

**Features**

- CMOS Technology for Bus and Analog Applications
- Low On-Resistance:  $4.3\Omega$  @  $V_{DD} = 3.0V$
- Wide VDD Range: 1.8V to 4.3V
- Rail-to-Rail Signal Range
- High Off Isolation: -80dB @ 1MHz
- Crosstalk Rejection Reduces Signal Distortion: -90dB @ 1MHz
- Wide -3dB Bandwidth: 850MHz
- Near-Zero propagation delay: 250ps
- Support for 1.8V/2.5V/3.3V Logic on Control pins
- Channel On Capacitance: 6.0pF
- Extended Industrial Temperature Range: -40°C to 85°C
- ESD protection : 8kV(HBM)
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. “Green” Device (Note 3)
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/contact-us) or your local Diodes representative.  
<https://www.diodes.com/quality/product-definitions/>
- Packaging (Pb-free & Green):
  - 10-pin UQFN (ZM), 1.4mm x 1.8mm

**Applications**

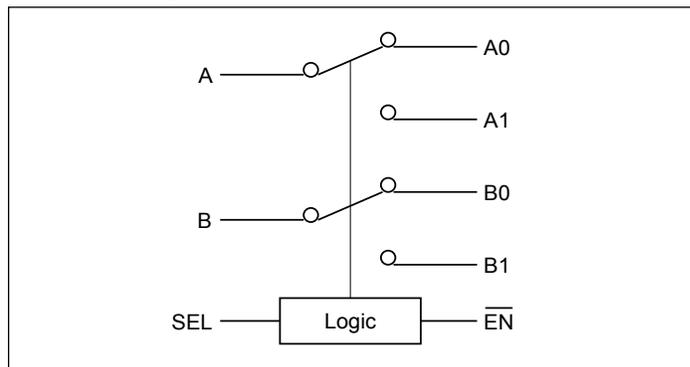
- Portable Instrumentation
- Computer Peripherals
- Server

**Description**

PSMUX154 is a High-bandwidth dual fast single-pole double throw (SPDT) CMOS switch. It can be used as an analog switch or as a low-delay bus switch. Specified over a wide operating power supply voltage, 1.8V to 4.3V, the PSMUX154 has an On-Resistance of  $4.3\Omega$  at  $V_{DD} = 3.0V$ .

Break-before-make switching prevents both switches being enabled simultaneously. This eliminates signal disruption during switching.

**Block Diagram**



**Function Table**

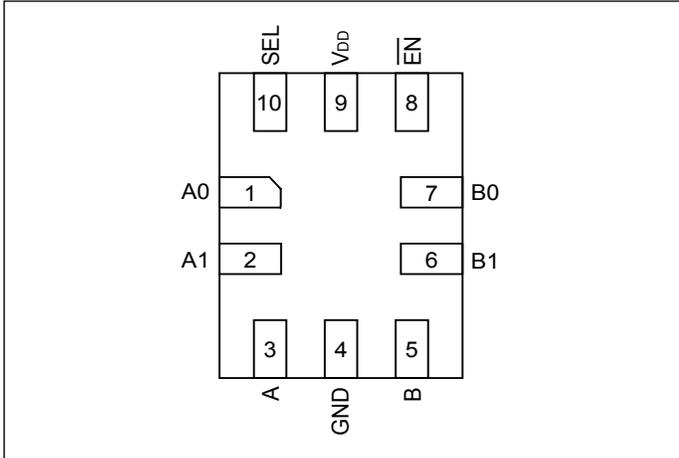
$\overline{EN}$	SEL	Function
H	X	I/O's = Hi-Z
L	L	A0, B0 Connected to A, B
L	H	A1, B1 Connected to A, B

Note: x = 1 or 2

**Notes:**

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Pin Configuration



## Pin Description

Pin#	Pin Name	Type	Description
1	A0	I/O	Data Port 0
2	A1	I/O	Data Port 1
3	A	I/O	Common Output / Data Port
4	GND	—	Ground
5	B	I/O	Common Output / Data Port
6	B1	I/O	Data Port 1
7	B0	I/O	Data Port 0
8	$\overline{EN}$	Input	Switch Enable
9	VDD	—	Positive Power Supply
10	SEL	Input	Switch Select

### Absolute Maximum Ratings

(Above which useful life may be impaired. For user guidelines, not tested.)

