

**High Speed, Dual DPDT Analog Switch**

**Description**

The DIODES PI3A3899 is a dual double-pole double-throw (DPDT) CMOS switch. It can be used as low power audio and dual SIM card applications. Specified over a wide operating power supply voltage range, +1.65V to +4.3V, the switch has a low On-Resistance of 2.4Ω at 3.0V.

Control inputs, Ax, tolerate input drive signals up to 5V, independent of supply voltage.

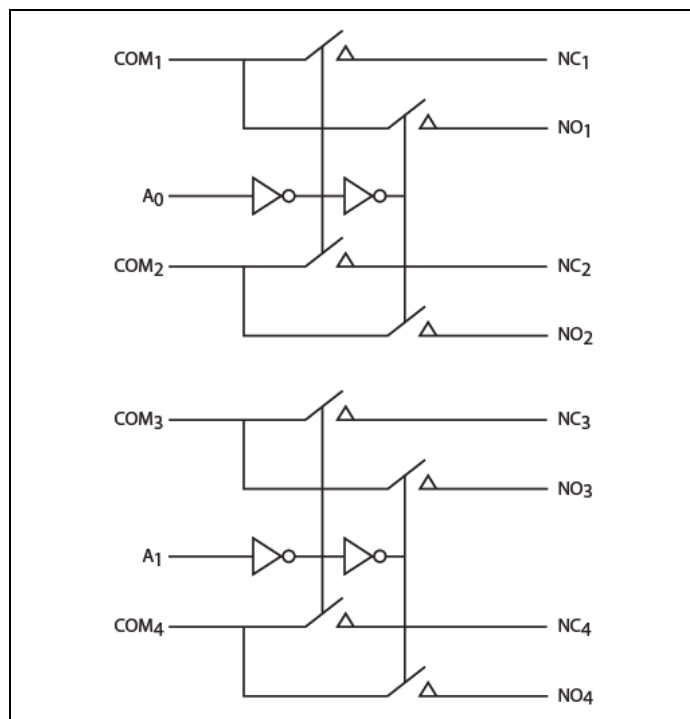
**Application(s)**

- Cell Phones
- PDAs
- Portable Instrumentation Battery Powered
- Computer Peripherals
- Dual SIM Card Switching

**Function Truth Table**

A <sub>0</sub>	Function	A <sub>1</sub>	Function
0	NC <sub>1,2</sub> Connected to COM <sub>1,2</sub>	0	NC <sub>3,4</sub> Connected to COM <sub>3,4</sub>
1	NO <sub>1,2</sub> Connected to COM <sub>1,2</sub>	1	NO <sub>3,4</sub> Connected to COM <sub>3,4</sub>

**Block Diagram**



Notes:

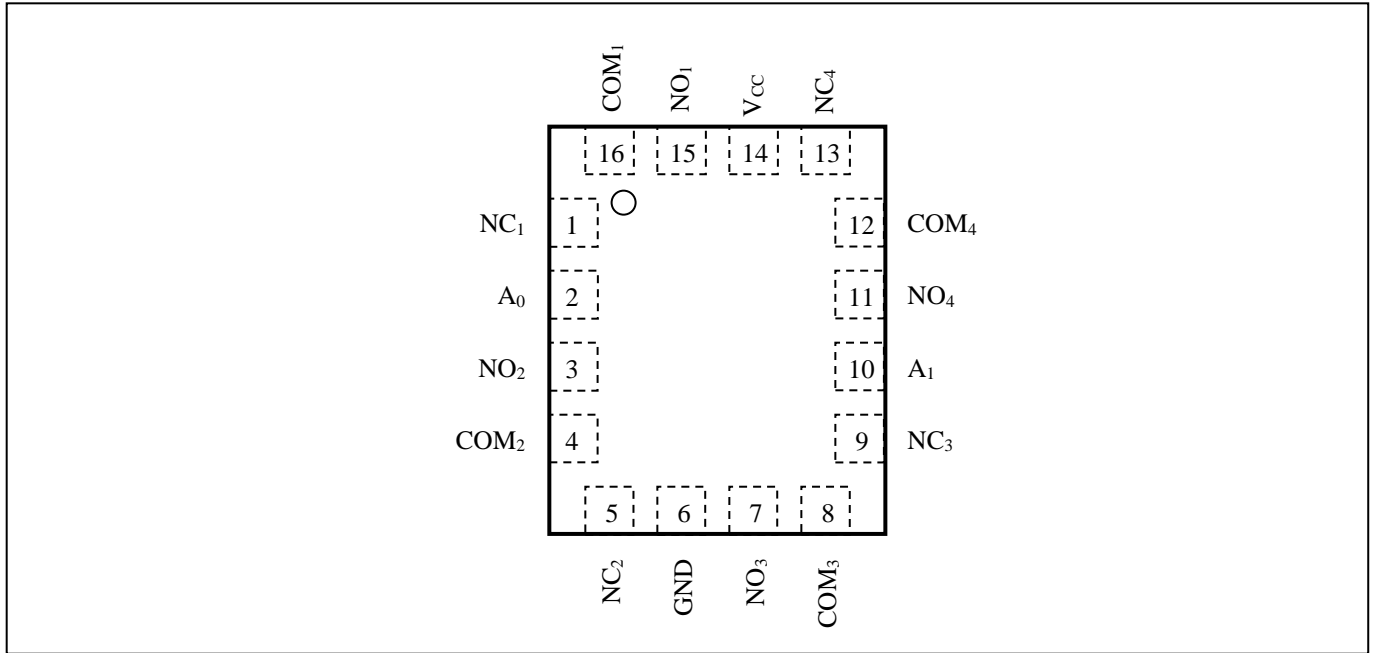
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and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

