

PI3A268C

Small Plastic Package, Dual SPDT Analog Switch with -1.5V Signal Support for AC Coupled Audio Signals and D-Class Audio Signals

Features

- CMOS Technology for Bus and Analog Applications
- Low On-Resistance: 0.6Ω.
- Wide VDD Range: 2.5V to 4.2V
- High Off Isolation: -80dB @ 100kHz
- Crosstalk Rejection Reduces Signal Distortion: 72dB @ 100kHz
- Input signals can be from -1.5V up to VDD without distortion
- Break-Before-Make Switching
- Extended Industrial Temperature Range: -40°C to 85°C
- 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-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative.
- Packaging (Pb-free & Green):
 - 10-contact UQFN (ZM10) 1.4 × 1.8

Application(s)

- Cell Phones
- PDAs
- MP3 players
- Portable Instrumentation
- Computer Peripherals
- Speaker Headset Switching
- Power Routing
- Relay Replacement
- Audio and Video Signal Routing
- PCMCIA Cards
- Modems

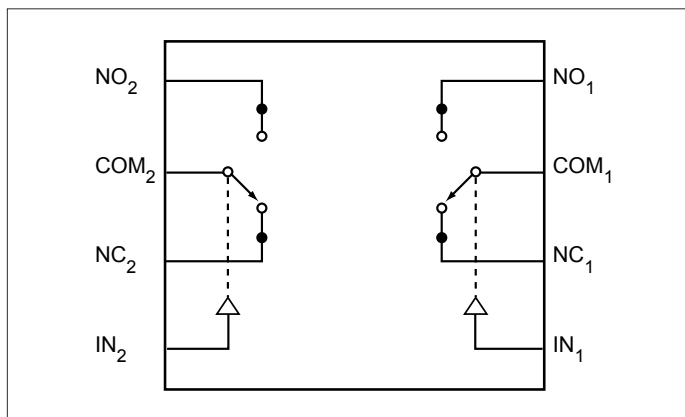
Description

The DIODES™ PI3A268C is a dual, fast single-pole double throw (SPDT) CMOS switch. It can be used as an analog switch or as a low-delay bus switch.

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

With the use of 3rd party headsets, AC coupling is required to protect against EOS damage caused by DC offsets. The PI3A268C can support these AC coupled audio signals, since the switch can tolerate signals down to -1.5V without a negative power supply.

Block Diagram



Function Table

Logic Input (IN _x)	Function
0	NC _x Connected to COM _x
1	NO _x Connected to COM _x

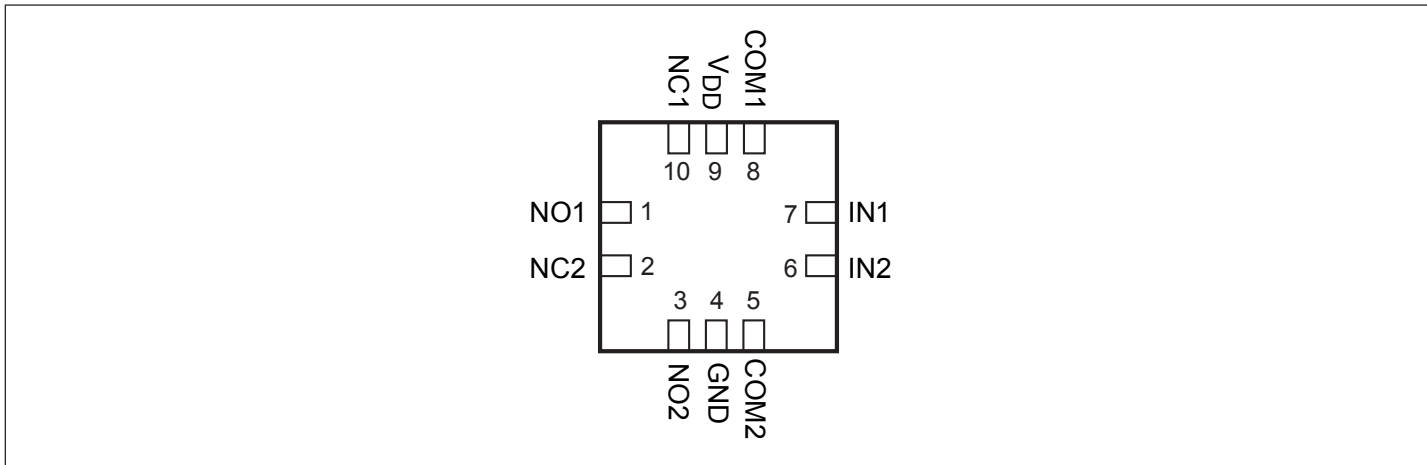
Note: x = 1 or 2

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.

