1.8/3.3V High-Bandwidth 6-channel, 2:1 Mux/DeMux

Features

- CMOS Technology for bus and analog applications
- Low propagation delay
- Low typical On-Resistance: 5Ω
- Signal passing bandwidth, 380 MHz
- Wide V_{DD} range: 1.65V to 3.6V
- Rail-to-Rail signal range
- High Off Isolation: -66dB @ 10MHz
- Crosstalk Rejection reduces signal distortion: -60dB @ 10MHz
- Break-Before-Make Switching
- Extended Industrial Temperature Range: -40°C to 85°C
- ESD protection : 2.5kV(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 or your local Diodes representative.
- https://www.diodes.com/quality/product-definitions/
- Packaging (Pb-free & Green):
  - 24-pin TQFN (ZD), 4mm x 4mm

Applications

- SD-SDIO and MMC Two-Port MUX
- qSPI Two-Port MUX
- Audio and Video Signal Routing

Description

The PI3A27518 is a 6-channel, 1:2 multiplexer/demultiplexer. The COMx port can be configured to connect with NOx or NCx ports in 4 different modes (refer to Truth Table for details).

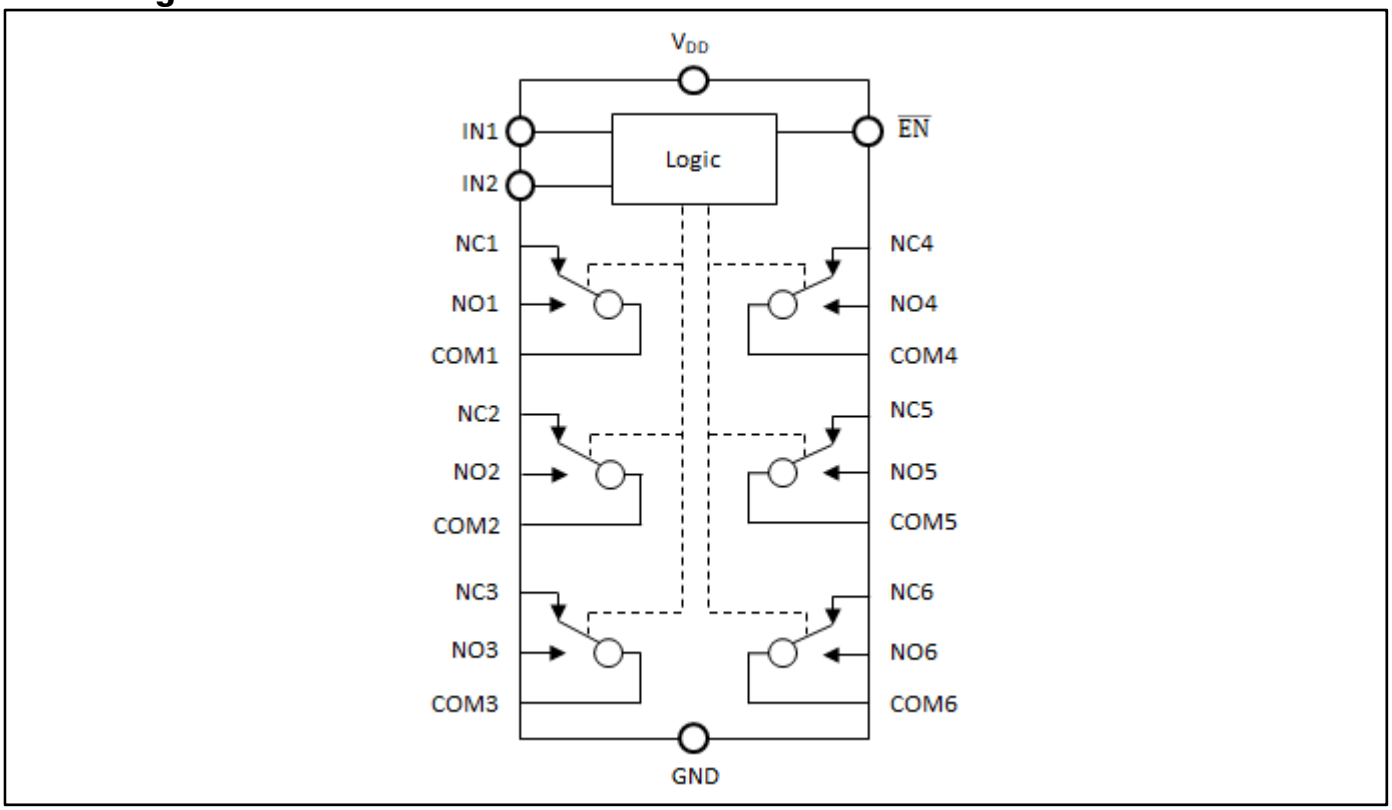
The PI3A27518 has a wide operating voltage range, very low power consumption and small packaging.