**Features**

- CMOS Technology for Analog Applications
- Low On-Resistance: 2.0Ω
- Wide VCC Range: +1.65V to +4.3V
- ICC Maximum 1μA @ TA = +25°C
- Rail-to-Rail Switching Throughout Signal Range
- Fast Switching Speed: 10ns TYP. at 3.0V
- High Off Isolation: -67dB@1MHz
- Crosstalk Rejection: -100dB@1MHz
- Wide Bandwidth: 330MHz
- Interfaces with 1.8V Chipset
- High ESD Performance : 8kV for I/O to GND
- 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-Q100/101/200, 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):
  - 16-pin, UQFN 1.8mmx2.6mm (ZTA)

## Pin Configuration

UQFN16 1.8mmx2.6mm Package (Top View)



## Pin Description

Pin#	Name	Description
4, 8, 12, 16	COM <sub>X</sub>	Common Output / Data Port
1, 5, 9, 13	NC <sub>X</sub>	Data Port (normally connect)
3, 7, 11, 15	NO <sub>X</sub>	Data Port (normally open)
2, 10	A <sub>0</sub> , A <sub>1</sub>	Logic Input Control
6	GND	Ground
14	VCC	Positive Power Supply

Notes: X = 1, 2, 3, or 4

## Maximum Ratings

Storage Temperature .....	-65°C to +150°C
Ambient Temperature .....	-40°C to +85°C
ESD (HBM) .....	4kV for All Pins 8kV for I/O to GND
Supply Voltage $V_{CC}$ .....	-0.5V to +4.6V
Control Input Voltage ( $V_{INX}$ ) .....	0 to +5.0V
DC Input Voltage ( $V_{INPUT}$ ) .....	-0.5V to +4.6V
Continuous Current NO/NC/COM.....	±400mA
Peak Current NO/NC/COM (Pulse at 1ms 10% duty cycle).....	±500mA

**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	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CC}$	Supply Voltage	-	1.65	-	4.3	V
$V_{INX}$	Control Input Voltage	-	0	-	4.3	V
$V_{INPUT}$	Switch Input Voltage	-	-0.3	-	$V_{CC}$	V
$T_A$	Operating Temperature	-	-40	25	85	°C
$t_r, t_f$	Input Rise and Fall Time	Control Input pins $V_{CC} = 2.3V$ to $3.6V$	0	-	10	ns/V

