A Product Line of
Diodes Incorporated

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 or your local Diodes representative.
  https://www.diodes.com/quality/product-definitions/
- 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

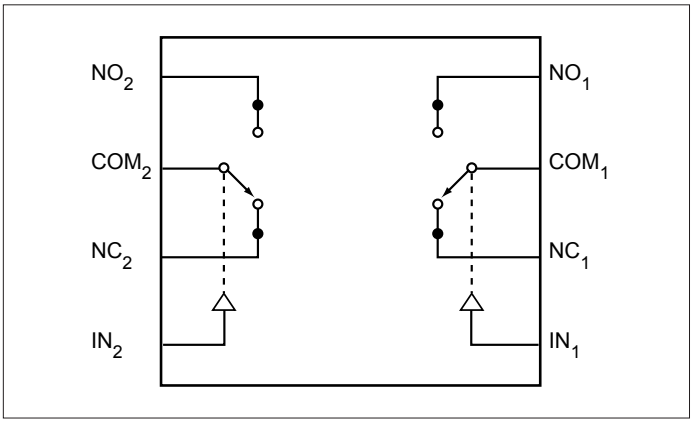
Description

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



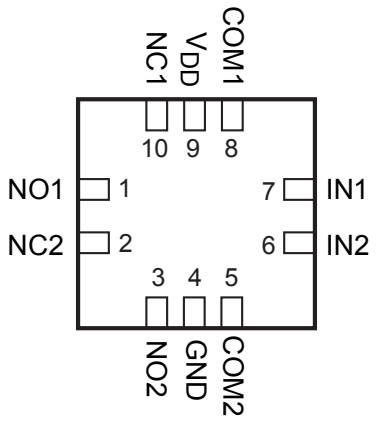
Function Table

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.

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)
Infared (15s). . . . . +220°C
Vapor Phase (60ns) . . . . . +215°C

Notes:

1. "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.
2. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.
3. 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 ±10%

(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} = 2.25V, 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 VNC = -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	nA

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, Vinput = $2V_{PP}$		0.035		%
		Load = 16Ω pulled to GND, V_{DD} = 2.7V, freq = 20Hz to 20KHz, Vinput = $2V_{PP}$		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 VNC = -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, Vinput = $2V_{PP}$		0.04		%
		Load = 16Ω pulled to GND, V_{DD} = 2.7V, freq = 20Hz to 20KHz, Vinput = $2V_{PP}$		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

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 VNC = -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, Vinput = $2V_{PP}$		0.025		%
		Load = 16Ω pulled to GND, V_{DD} =3V, freq = 20Hz to 20KHz, Vinput = $2V_{PP}$		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

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, *See Test Circuit Figure 1 & 2.*			85	ns
t_{OFF}	Turn-Off Time	V_{DD} = 2.5V, V_{NO} or V_{NC} = 1.5V, R_L = 50Ω, C_L = 35pF, *See Test Circuit Figure 1 & 2.*			85	
t_{BBM}	Break-Before-Make Delay	V_{DD} = 2.7V, V_{NO} or V_{NC} = 1.5V, R_L = 50Ω, C_L = 35pF, *See Test Circuit Figure 3.*			20	
Q	Charge Injection	*See Test Circuit Figure 4.*		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}, *See Test Circuit Figure 5.*		-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}, *See Test Circuit Figure 6.*		-72		
f_{3dB}	3dB Bandwidth	V_{DD} = 2.5V to 4.2V, *See Test Circuit Figure 9*		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, *See Test Circuit Figure 7.*		18		pF
$C_{NO\ (OFF)}$	NO Off Capacitance	f = 1MHz, *See Test Circuit Figure 7.*		18		
$C_{NC\ (ON)}$	NC On Capacitance	f = 1MHz, *See Test Circuit Figure 8.*		55		
$C_{NO\ (ON)}$	NO On Capacitance	f = 1MHz, *See Test Circuit Figure 8.*		55		

Test Circuits and Timing Diagrams

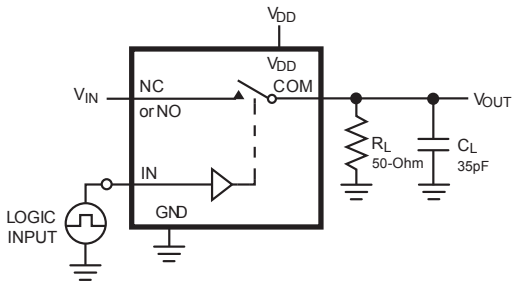


Figure 1. AC Test Circuit

Notes:

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

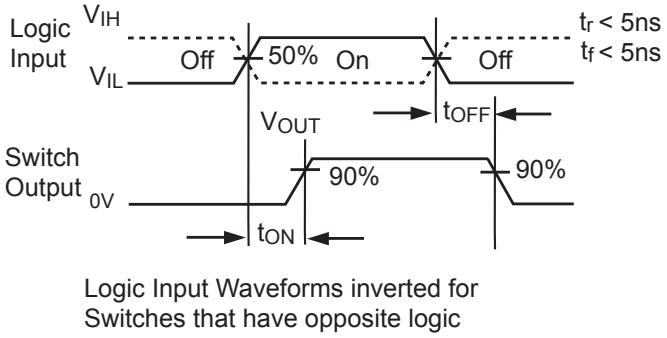


Figure 2. AC Waveforms

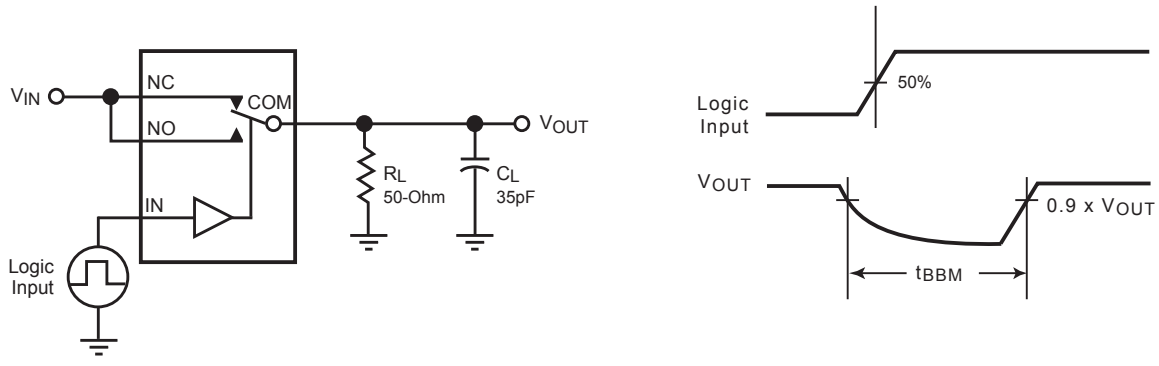


Figure 3. Break Before Make Interval Timing

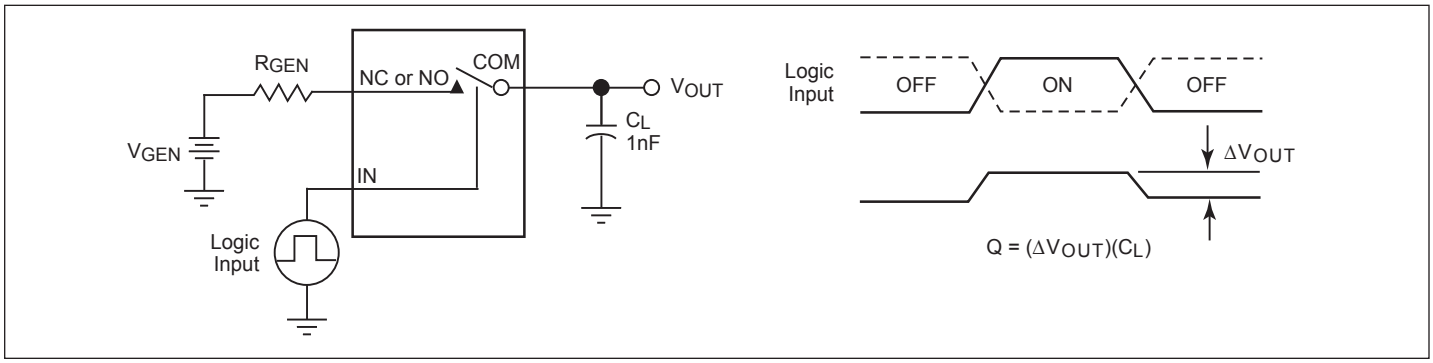


Figure 4. Charge Injection Test

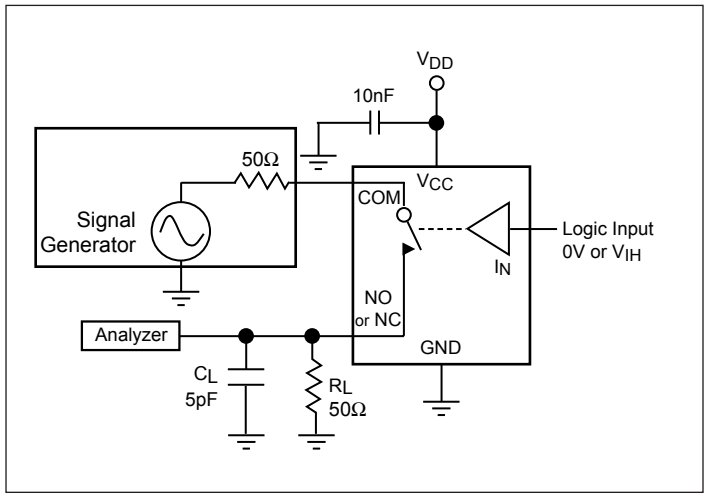


Figure 5. Off Isolation

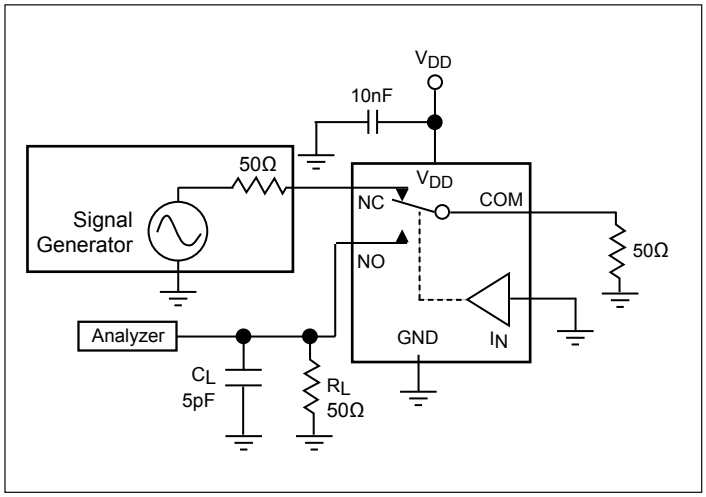


Figure 6. Crosstalk