PI3A268C

Pin Configuration



Pin Description

Pin #	Pin Name	Description
1, 3	NO _X	Data Port (Normally open)
4	GND	Ground
2, 10	NC _X	Data Port (Normally closed)
5, 8	COM _X	Common Output / Data Port
9	V _{DD}	Positive Power Supply
6, 7	IN _X	Logic Control

Absolute Maximum Ratings⁽¹⁾

Supply Voltage V_{DD}	2.5V to 4.6V
DC Control Switch Voltage (V_{INX})	0V to 5.0V
DC Input Voltage (V_{IN}) ⁽²⁾	-1.5V to V_{DD}
Continuous Current NO_NC_COM_	±300mA
Peak Current NO_NC_COM_ (pulsed at 1ms 50% duty cycle)	±400mA
Peak Current NO_NC_COM_ (pulsed at 1ms 10% duty cycle)	±500mA
Storage Temperature Range (T_{STG})	-65°C to +150°C
Junction Temperature under Bias (T_J)	150°C
Junction Lead Temperature (T_L) (Soldering, 10 seconds)	260°C

Recommended Operating Conditions⁽³⁾

Supply Voltage Operating (V_{DD})	2.5V to 4.2V
Control Input Voltage (V_{IN})	0V to V_{DD}
Switch Input Voltage (V_{INPUT})	-1.5V to V_{DD}
Operating Temperature (T_A)	-40°C to +85°C
Input Rise and Fall Time (t_r, t_f)	
Control Input $V_{DD} = 2.3V - 3.6V$	0ns/V to 10ns/V
Thermal Resistance (θ_{JA})	350°C/W
Lead Temperature (soldering 10s)	+300°C
Bump Temperature (soldering notes)	
Infrared (15s)	+220°C
Vapor Phase (60ns)	+215°C

Notes:

- "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.
- The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.
- Control input must be held HIGH or LOW; it must not float.

Power Supply

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_{CC}	Supply Current	$V_{DD} = 2.7V, V_{IN} = 0V$ or V_{DD}			20	μA
		$V_{DD} = 3.3V, V_{IN} = 0V$ or V_{DD}			36	
		$V_{DD} = 4.2V, V_{IN} = 0V$ or V_{DD}			80	

DC Electrical Characteristics

$V_{DD} = 2.5V$ to $2.7V \pm 10\%$

($T_A = -40^\circ C$ to $85^\circ C$, unless otherwise noted. Typical values are at $25^\circ C$.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Analog Switch						
V_{NO}, V_{NC}, V_{COM}	Analog Signal Range		-1.5		V_{DD}	V
$R_{ON(NC)}$	NC On-Resistance	$V_{DD} = 2.25V, I_{COM} = 100mA, V_{NC} = -1.5V$ to V_{DD}		0.9		Ω
$R_{ON(NO)}$	NO On-Resistance	$V_{DD} = 2.25V, I_{COM} = 100mA, V_{NO} = -1.5V$ to V_{DD}		0.9		
ΔR_{ON}	On-Resistance Match Between Channels	$V_{DD} = 2.25V, I_{COM} = 100mA, V_{NO}$ or $V_{NC} = -1.5V$ to V_{DD}		0.1		
$R_{ONF(NC)}$	NC On-Resistance Flatness	$V_{DD} = 2.25V, I_{COM} = 100mA, V_{NC} = -1.5V$ to V_{DD}		0.25		
$R_{ONF(NO)}$	NO On-Resistance Flatness	$V_{DD} = 2.25V, I_{COM} = 100mA, V_{NO} = -1.5V$ to V_{DD}		0.25		
$I_{OFF(NO)}$ or $I_{OFF(NC)}$	NO or NC Off Leakage Current	$V_{DD} = 2.25V, V_{NO}$ or $V_{NC} = -1.5V$ to $+3.3V$	-400		400	