The device can be used as an analog switch or as a low-delay bus switch. The PI3A27518 supports a wide operating power supply voltage, 1.65V to 3.6V and has an On-Resistance of 5Ω at +3.3V.

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

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.

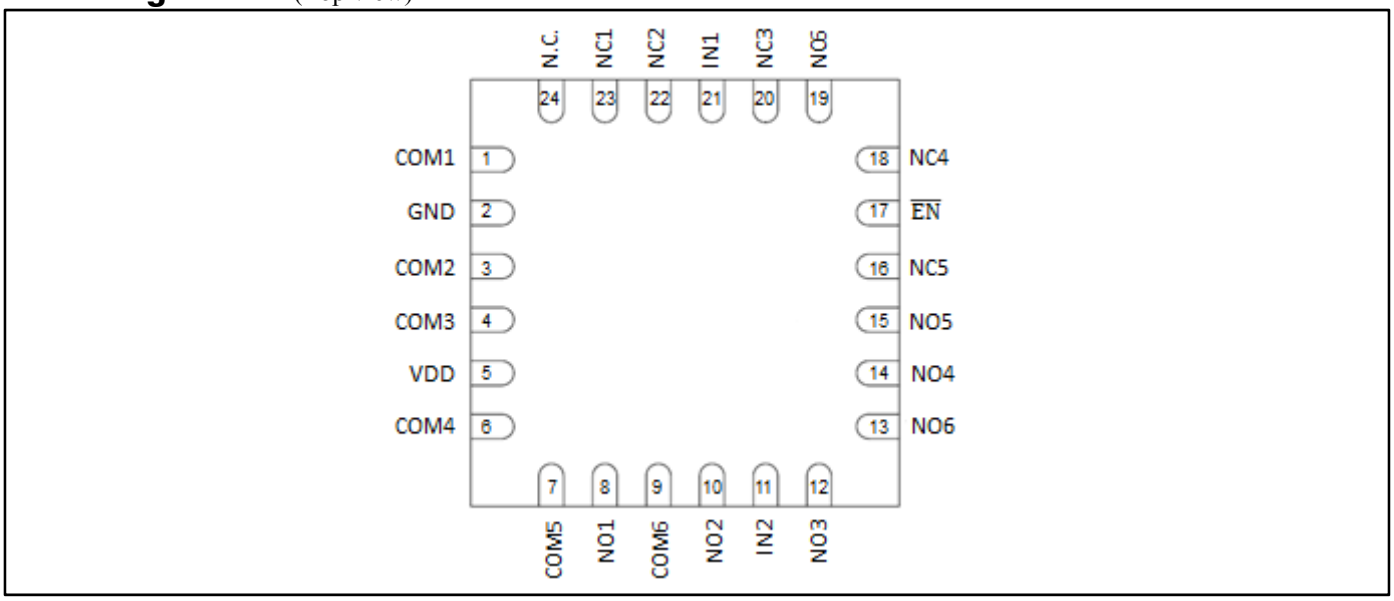
Block Diagram



Function Table

Select Input			Function
$\overline{EN}$	IN1	IN2	
1	X	X	All Channels are OFF
0	0	0	$NC_{1,2,3}$ Connected to $COM_{1,2,3}$ $NC_{4,5,6}$ Connected to $COM_{4,5,6}$
0	1	0	$NO_{1,2,3}$ Connected to $COM_{1,2,3}$ $NC_{4,5,6}$ Connected to $COM_{4,5,6}$
0	0	1	$NC_{1,2,3}$ Connected to $COM_{1,2,3}$ $NO_{4,5,6}$ Connected to $COM_{4,5,6}$
0	1	1	$NO_{1,2,3}$ Connected to $COM_{1,2,3}$ $NO_{4,5,6}$ Connected to $COM_{4,5,6}$

Pin Configuration (Top view)



Pin Description

Pin#	Name	Description
1	COM1	Common Signal Path
2	GND	Ground
3	COM2	Common Signal Path
4	COM3	Common Signal Path
5	VDD	Positive Power Supply
6	COM4	Common Signal Path
7	COM5	Common Signal Path
8	NO1	Signal Path – Normal Open
9	COM6	Common Signal Path
10	NO2	Data Port (Normally open)
11	IN2	Select Input 2
12	NO3	Signal Path – Normal Open
13	NO6	Signal Path – Normal Open