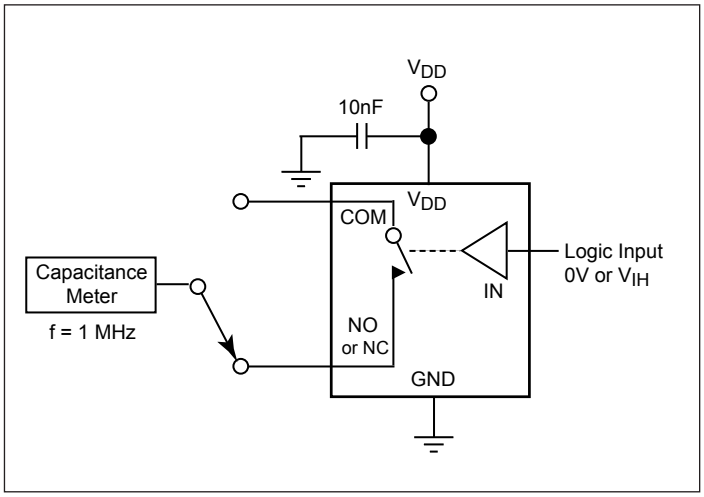


Figure 7. Channel Off Capacitance

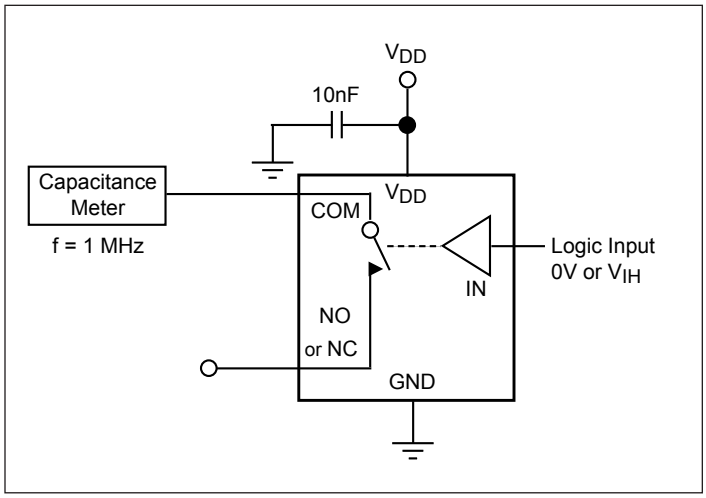


Figure 8. Channel On Capacitance

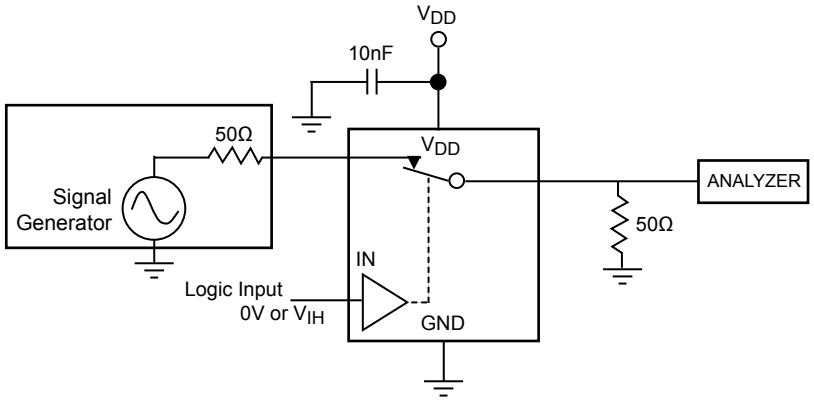


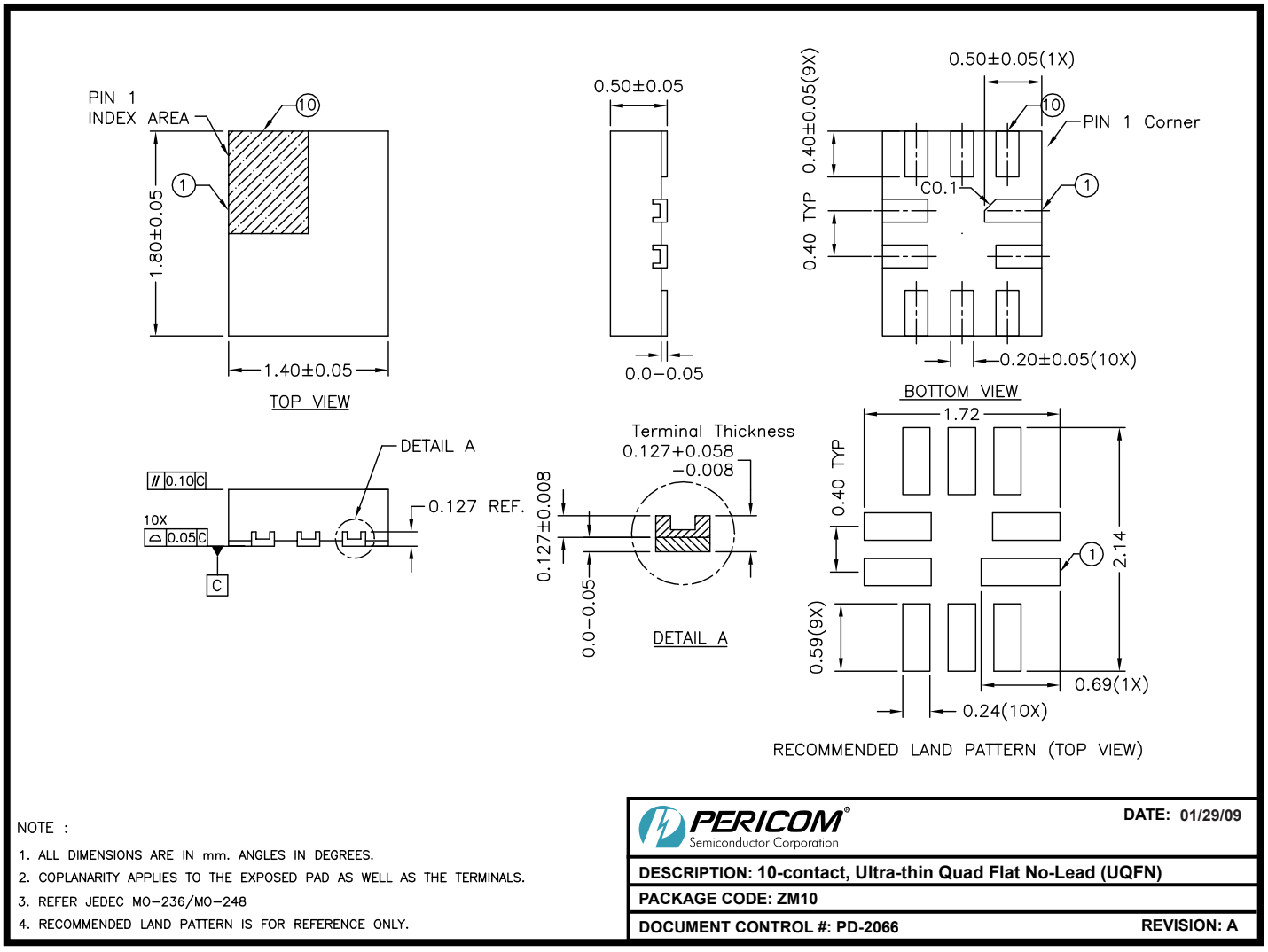
Figure 9. Bandwidth

Part Marking

PI3A268CZME = IM
YW: Year & Workweek
The “I” is “L” lowcase letter
The “M” is “m” capital letter

Packaging Mechanical

10-UQFN (ZM)



NOTE :

1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
3. REFER JEDEC MO−236/MO−248
4. RECOMMENDED LAND PATTERN IS FOR REFERENCE ONLY.

PERICOM Semiconductor Corporation — DATE: 01/29/09

DESCRIPTION: 10-contact, Ultra-thin Quad Flat No-Lead (UQFN)

PACKAGE CODE: ZM10

DOCUMENT CONTROL #: PD-2066 — REVISION: A

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:

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

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