V_{DD} = 2.5V to 2.7V ±10% Cont.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I _{COM (ON)}	COM On Leakage Current	V _{DD} = 2.25V, V _{NO} or V _{NC} = 0.3V, V _{COM} = 3V, 0.3V, or floating	-250		250	nA
THD	Total Harmonic Distortion	Load = 8Ω pulled to GND, V _{DD} = 2.7V, freq = 20Hz to 20KHz, V _{input} = 2V _{PP}		0.035		%
		Load = 16Ω pulled to GND, V _{DD} = 2.7V, freq = 20Hz to 20KHz, V _{input} = 2V _{PP}		0.025		
Digital I/O						
V _{IH}	Input Logic High		1.3			V
V _{IL}	Input Logic Low				0.6	
V _H	Input Hysteresis	V _{DD} = 2.7V		100		mV
I _{IN}	IN Input Leakage Current	V _{IN} = 0 or V _{DD}	-0.5		0.5	μA

V_{DD} = 2.7V to 3.3V

(T_A = -40°C to 85°C, unless otherwise noted. Typical values are at 25°C.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Analog Switch						
V _{NO} , V _{NC} , V _{COM}	Analog Signal Range		-1.5		V _{DD}	V
R _{ON(NC)}	NC On-Resistance	V _{DD} = 2.7V, I _{COM} = 100mA, V _{NC} = -1.5V to V _{DD}		0.7		Ω
R _{ON(NO)}	NO On-Resistance	V _{DD} = 2.7V, I _{COM} = 100mA, V _{NO} = -1.5V to V _{DD}		0.7		
ΔR _{ON}	On-Resistance Match Between Channels	V _{DD} = 2.7V, I _{COM} = 100mA, V _{NO} or V _{NC} = -1.5V to V _{DD}		0.1		
R _{ONF(NC)}	NC On-Resistance Flatness	V _{DD} = 2.7V, I _{COM} = 100mA, V _{NC} = -1.5V to V _{DD}		0.2		
R _{ONF(NO)}	NO On-Resistance Flatness	V _{DD} = 2.7V, I _{COM} = 100mA, V _{NO} = -1.5V to V _{DD}		0.2		
I _{OFF (NO)} or I _{OFF (NC)}	NO or NC Off Leakage Current	V _{DD} = 3.3V, V _{NO} or V _{NC} = -1.5V to +3.3V	-400		400	nA
I _{COM (ON)}	COM On Leakage Current	V _{DD} = 3.3V, V _{NO} or V _{NC} = 0.3V, V _{COM} = 3V, 0.3V, or floating	-250		250	
THD	Total Harmonic Distortion	Load = 8Ω pulled to GND, V _{DD} = 2.7V, freq = 20Hz to 20KHz, V _{input} = 2V _{PP}		0.04		%
		Load = 16Ω pulled to GND, V _{DD} = 2.7V, freq = 20Hz to 20KHz, V _{input} = 2V _{PP}		0.035		
Digital I/O						
V _{IH}	Input Logic High		1.3			V
V _{IL}	Input Logic Low				0.6	
V _H	Input Hysteresis	V _{DD} = 2.7V		100		mV
I _{IN}	IN Input Leakage Current	V _{IN} = 0 or V _{DD}	-0.5		0.5	μA

PI3A268C
V_{DD} = 3.3V to 4.4V

 (T_A = -40°C to 85°C, unless otherwise noted. Typical values are at 25°C.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Analog Switch						
V _{NO} , V _{NC} , V _{COM}	Analog Signal Range		-1.5		V _{DD}	V
R _{ON(NC)}	NC On-Resistance	V _{DD} = 4.2V, I _{COM} = 100mA, V _{NC} = -1.5V to V _{DD}		0.6		Ω
R _{ON(NO)}	NO On-Resistance	V _{DD} = 4.2V, I _{COM} = 100mA, V _{NO} = -1.5V to V _{DD}		0.6		
ΔR _{ON}	On-Resistance Match Between Channels	V _{DD} = 4.2V, I _{COM} = 100mA, V _{NO} or V _{NC} = -1.5V to V _{DD}		0.1		
R _{ONF(NC)}	NC On-Resistance Flatness	V _{DD} = 4.2V, I _{COM} = 100mA, V _{NC} = -1.5V to V _{DD}		0.2		
R _{ONF(NO)}	NO On-Resistance Flatness	V _{DD} = 4.2V, I _{COM} = 100mA, V _{NO} = -1.5V to V _{DD}		0.2		
I _{OFF (NO)} or I _{OFF (NC)}	NO or NC Off Leakage Current	V _{DD} = 4.2V, V _{NO} or V _{NC} = -1.5V to +3.3V	-700		700	nA
I _{COM (ON)}	COM On Leakage Current	V _{DD} = 4.2V, V _{NO} or V _{NC} = 0.3V, V _{COM} = 3V, 0.3V, or floating	-550		550	
THD	Total Harmonic Distortion	Load = 8Ω pulled to GND, V _{DD} = 3.3V, freq = 20Hz to 20KHz, V _{input} = 2V _{PP}		0.025		%
		Load = 16Ω pulled to GND, V _{DD} = 3V, freq = 20Hz to 20KHz, V _{input} = 2V _{PP}		0.02		
Digital I/O						
V _{IH}	Input Logic High		1.3			V
V _{IL}	Input Logic Low				0.6	
V _H	Input Hysteresis	V _{DD} = 4.2V		150		mV
I _{IN}	IN Input Leakage Current	V _{IN} = 0 or V _{DD}	-0.5		0.5	μA