**Note:** Control input must be held HIGH or LOW; it must not float.

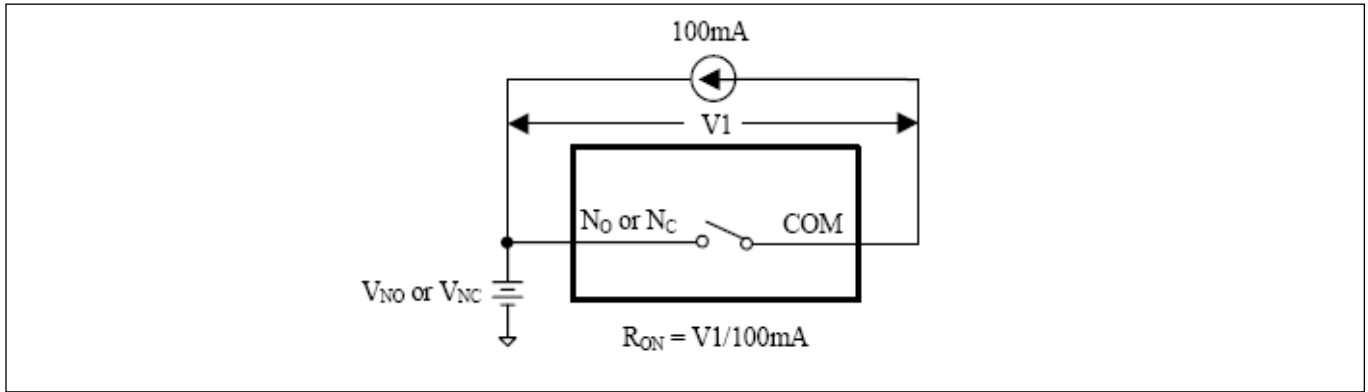
## DC Electrical Characteristics

$V_{CC} = 1.65$  to  $4.3V$ ,  $GND=0V$ ,  $V_{IH}=+1.6V$ ,  $V_{IL}=+0.4V$ ,  $T_A = -40^\circ C$  to  $85^\circ C$ , unless otherwise noted. Typical values are at  $3V$  and  $+25^\circ C$ .

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
$V_{NO}, V_{NC}, V_{COM}$	Analog Signal Range	-	0	-	$V_{CC}$	V	
$R_{ON}$	On-Resistance	$I_{COM} = 100mA$ , $V_{NO}$ or $V_{NC} = 1V$ , Test Circuit 1	$V_{CC} = 2.7V$ ,	-	2.2	3.6	$\Omega$
			$V_{CC} = 3.0V$ ,	-	2.0	3	
			$V_{CC} = 4.3V$	-	1.6	2.4	
$\Delta R_{ON}$	On-Resistance Match Between Channels	$I_{COM} = 100mA$ , $V_{NO}$ or $V_{NC} = 1V$ , Test Circuit 1	$V_{CC} = 3.0V$	-	0.2	-	$\Omega$
			$V_{CC} = 4.3V$	-	0.2	-	
$R_{ONF}$	On-Resistance Flatness	$I_{COM} = 100mA$ , $V_{NO}$ or $V_{NC} = 0 \sim V_{CC}$ , Test Circuit 1	$V_{CC} = 3.0V$	-	0.6	-	$\Omega$
			$V_{CC} = 4.3V$	-	0.5	-	
$I_{OFF( NO )}$ OF $I_{OFF( NC )}$	Source Off Leakage Current	$V_{CC} = 4.3V$ , $V_{NO}$ or $V_{NC} = 4.3V/0V$ , $V_{COM} = 0V/4.3V$	-	-	1	$\mu A$	
$I_{NC( ON )}, I_{NO( ON )}, I_{COM( ON )}$	Channel On Leakage Current	$V_{CC} = 4.3V$ , $V_{NO}$ or $V_{NC} = 4.3V/0V$ , $V_{COM} = 0V/4.3V$ or floating	-	-	1		
$V_{IH}$	Input Logic High	$V_{CC} = 3.0V$	1.2	-	-	V	
		$V_{CC} = 4.3V$	1.3	-	-		
$V_{IL}$	Input Logic Low	$V_{CC} = 3.0V$	-	-	0.5	V	
		$V_{CC} = 4.3V$	-	-	0.6		
$I_{IN}$	IN Input Leakage Current	$V_{CC} = 4.3V$ , $V_{IN} = 0 \sim 4.3V$	-	-	+/-1	$\mu A$	
$t_{ON}$	Turn-On Time	$R_L = 50\Omega$ , $C_L = 35pF$ , $T_A = 25^\circ C$ , See Test Circuit Figure 2	-	8	-	ns	
$t_{OFF}$	Turn-Off Time		-	12	-	ns	
$t_D$	Break-Before-Make Delay	$T_A = 25^\circ C$ , See Test Circuit Figure 3	-	9	-	ns	