14	NO4	Signal Path – Normal Open
15	NO5	Signal Path – Normal Open
16	NC5	Signal Path – Normal Closed
17	$\overline{EN}$	Enable Input, Low Active
18	NC4	Signal Path – Normal Closed
19	NC6	Signal Path – Normal Closed
20	NC3	Signal Path – Normal Closed
21	IN1	Select Input 1
22	NC2	Signal Path – Normal Closed
23	NC1	Signal Path – Normal Closed
24	N.C	No connect

Maximum Ratings

Storage Temperature..... -65℃ to +150℃
Ambient Temperature with Power Applied.....-40℃ to +85℃
Supply Voltage V_{DD}.....-0.5Vto +4.6V
Control Input Voltage V_{INx}.....0Vto +4.6V
DC Input Voltage V_{INPUT}.....-0.5Vto +4.6V
Continuous Current NO_NC_COM_.....±50mA
ESD(HBM) 2.5kV
ESD(CDM) 1.5kV

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.
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.

Recommended Operating Conditions

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{DD}	Operating Voltage	-	1.65	-	3.6	V
V_{IN}	Control Input Voltage	-	0	-	V_{DD}	V
V_{INPUT}	Switch Input Voltage	-	-0.3	-	V_{DD}	V
T_A	Operating Temperature	-	-40	25	85	°C

DC Electrical Characteristics

+3.3V Supply (V_{DD} = 3V to 3.6V, T_A = –40°C to 85°C, unless otherwise noted. Typical values are at 3.3V and +25°C.)