PI3A268C

Switch and AC Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
t _{ON}	Turn-On Time	V _{DD} = 2.5V, V _{NO} or V _{NC} = 1.5V, R _L = 50Ω, C _L = 35pF, <i>See Test Circuit Figure 1 & 2.</i>			85	ns
t _{OFF}	Turn-Off Time	V _{DD} = 2.5V, V _{NO} or V _{NC} = 1.5V, R _L = 50Ω, C _L = 35pF, <i>See Test Circuit Figure 1 & 2.</i>			85	
t _{BBM}	Break-Before-Make Delay	V _{DD} = 2.7V, V _{NO} or V _{NC} = 1.5V, R _L = 50Ω, C _L = 35pF, <i>See Test Circuit Figure 3.</i>			20	
Q	Charge Injection	<i>See Test Circuit Figure 4.</i>		35		pC
O _{IRR}	Off-Isolation	C _L = 5pF, R _L = 50Ω, f = 100kHz, V _{DD} = 2.5V to 4.2V, V _{COM} = 1 V _{RMS} , <i>See Test Circuit Figure 5.</i>		-80		dB
X _{TALK}	Crosstalk	C _L = 5pF, R _L = 50Ω, f = 100kHz, V _{DD} = 2.5V to 4.2V, V _{COM} = 1 V _{RMS} , <i>See Test Circuit Figure 6.</i>		-72		
f _{3dB}	3dB Bandwidth	V _{DD} = 2.5V to 4.2V, <i>See Test Circuit Figure 9</i>		100		MHz

Capacitance (V_{DD} = 2.5V to 4.2V)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
C _{NC (OFF)}	NC Off Capacitance	f = 1MHz, <i>See Test Circuit Figure 7.</i>		18		pF
C _{NO (OFF)}	NO Off Capacitance	f = 1MHz, <i>See Test Circuit Figure 7.</i>		18		
C _{NC (ON)}	NC On Capacitance	f = 1MHz, <i>See Test Circuit Figure 8.</i>		55		
C _{NO (ON)}	NO On Capacitance	f = 1MHz, <i>See Test Circuit Figure 8.</i>		55		

Test Circuits and Timing Diagrams

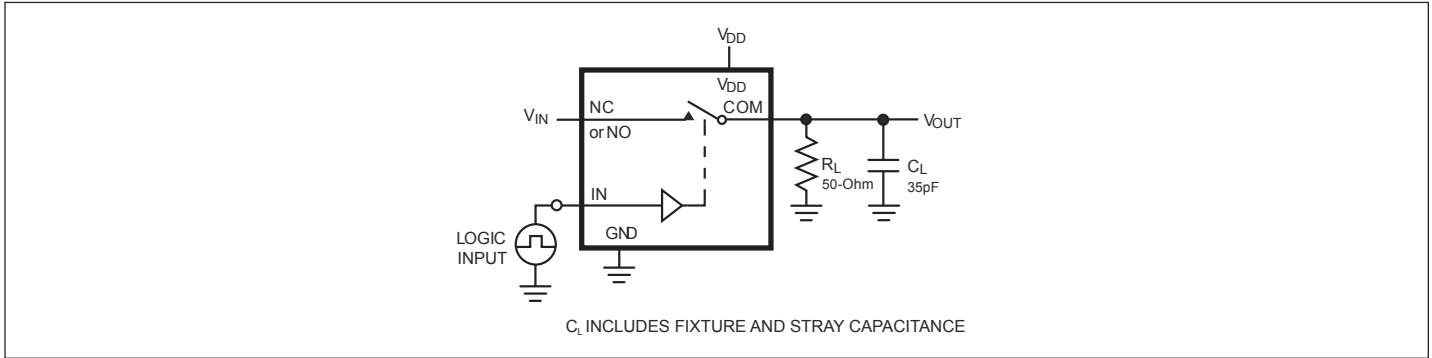


Figure 1. AC Test Circuit

Notes:

- 1. Unused input (NC or NO) must be grounded.