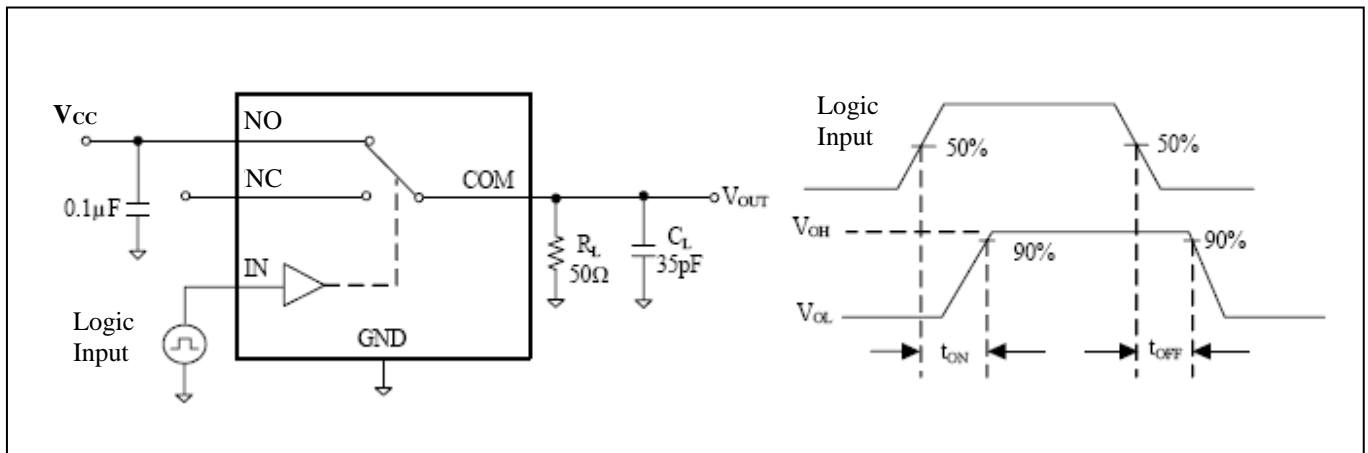
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
$O_{ISO}$	NC-NO and COM-NC/NO Off-Isolation	$V_{BIAS} = 1.5V$ , $V_{IN} = 0dBm$ , $T_A = 25^{\circ}C$ , See Test Circuit Figure 4	1MHz	-	-67	-	dB
$X_{TALK}$	Channel-to-Channel Crosstalk	$V_{BIAS} = 1.5V$ , $V_{IN} = 0dBm$ , $T_A = 25^{\circ}C$ , See Test Circuit Figure 5	1MHz	-	-100	-	dB
$f_{3dB}$	3dB Bandwidth	$C_L = 5pF$ , See Test Circuit Figure 6	-	330	-	MHz	
THD	Total Harmonic Distortion	$V_{CC} = 3.0V$ , $f = 20\text{ Hz to }20\text{ kHz}$ , $R_L = 32\Omega$ , $V_{IN} = 1.0\text{ VPP}$	-	0.03	-	%	
Q	Charge Injection Select Input to Common I/O	$V_{IN} = GND$ , $R_S = 0$ , $C_L = 1nF$ , $T_A = 25^{\circ}C$ , See Test Circuit Figure 7	-	13	-	pC	
$C_{NC(OFF)}$ $C_{NO(OFF)}$	Off Capacitance	$F = 1MHz$ , $T_A = 25^{\circ}C$ , See Test Circuit Figure 8	-	7	-	pF	
$C_{ON}$	On Capacitance	$F = 1MHz$ , $T_A = 25^{\circ}C$ , See Test Circuit Figure 9	-	15	-		
$I_{CC}$	Power Supply Current	$V_{CC} = 4.3V$ , $V_{IN} = 0V$ or $V_{CC}$	-	-	1	$\mu A$	