Symbol	Parameter	Test Conditions	TEMP	Min.	Typ.	Max.	Units
ANALOG SWITCH							
V_{NO}, V_{NC}, V_{COM}	Analog Signal Range		-40°C to 85°C	0	-	V_{DD}	V
R_{ON}	On-Resistance	V_{DD} = 3V, I_{COM} = -32mA, 0 ≤ V_{NO} or V_{NC} ≤ V_{DD}, *Test Circuit 1*	+25°C	-	4.4	5.2	Ω
			-40°C to 85°C	-		7.6	
ΔR_{ON}	On-Resistance Match Between Channels	V_{DD} = 3V, I_{COM} = -32mA, V_{NO} or V_{NC} = 2.1V, *Test Circuit 1*	+25°C	-	0.3	0.7	Ω
			-40°C to 85°C	-		0.8	
R_{ONF}	On-Resistance Flatness	V_{DD} = 3.3V, I_{COM} = -32mA, V_{NO}= 0.15*V* or V_{NC}=3.15V, *Test Circuit 1*	+25°C	-	0.95	2.1	Ω
			-40°C to 85°C	-		2.3	
$I_{OFF\ (NO)}$ or $I_{OFF\ (NC)}$	NC/NO Channel-Off Leakage Current	V_{DD}=3.6V, V_{NO} or V_{NC} = 3V & V_{COM} = 1V or V_{NO} or V_{NC} = 1V & V_{COM} = 3V	-40°C to 85°C	-2		2	µA
$I_{OFF\ (COM)}$	COM Channel-Off Leakage Current	VDD=3.6V, VNO or VNC = 3V & VCOM = 1V or VNO or VNC = 1V & VCOM = 3V	-40°C to 85°C	-2		2	µA
$I_{OFF\ (NO)}$ or $I_{OFF\ (NC)}$	NC/NO POWER-Off Leakage Current	V_{DD}=0V, V_{NO} or V_{NC} = 3.6V & V_{COM} = 0V or V_{NO} or V_{NC} = 0V & V_{COM} = 3.6V	-40°C to 85°C	-12		12	µA
$I_{OFF\ (COM)}$	COM POWER-Off Leakage Current	VDD=0V, VNO or VNC = 3.6V & VCOM = 0V or VNO or VNC = 0V & VCOM = 3.6V	-40°C to 85°C	-12		12	µA
I_{ON} (NO) or I_{ON} (NC)	Channel-On Leakage Current (NO/NC)	V_{DD}=3.6V, V_{NO} or V_{NC} = 3V & V_{COM} = open or V_{NO} or V_{NC} = 1V & V_{COM} = open	-40°C to 85°C	-7		7	µA
I_{ON} (COM)	Channel-On Leakage Current (COM)	V_{DD}=3.6V, V_{NO} or V_{NC} = open & V_{COM} = 3V or	-40°C to 85°C	-7		7	µA

Symbol	Parameter	Test Conditions	TEMP	Min.	Typ.	Max.	Units
		V_{NO} or V_{NC} = open & V_{COM} = 1V					
DIGITAL INPUTS							
V_{IH}	Input Logic High	-	-40°C to 85°C	0.8	-	3.6	V
V_{IL}	Input Logic Low	-	-40°C to 85°C	0	-	0.2	
I_{IN}	IN Input Leakage Current	V_{DD} = 3.6V, V_{IN}=0 or 3.6V	-40°C to 85°C	-2.5	-	2.5	µA
DYNAMIC CHARACTERISTICS							
T_{ON}	Turn-On Time	V_{DD}=3.3V, V_{COM}=V_{DD}, R_L=50Ohm, C_L=35pF *See Test Circuit Figure 2.*	+25°C	-	11.5	30.0	ns
		V_{DD}=3V to 3.6V, V_{COM}=V_{DD}, R_L=50Ohm, C_L=35pF *See Test Circuit Figure 2.*	-40°C to 85°C	-		30.0	ns
T_{OFF}	Turn-Off Time	V_{DD}=3.3V, V_{COM}=V_{DD}, R_L=50Ohm, C_L=35pF *See Test Circuit Figure 2.*	+25°C	-	7.6	30.0	ns
		V_{DD}=3V to 3.6V, V_{COM}=V_{DD}, R_L=50Ohm, C_L=35pF *See Test Circuit Figure 2.*	-40°C to 85°C	-	-	30.0	ns
T_D	Break-Before-Make Delay	V_{DD}=3.3V, V_{NC}=V_{NO}=V_{DD}, R_L=50Ohm, C_L=35pF *See Test Circuit Figure 3.*	+25°C	4.0	6.5	20.0	ns
		V_{DD}=3V to 3.6V, V_{NC}=V_{NO}=V_{DD}, R_L=50Ohm, C_L=35pF *See Test Circuit Figure 3.*	-40°C to 85°C	-	-	20.0	ns
f_{3dB}	3dB Bandwidth	R_L=50Ohm. *See Test Circuit Figure 6.*	+25°C	-	380		MHz
O_{ISO}	COM-NC/NO and NC-NO Isolations	R_L=50Ohm, f=10MHz *See Test Circuit Figure 4.*	+25°C	-	-68		dB
X_{TALKD}	Channel-to-Channel Crosstalk	R_L=50Ohm, f=10MHz *See Test Circuit Figure 5.*	+25°C	-	-62		dB
$X_{TALK(ADJ)}$	Crosstalk adjacent	R_L=50Ohm, f=10MHz *See Test Circuit Figure 5.*	+25°C	-	-91		dB
I_{CC}	Power Supply Current	V_{DD}=3.6V, VIN=0V or V_{DD}, Switch ON or OFF	-40°C to 85°C	-		3.0	µA