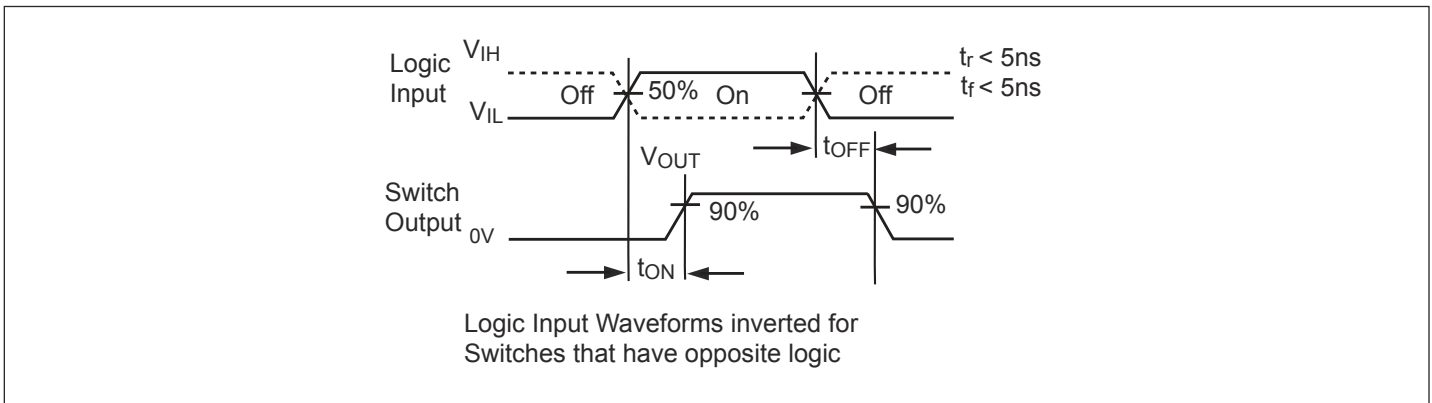


Figure 2. AC Waveforms

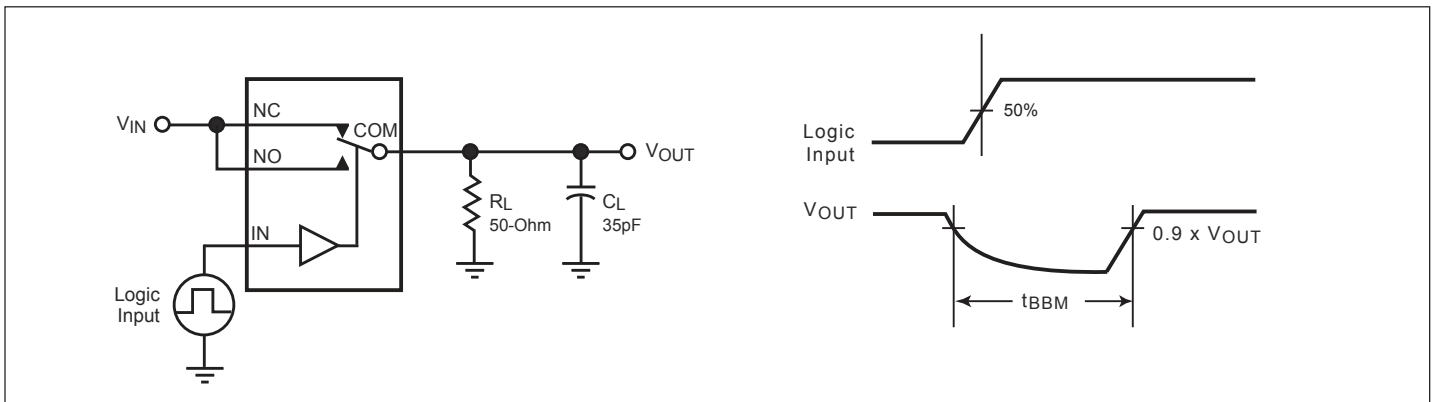


Figure 3. Break Before Make Interval Timing

PI3A268C

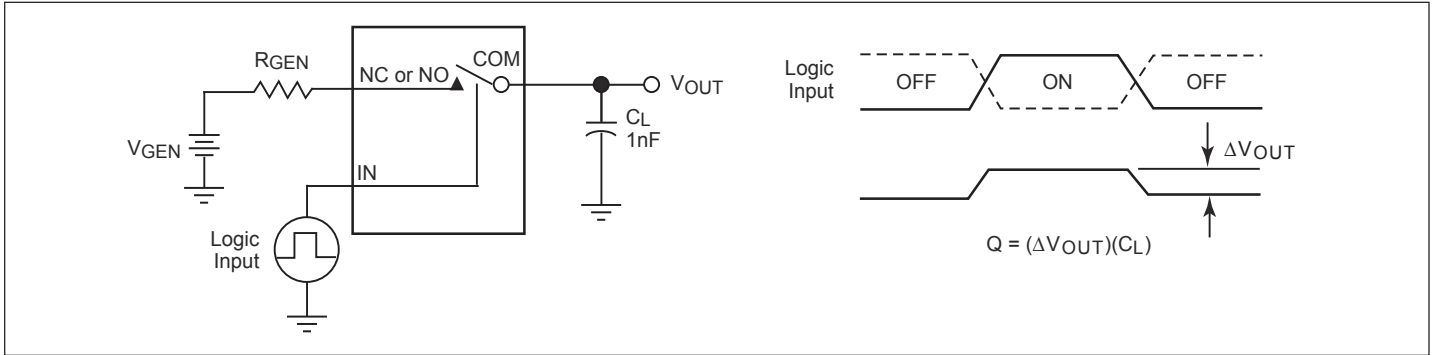


Figure 4. Charge Injection Test

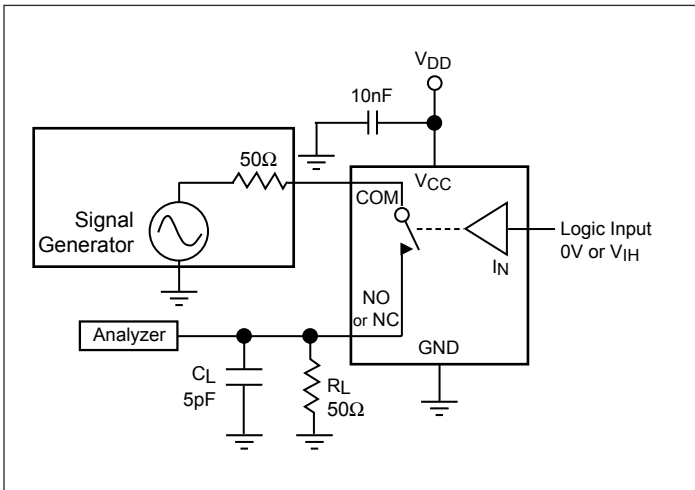


Figure 5. Off Isolation

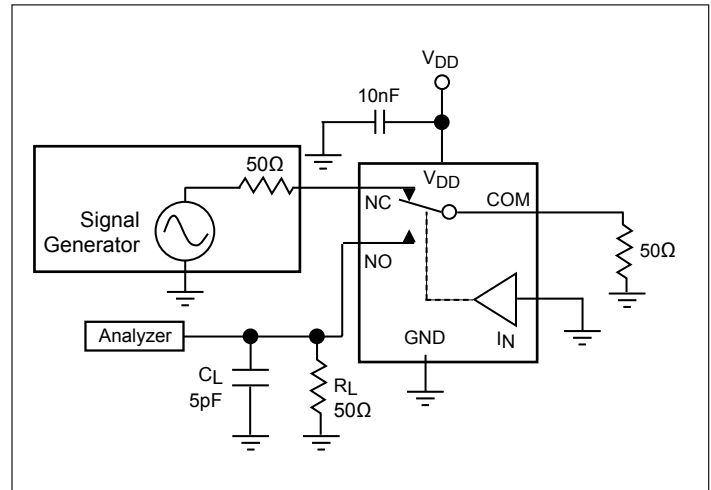


Figure 6. Crosstalk

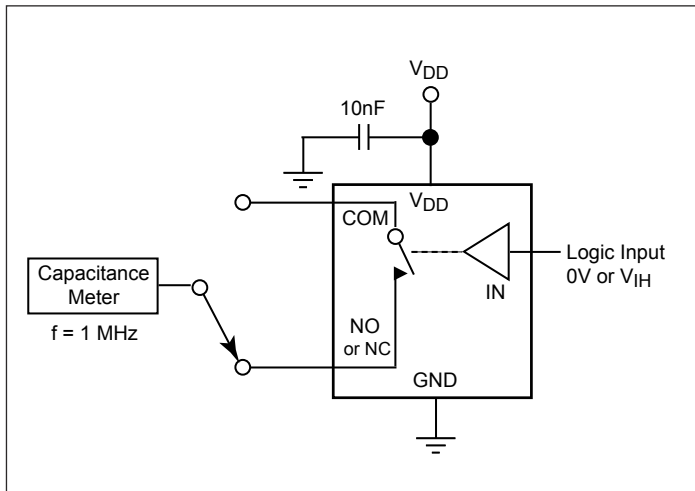


Figure 7. Channel Off Capacitance