Storage Temperature .....	-65°C to +150°C
Ambient Temperature with Power Applied .....	-40°C to +85°C
Supply Voltage, V <sub>DD</sub> .....	-0.5V to +4.6V
Control Input Voltage, V <sub>SEL, EN</sub> .....	0V to +4.6V
DC Input Voltage, V <sub>INPUT</sub> .....	-0.5V to +4.6V
DC Continuous Current Ax, Bx, A/B.....	100mA
ESD (HBM) .....	8kV
ESD(CDM).....	1kV

**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.

### Recommended Operating Conditions

Symbol	Description	Test Conditions	Min.	Typ.	Max.	Units
V <sub>DD</sub>	Operating Voltage		1.8	-	4.3	V
V <sub>IH</sub>	High-Level Control Input Voltage	V <sub>DD</sub> = 1.8V to 4.3V	1.2	-	V <sub>DD</sub>	V
V <sub>IL</sub>	Low-Level Control Input Voltage	V <sub>DD</sub> = 1.8V to 3.6V	0	-	0.5	V
		V <sub>DD</sub> = 4.3V	0	-	0.7	
V <sub>I/O</sub>	Switch Input Voltage		-0.5	-	V <sub>DD</sub>	V
T <sub>A</sub>	Operating Temperature		-40	25	85	°C

### DC Electrical Characteristics

V<sub>DD</sub> = 3.0V to 4.4V, T<sub>A</sub> = -40°C to 85°C.

Symbol	Parameter	Test Conditions	Temp.	Min.	Typ.	Max.	Units
<b>Analog Switch</b>							
V <sub>Ax/Bx</sub> , V <sub>A/B</sub>	Analog Signal Range		-40°C to 85°C	0		V <sub>DD</sub>	V
R <sub>ON</sub>	On-Resistance	V <sub>DD</sub> = 3V, V <sub>I</sub> = 0V to 0.4V, I <sub>O</sub> = -40mA	-40°C to 85°C		4.3	6.5	Ω
ΔR <sub>ON</sub>	On-Resistance Match Between Channels	V <sub>DD</sub> = 3V, V <sub>I</sub> = 0V to 0.4V, I <sub>O</sub> = -40mA	-40°C to 85°C		0.1	1.0	Ω
R <sub>ONF</sub>	On-Resistance Flatness	V <sub>DD</sub> = 3V, V <sub>I</sub> = 0V to 0.4V, I <sub>O</sub> = -40mA	-40°C to 85°C		0.25		Ω
I <sub>DD</sub>	Supply Current	V <sub>DD</sub> = 4.3V, I <sub>I/O</sub> = 0, Switch ON or OFF				1	uA
ΔI <sub>DD</sub>	Difference of supply current due to control input voltage not V <sub>DD</sub> or GND	V <sub>DD</sub> = 4.3V, V <sub>SEL</sub> , V <sub>EN</sub> = 2.6V				10	uA
I <sub>SEL</sub> , I <sub>EN</sub>	Control Inputs	V <sub>DD</sub> = 4.3V, 0V, V <sub>SEL</sub> , V <sub>EN</sub> = 0 to 4.3V		-1		1	uA
I <sub>OZ</sub>	Output leakage current when port is off	V <sub>DD</sub> = 4.3V, 0 ≤ V <sub>A,B</sub> ≤ 3.6V, V <sub>I</sub> = 0V, Switch OFF	-40°C to 85°C	-1		1	μA

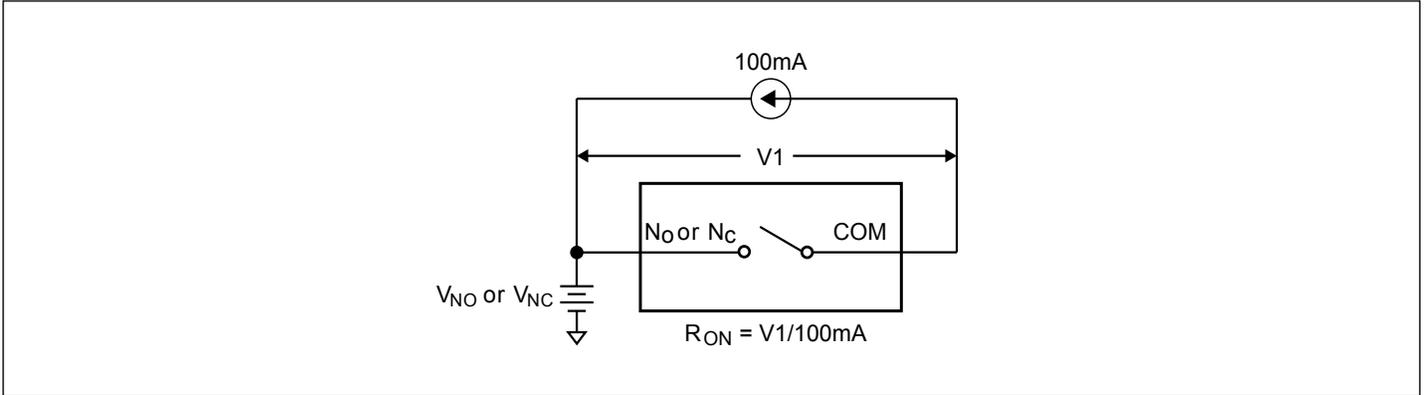
### DC Electrical Characteristics Cont.