+1.8V Supply (V_{DD} = 1.65V to 1.95V, T_A = –40°C to 85°C, unless otherwise noted. Typical values are at 1.8V and +25°C.)

Symbol	Parameter	Test Conditions	TEMP	Min.	Typ.	Max.	Units
ANALOG SWITCH							
V_{NO}, V_{NC}, V_{COM}	Analog Signal Range		-40°C to 85°C	0	-	V_{DD}	V
R_{ON}	On-Resistance	V_{DD} = 1.65V, I_{COM} = -32mA, 0 ≤ V_{NO} or V_{NC} ≤ V_{DD}, *Test Circuit 1*	+25°C	-	7.1	14.4	Ω
			-40°C to 85°C	-		16.3	
ΔR_{ON}	On-Resistance Match Between Channels	V_{DD} = 1.65V, I_{COM} = -32mA, V_{NO} or V_{NC} = 1.5V, *Test Circuit 1*	+25°C	-	0.3	1	Ω
			-40°C to 85°C	-		1.2	
R_{ONF}	On-Resistance Flatness	V_{DD} = 1.65V, I_{COM} = -32mA, V_{NO}= 0.15*V* or V_{NC}=1.5V, *Test Circuit 1*	+25°C	-	2.7	5.5	Ω
			-40°C to 85°C	-		7.3	
$I_{OFF\ (NO)}$ or $I_{OFF\ (NC)}$	NO/NC Channel-Off Leakage Current	V_{DD}=1.95V, V_{NO} or V_{NC} = 1.65V & V_{COM} = 0.3V or V_{NO} or V_{NC} = 0.3V & V_{COM} = 1.65V	-40°C to 85°C	-0.9		0.9	µA
$I_{OFF\ (COM)}$	COM Channel-Off Leakage Current	V_{DD}=1.95V, V_{NO} or V_{NC} = 1.65V & V_{COM} = 0.3V or V_{NO} or V_{NC} = 0.3V & V_{COM} =	-40°C to 85°C	-0.9		0.9	µA