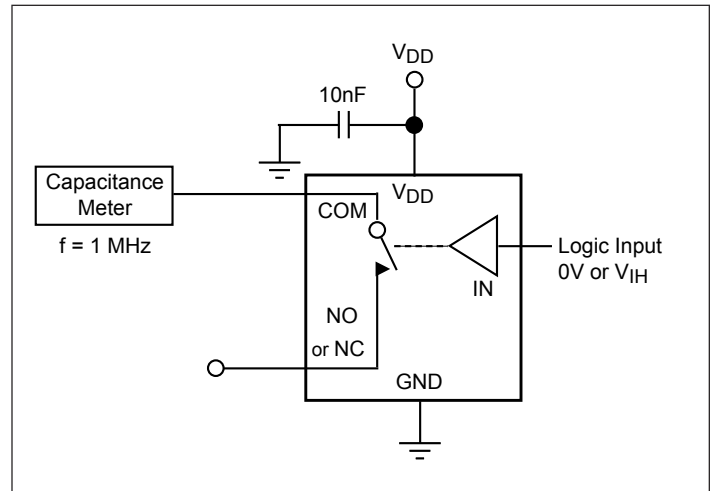


Figure 8. Channel On Capacitance

PI3A268C

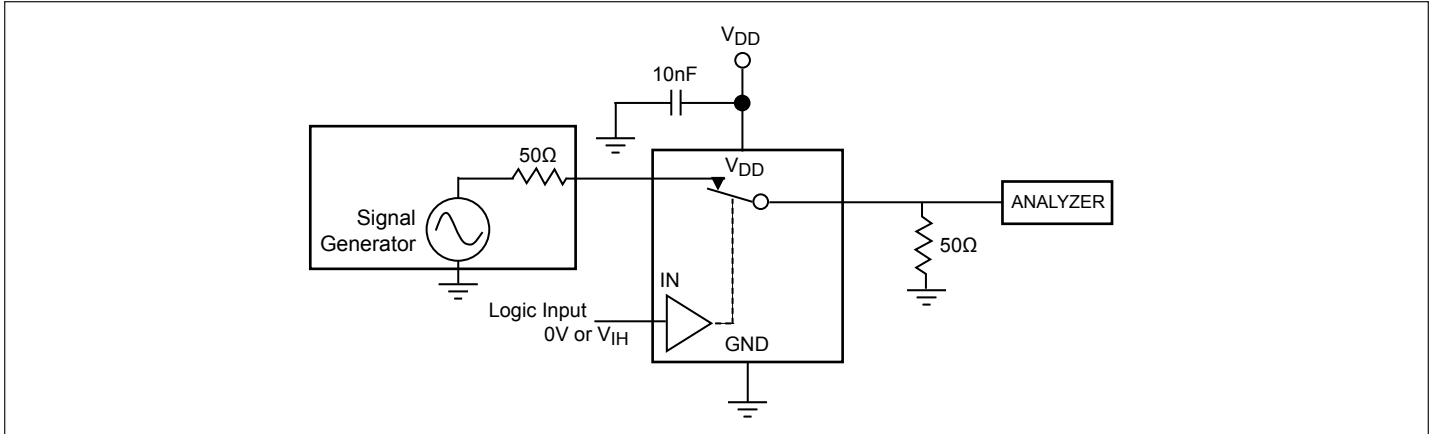


Figure 9. Bandwidth

Part Marking

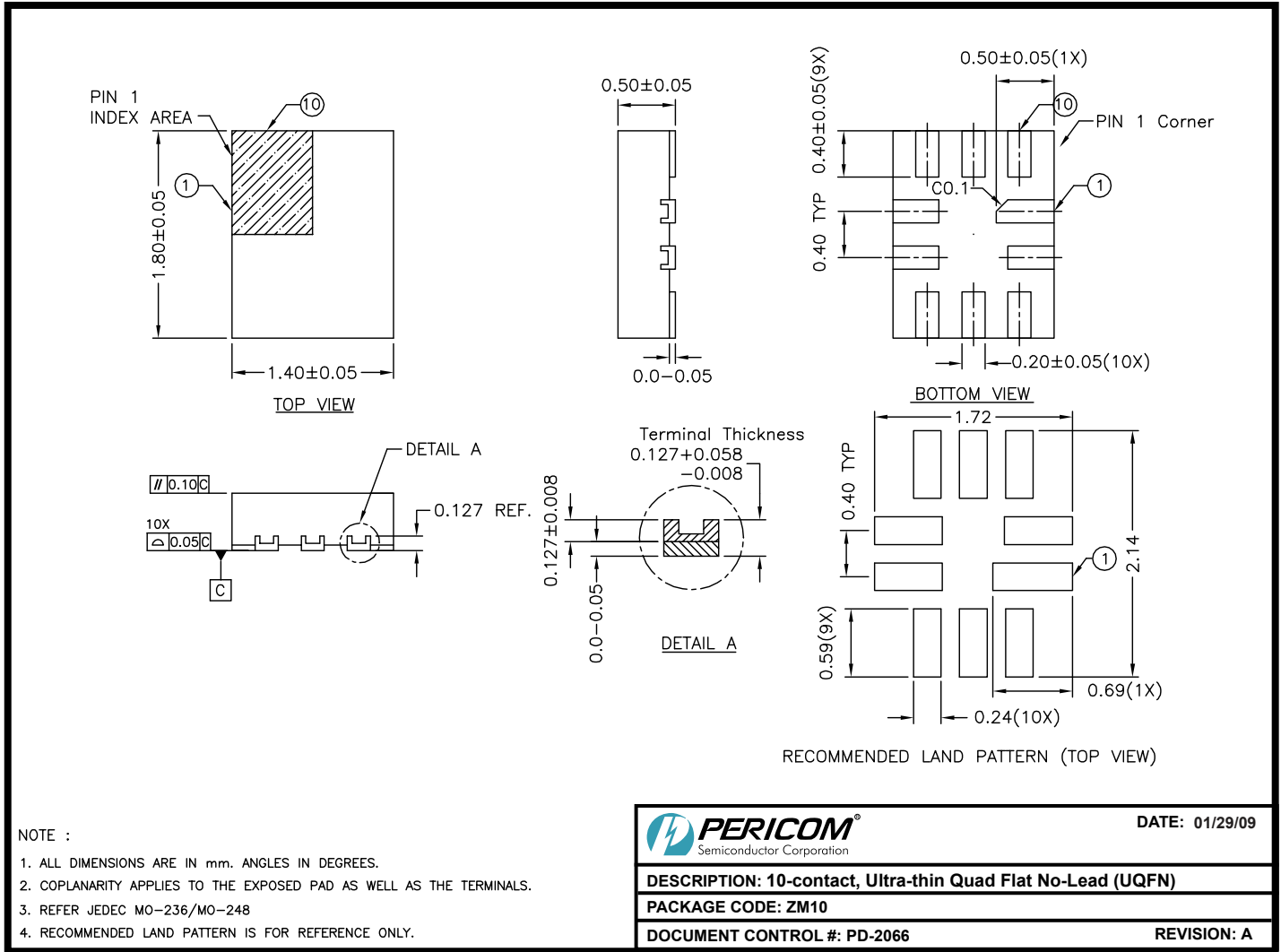
IM
YW

PI3A268CZME = IM
YW: Year & Workweek
The "I" is "L" lowercase letter
The "M" is "m" capital letter

PI3A268C

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	Packaging Code	Package Description	Top Mark
PI3A268CZMEX	ZM	10-contact, Ultra-thin Quad Flat No-Lead (UQFN)	BV

Notes:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
- 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.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- E = Pb-free and Green
- X suffix = Tape/Reel

IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NOW WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD 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 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.
9. This Notice may be periodically updated with the most recent version available at <https://www.diodes.com/about/company/terms-and-conditions/important-notice>

DIODES is a trademark of Diodes Incorporated in the United States and other countries.

The Diodes logo is a registered trademark of Diodes Incorporated in the United States and other countries.

© 2022 Diodes Incorporated. All Rights Reserved.

www.diodes.com