Symbol	Parameter	Test Conditions	Temp.	Min.	Typ.	Max.	Units
$I_{OFF}$	Power Off Leakage Current	$V_{DD} = 0V, V_{An,Bn} = 0V, V_{A,B} = 0V$ to 4.3V, $V_{SEL}, V_{EN} = V_{DD}$ or GND	-40°C to 85°C			2	$\mu A$
<b>Dynamic Characteristics</b>							
$t_{PD}$	Propagation Delay	See Test Circuit for Electrical Characteristics	+25°C		0.25		ns
$t_{ON}$	Turn-On Time	See Test Circuit for Electrical Characteristics	+25°C		25		ns
$t_{OFF}$	Turn-Off Time	See Test Circuit for Electrical Characteristics	+25°C		4		ns
$t_D$	Break-Before-Make Delay		+25°C		7		ns
$X_{TALKD}$	Channel-to-Channel Crosstalk	$R_L = 50\Omega, f = 1MHz$	+25°C		-90		dB
$O_{ISO}$	OFF Isolation	$R_L = 50\Omega, f = 1MHz$	+25°C		-80		dB
$f_{3dB}$	3dB Bandwidth	$R_L = 50\Omega, C_L = 5pF$	+25°C		850		MHz

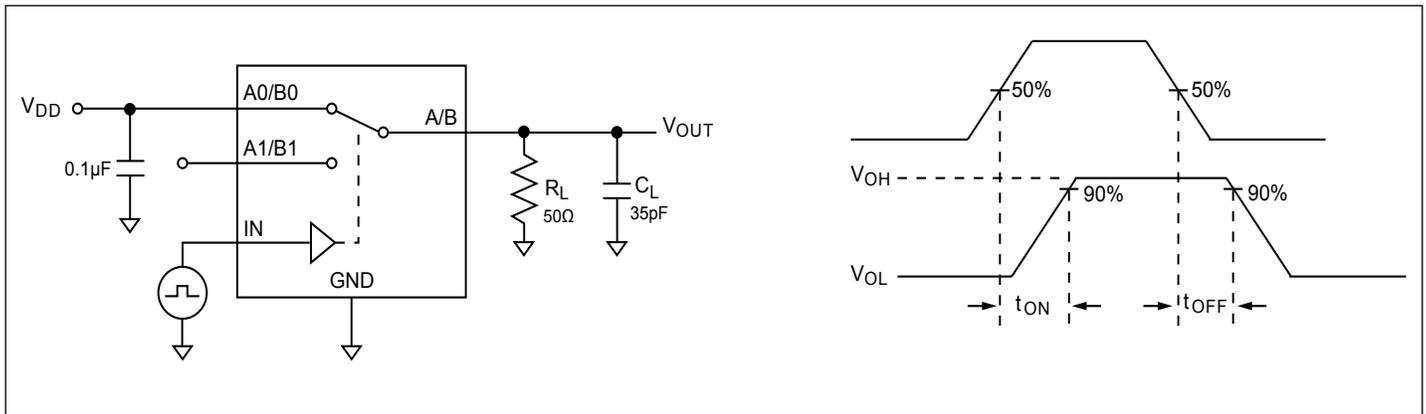
### Capacitance

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$C_{SEL}, C_{EN}$	Control inputs digital input capacitance	$f = 1MHz$		6		pF
$C_{I/O (ON)}$	ON-state input capacitance	$f = 1MHz$		6		pF
$C_{I/O (OFF)}$	OFF-state input capacitance	$f = 1MHz$		1.9		pF