Symbol	Parameter	Test Conditions	TEMP	Min.	Typ.	Max.	Units
		1.65V					
$I_{OFF\ (NO)}$ or $I_{OFF\ (NC)}$	NC/NO POWER-Off Leakage Current	V_{DD}=0V, V_{NO} or V_{NC} = 1.95V & V_{COM} = 0V or V_{NO} or V_{NC} = 0V & V_{COM} = 1.95V	-40°C to 85°C	-5		5	µA
$I_{OFF\ (COM)}$	COM POWER-Off Leakage Current	V_{DD}=0V, V_{NO} or V_{NC} = 1.95V & V_{COM} = 0V or V_{NO} or V_{NC} = 0V & V_{COM} = 1.95V	-40°C to 85°C	-5		5	µA
I_{ON} (NO) or I_{ON} (NC)	Channel-On Leakage Current (NO/NC)	V_{DD}=1.95V, V_{NO} or V_{NC} = 1.65V &V_{COM} = open or V_{NO} or V_{NC} = 0.3V & V_{COM} = open	-40°C to 85°C	-5.2		5.2	µA
I_{ON} (COM)	Channel-On Leakage Current (COM)	V_{DD}=1.95V, V_{NO} or V_{NC} = open & V_{COM} = 1.65V or V_{NO} or V_{NC} = open & V_{COM} = 0.3V	-40°C to 85°C	-5.2		5.2	µA
DIGITAL INPUTS							
V_{IH}	Input Logic High	-	-40°C to 85°C	0.8	-	1.95	V
V_{IL}	Input Logic Low	-	-40°C to 85°C	0	-	0.2	
I_{IN}	IN Input Leakage Current	V_{DD} = 1.95V, V_{IN}=0 or 1.95V	-40°C to 85°C	-2.1	-	2.1	µA
DYNAMIC CHARACTERISTICS							
T_{ON}	Turn-On Time	V_{DD}=1.65V to 1.95V, V_{COM}=V_{DD}, R_L=50Ohm, C_L=35pF *See Test Circuit Figure 2.*	+25°C	-	18.9	45	ns
			-40°C to 85°C	-	-	45	
T_{OFF}	Turn-Off Time	V_{DD}=1.65V to 1.95V, V_{COM}=V_{DD}, R_L=50Ohm, C_L=35pF *See Test Circuit Figure 2.*	+25°C	-	14.0	26	ns
			-40°C to 85°C	-	-	26	
T_D	Break-Before-Make Delay	V_{DD}=1.65V to 1.95V, V_{COM}=V_{DD}, R_L=50Ohm, C_L=35pF *See Test Circuit Figure 3.*	+25°C	5.3	11.8	40	ns
			-40°C to 85°C	-	-	40	
f_{3dB}	3dB Bandwidth	R_L=50Ohm. *See Test Circuit Figure 6.*	+25°C	-	380	-	MHz
O_{ISO}	COM-NC/NO and NC-NO Isolations	R_L=50Ohm, f=10MHz *See Test Circuit Figure 4.*	+25°C	-	-66.0	-	dB
X_{TALKD}	Channel-to-Channel Crosstalk	R_L=50Ohm, f=10MHz *See Test Circuit Figure 5.*	+25°C	-	-60.0	-	dB
$X_{TALK(ADJ)}$	Crosstalk adjacent	R_L=50Ohm, f=10MHz *See Test Circuit Figure 5.*	+25°C	-	-91.0	-	dB
I_{CC}	Power Supply Current	V_{DD}=1.95V, VIN=0V or V_{DD}, Switch ON or OFF	-40°C to 85°C	-	-	1.5	µA

Capacitance

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$C_{NC\ (OFF)}$, $C_{NO\ (OFF)}$	NC/NO Off Capacitance	V_{NC} or V_{NO} = V_{DD} or GND, Switch OFF f = 1MHz, *See Test Circuit Figure 7.*	-	10	-	pF
$C_{COM\ (OFF)}$	COM Off Capacitance	V_{COM} = V_{DD} or GND, Switch OFF f = 1MHz, *See Test Circuit Figure 7.*	-	16	-	
$C_{NC\ (ON)}$, $C_{NO\ (ON)}$	NC/NO On Capacitance	V_{NC} or V_{NO} = V_{DD} or GND, Switch ON f = 1MHz, *See Test Circuit Figure 8.*	-	21.5	-	
$C_{COM\ (ON)}$	COM On Capacitance	V_{COM} = V_{DD} or GND, Switch ON f = 1MHz, *See Test Circuit Figure 8.*	-	21.5	-	
C_{IN}	Digital Input Capacitance	f = 1MHz	-	3	-	pF