**Test Circuits and Timing Diagrams**

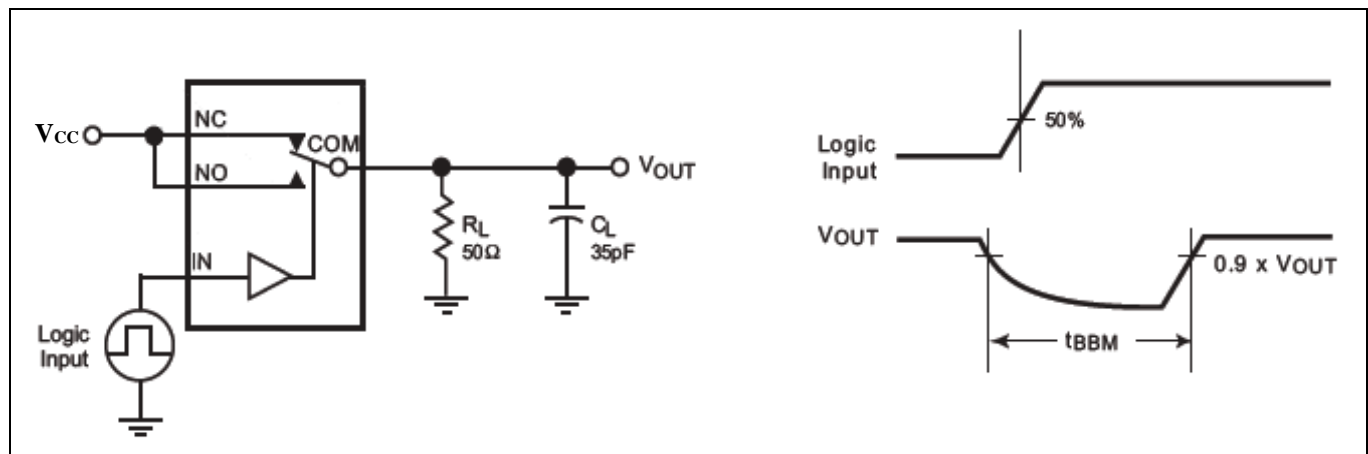


**Figure 1. On Resistance**

**Notes:** Unused input (NC or NO) must be grounded.