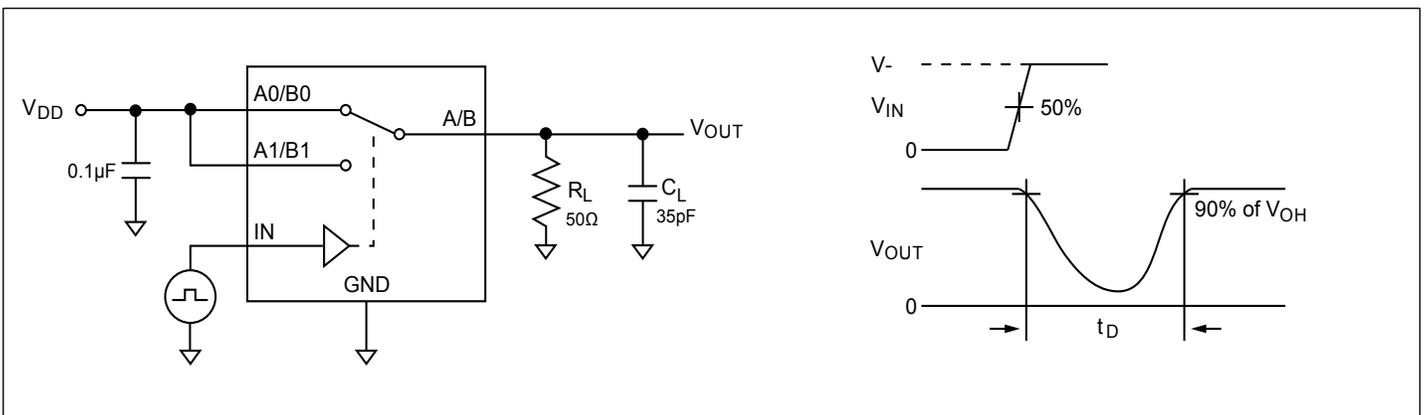
**Test Circuits and Timing Diagrams**



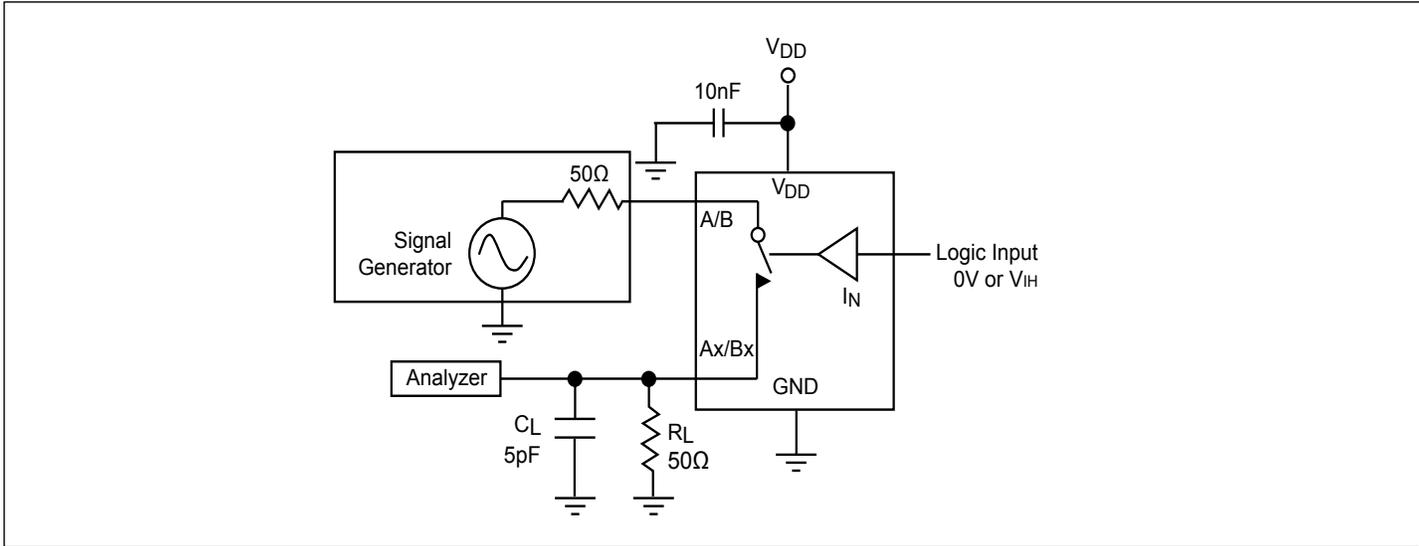
**Figure 1. On Resistance**



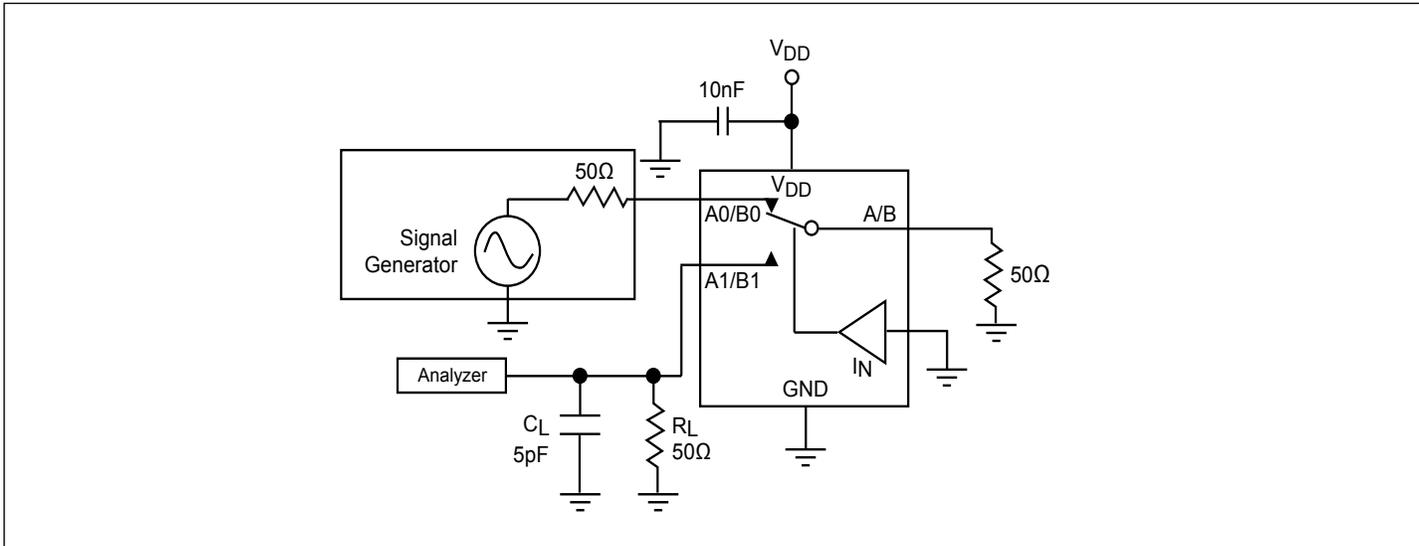
**Figure 2. Switching Times**



**Figure 3. Break Before Make Interval Timing**

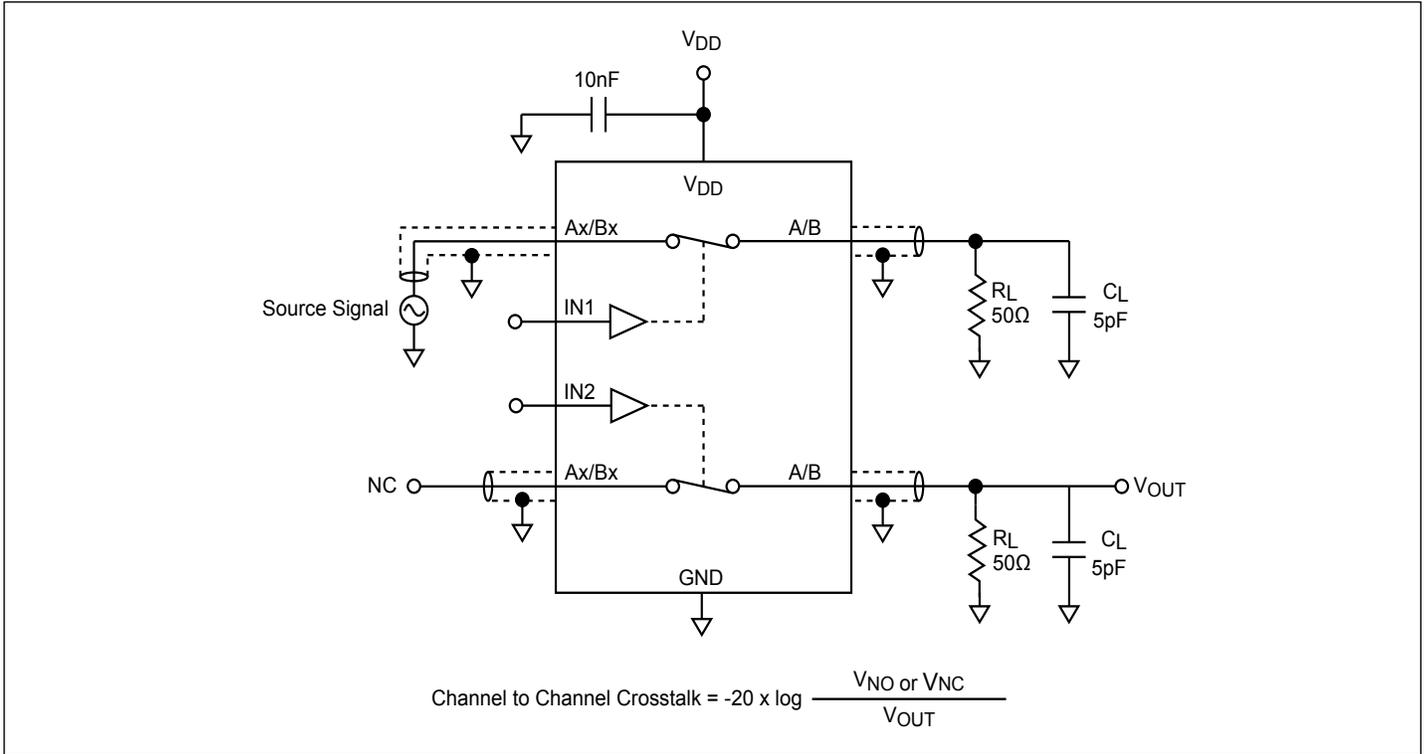


**Figure 4. COM-NC/NO Isolation**

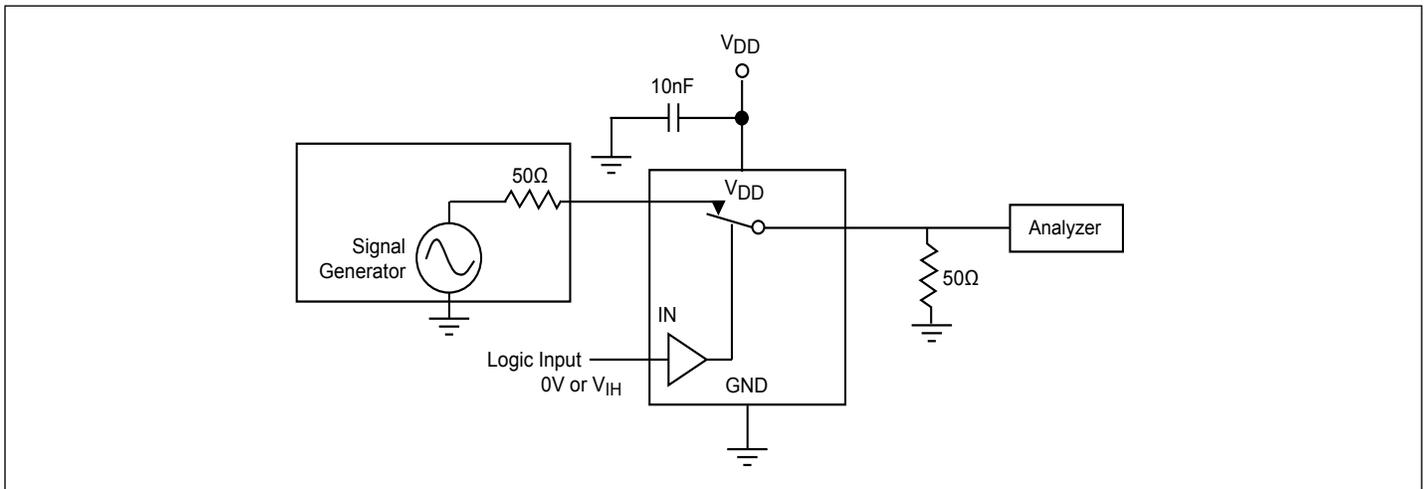