**Figure 2. Switching Times**



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

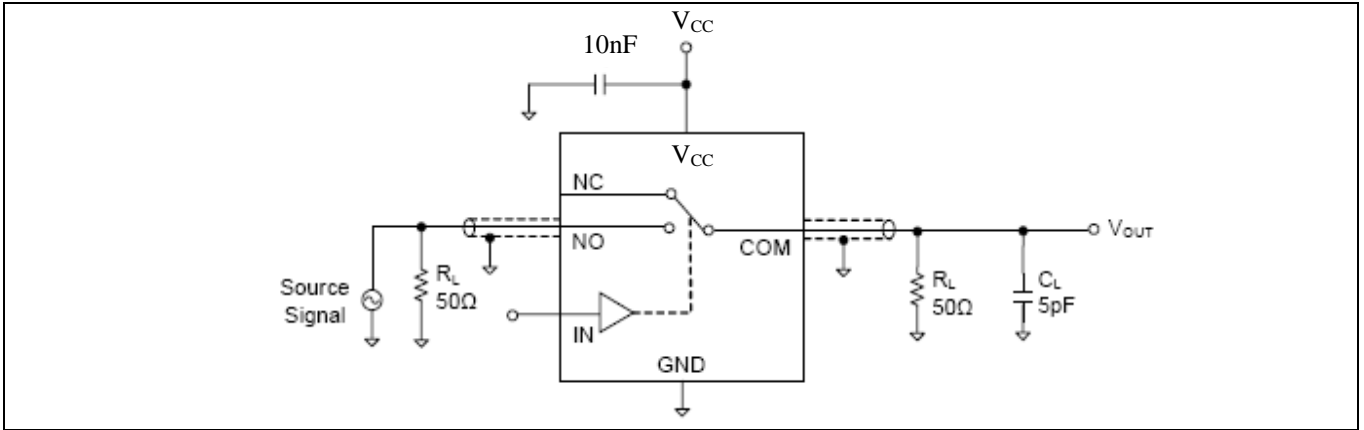


Figure 4. Off Isolation Test

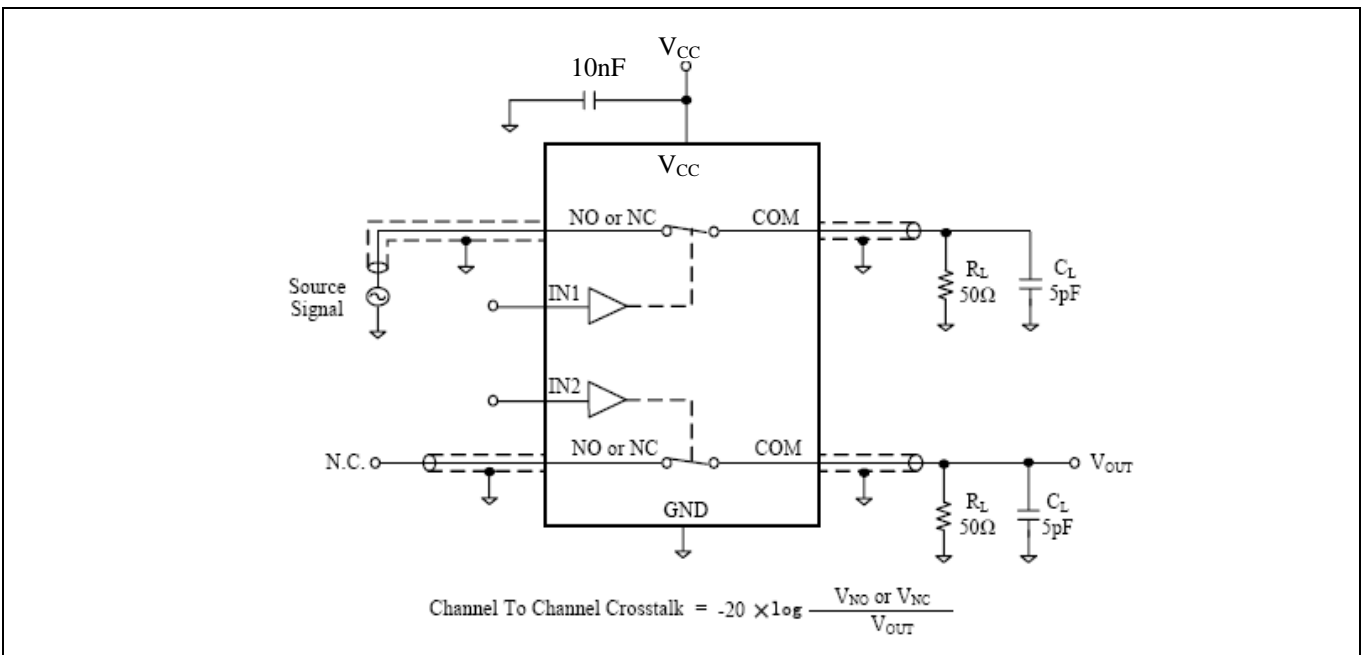


Figure 5. Channel-to-Channel Cross Talk

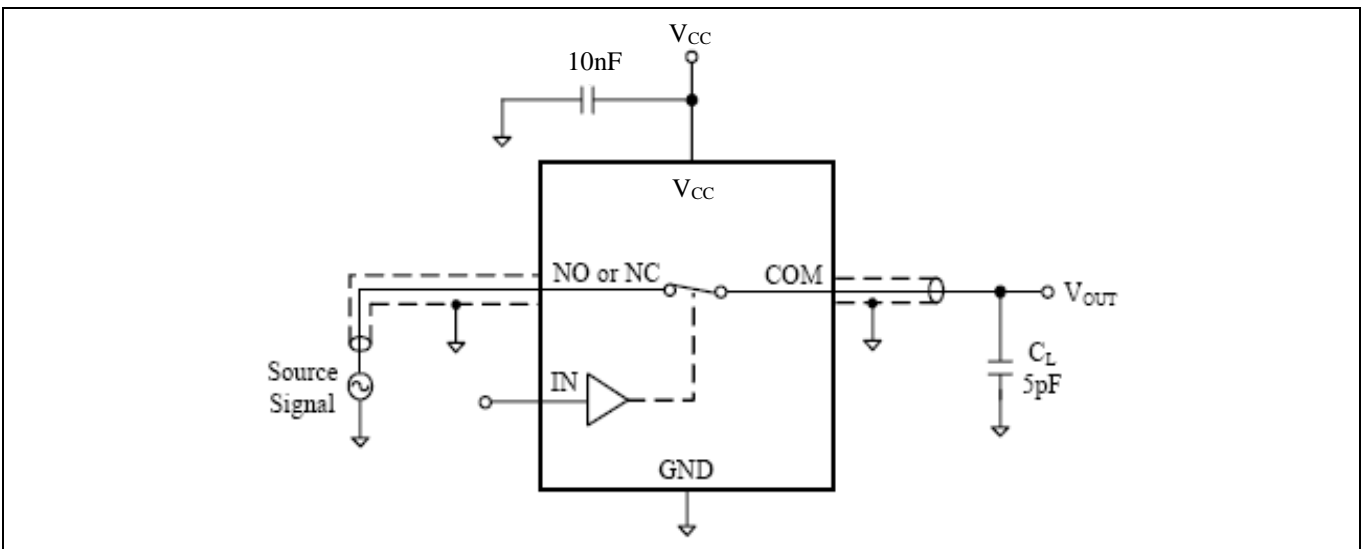
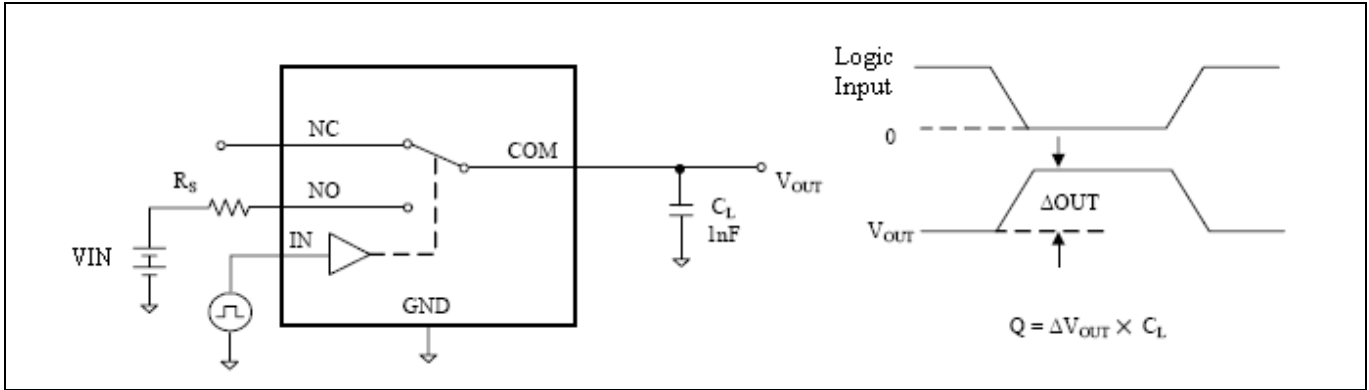
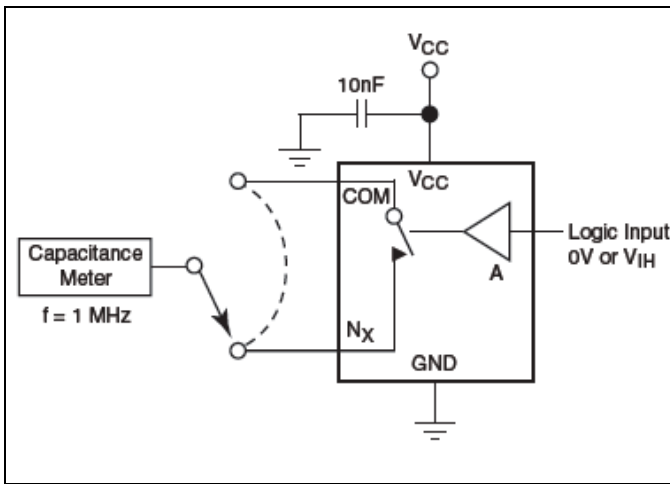