**Figure 5. Input Isolation**

**PSMUX154**

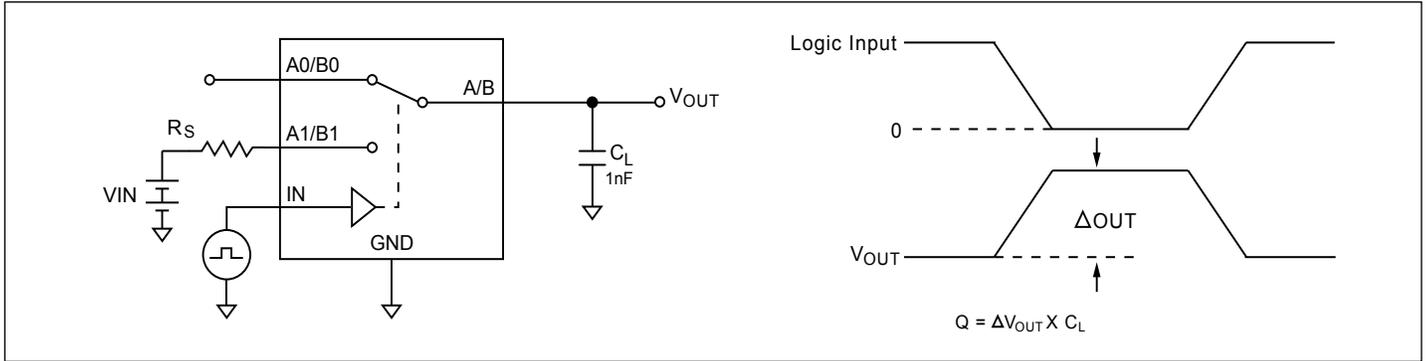


**Figure 6. Channel-to-Channel Crosstalk**

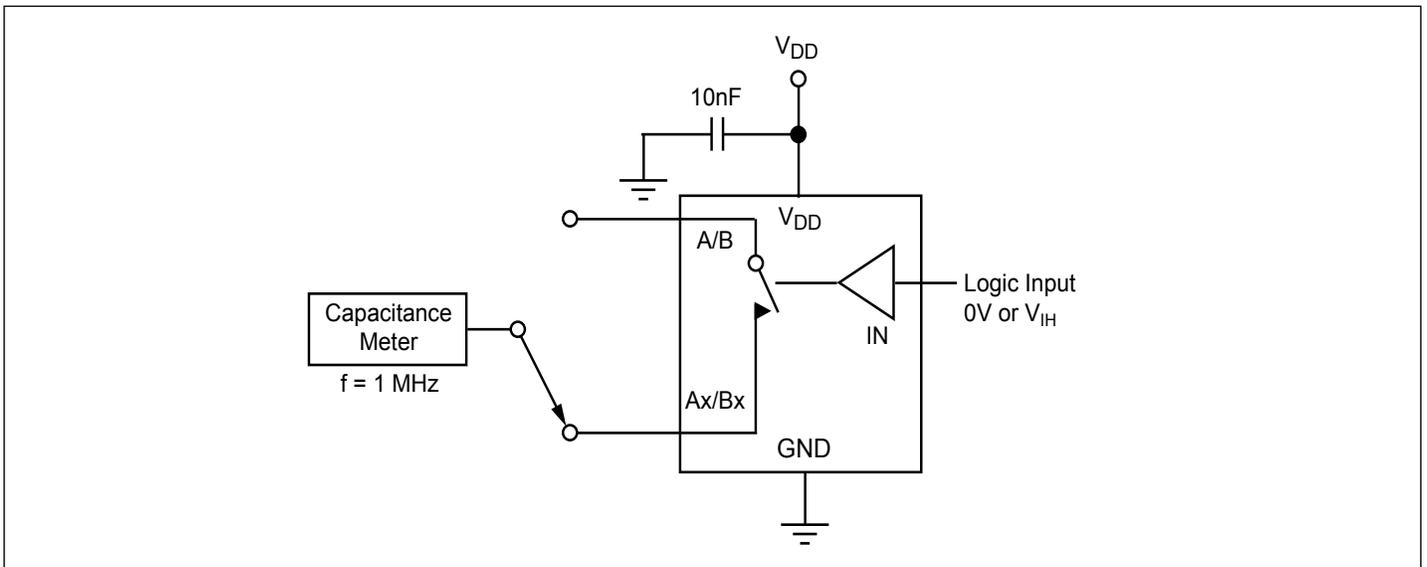


**Figure 7. Bandwidth**

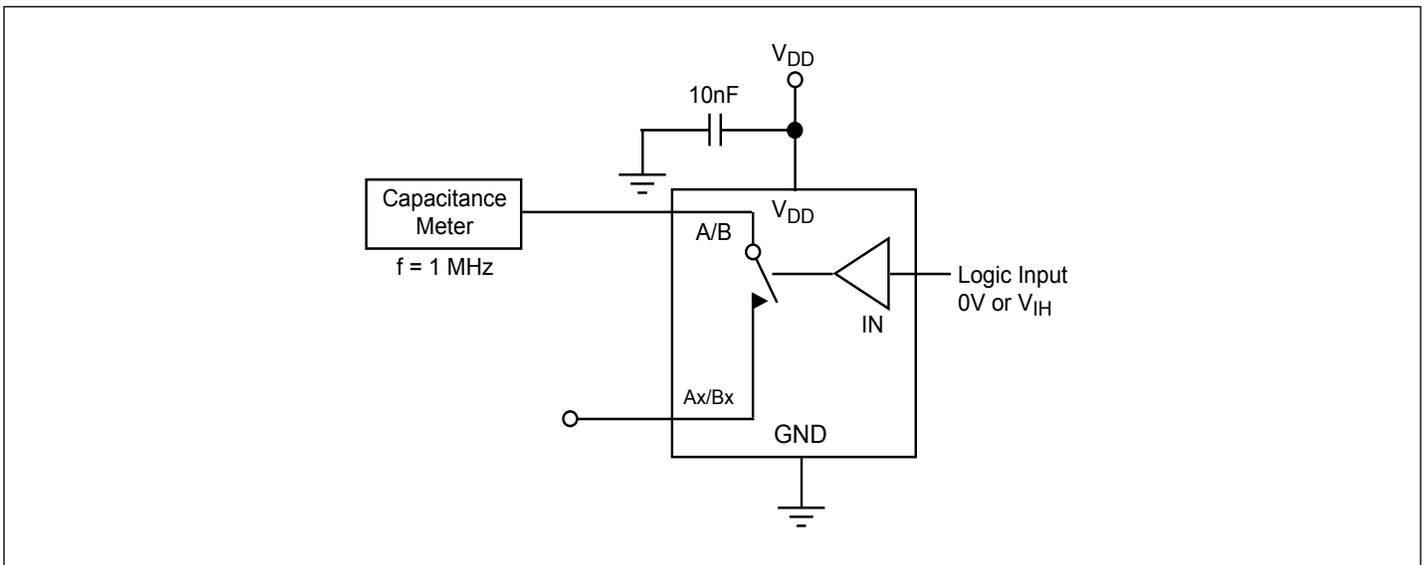
**PSMUX154**



**Figure 8. Charge Injection**



**Figure 9. Channel Off Capacitance**



**Figure 10. Channel On Capacitance**

**PSMUX154**

**Part Marking**

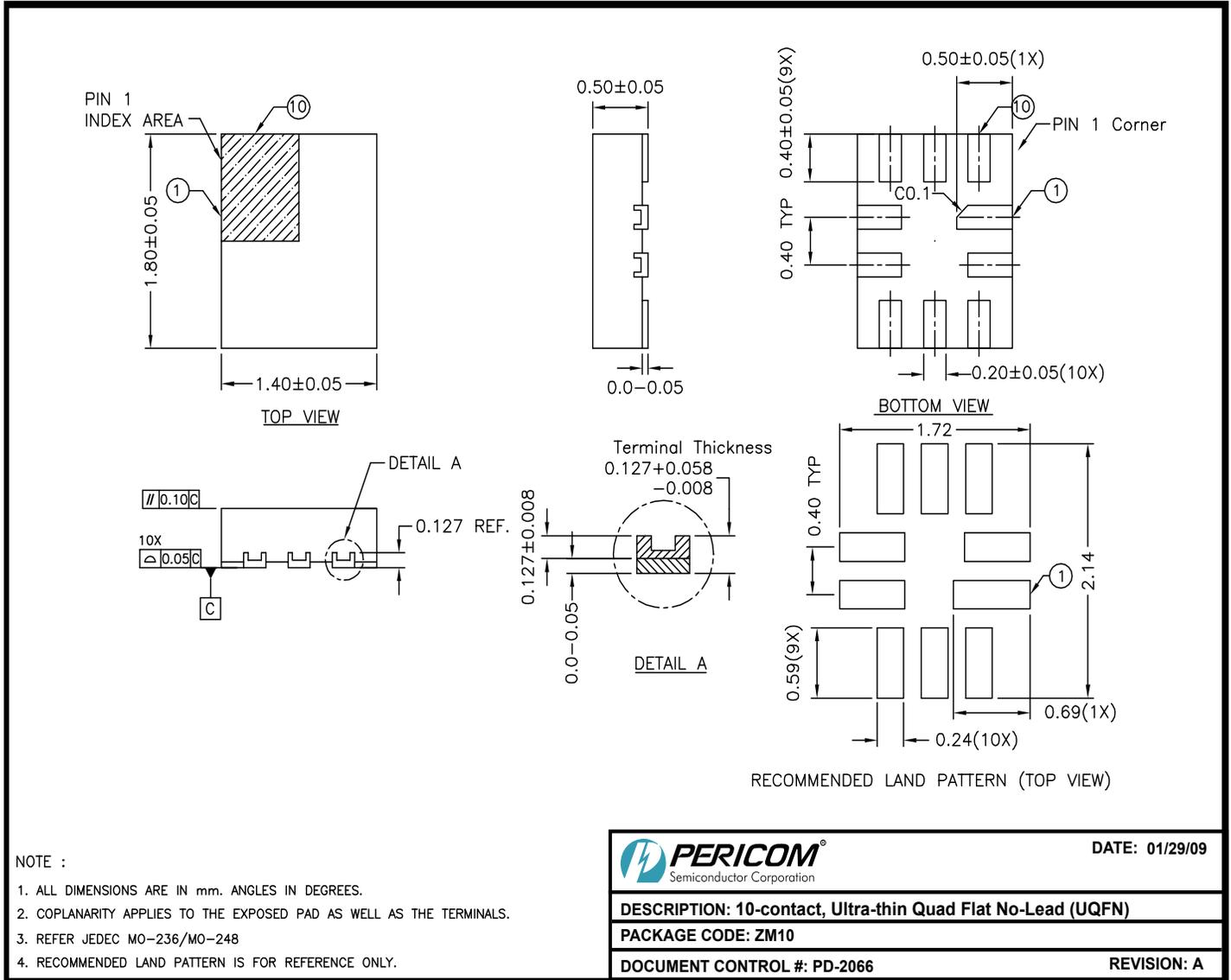


Y: Date Code (Year)

W: Date Code (Workweek)

Bar above the first "x" means pin 1

**Packaging Mechanical: 10-UQFN (ZM)**



09-0072

**For latest package info.**

please check: <http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/>

**Ordering Information**

Ordering Code	Package Code	Package Description
PSMUX154ZMEX	ZM	10-Contact, Ultra-thin Quad Flat No-Lead (UQFN)

**Notes:**

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. E = Pb-free and Green
5. X suffix = Tape/Reel

**IMPORTANT NOTICE**

1. DIODES INCORPORATED AND ITS SUBSIDIARIES (“DIODES”) MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes products. Diodes products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of the Diodes products for their intended applications, (c) ensuring their applications, which incorporate Diodes products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.

5. Diodes products are provided subject to Diodes' Standard Terms and Conditions of Sale (<https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/>) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. Diodes products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

Copyright © 2020 Diodes Incorporated

[www.diodes.com](http://www.diodes.com)