Figure 6. Bandwidth

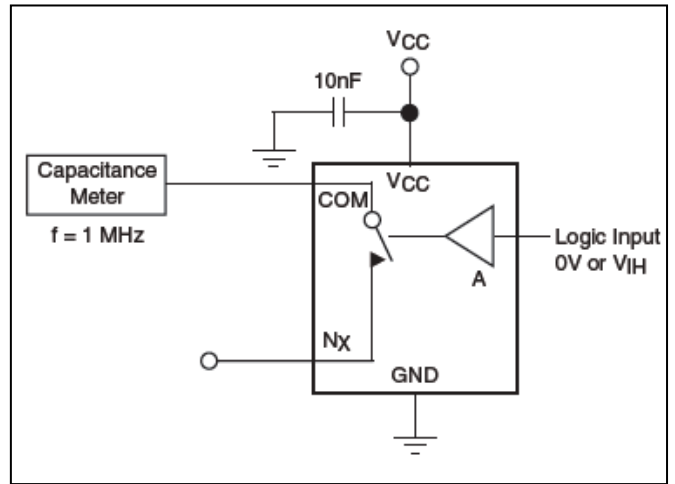
**PI3A3899**



**Figure 7. Charge Injection (Q)**

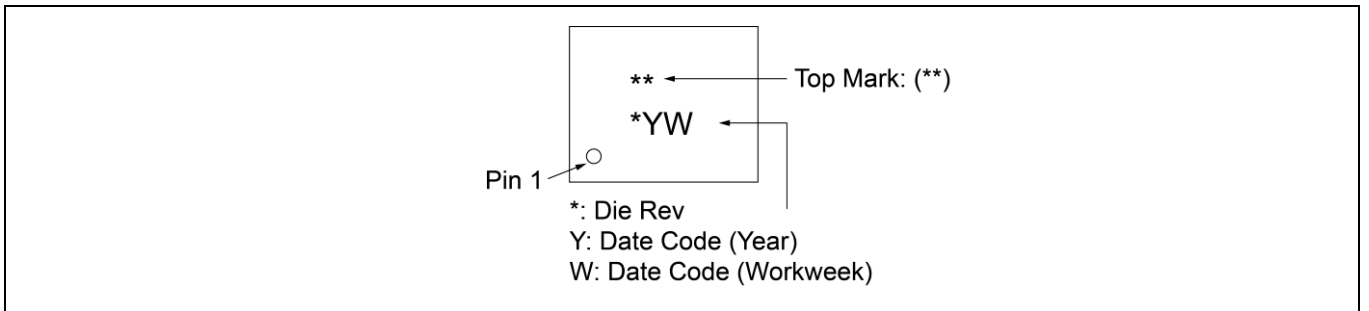


**Figure 8. Channel Off Capacitance**



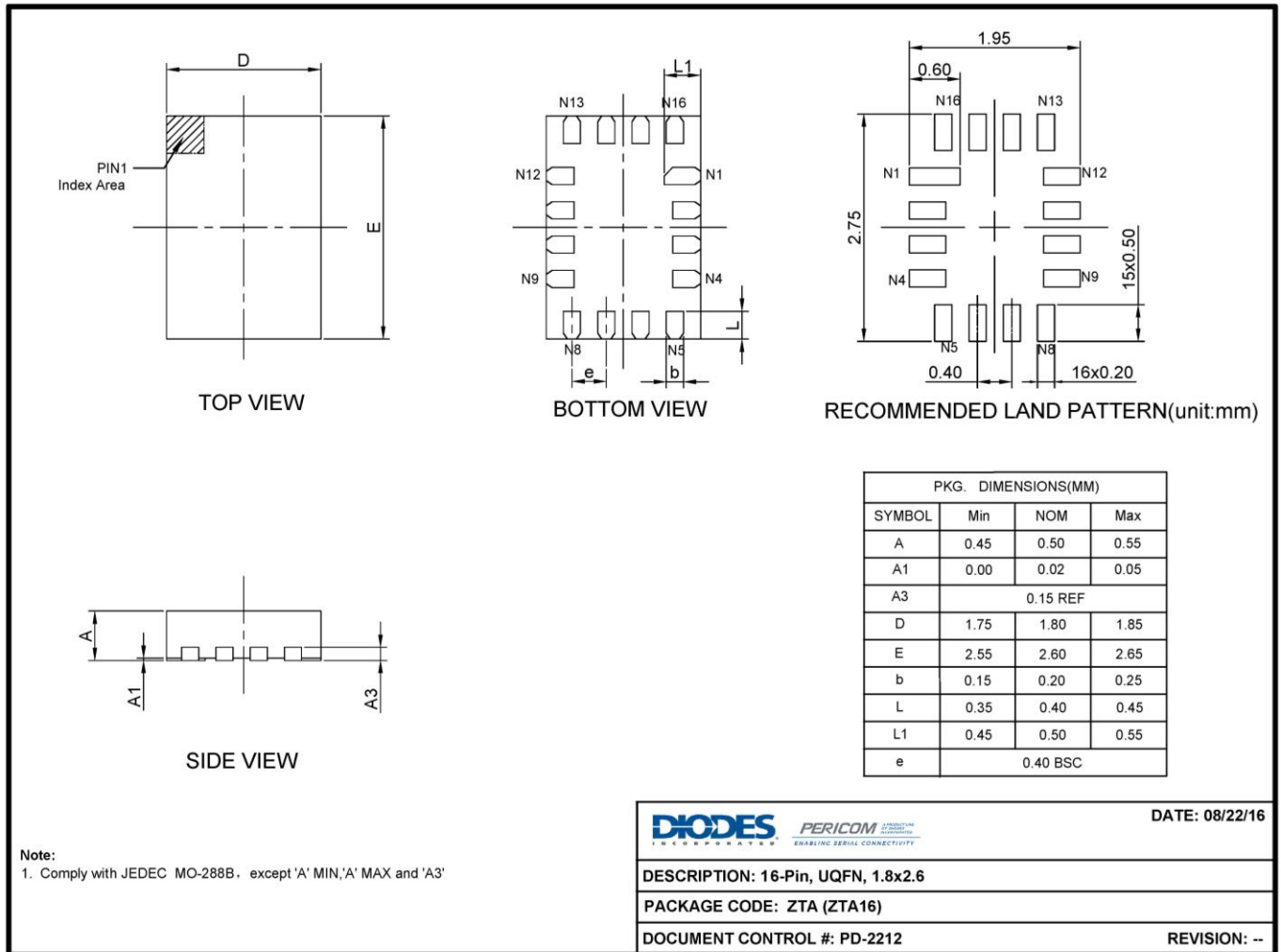
**Figure 9. Channel On Capacitance**

**Part Marking**



## Packaging Mechanical

### 16-UQFN (ZTA)



16-0164

### For latest package info.

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

## Ordering Information

Part Number	Package Code	Package Description
PI3A3899ZTAEX	ZTA	16-Pin, 1.8x2.6 (UQFN)

### 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



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