Test Circuits and Timing Diagrams

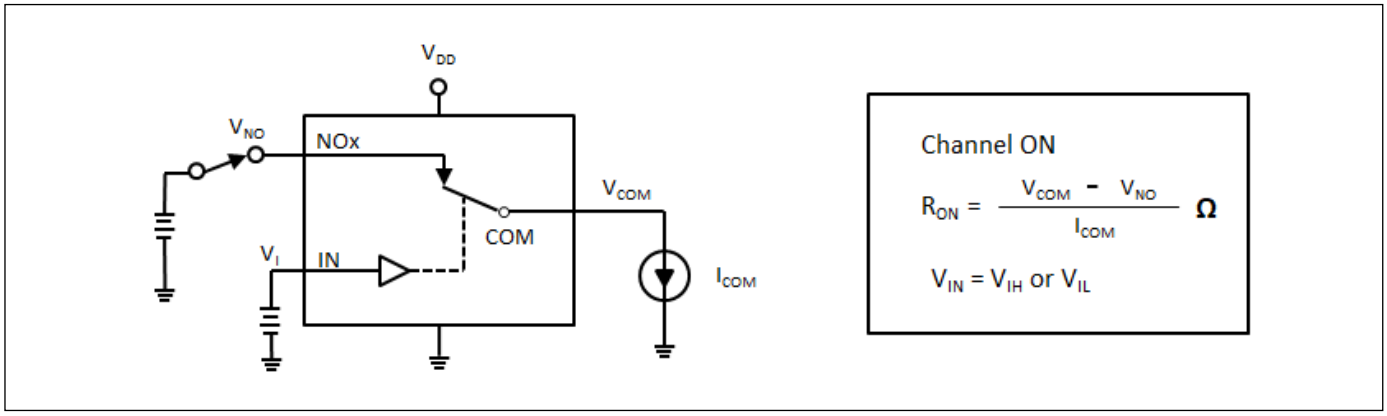


Figure 1. ON Resistance

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

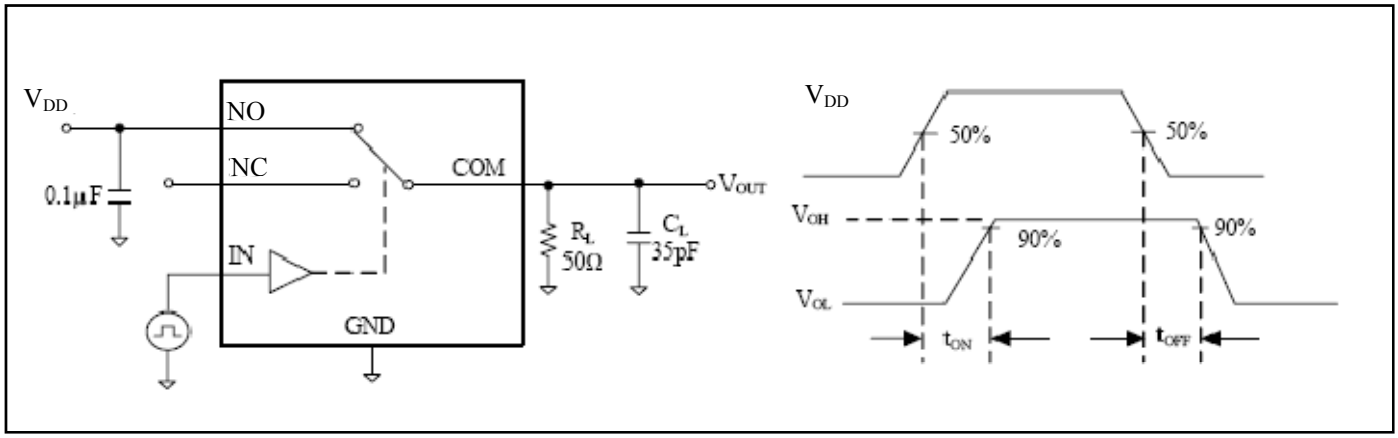


Figure 2. Switching Times

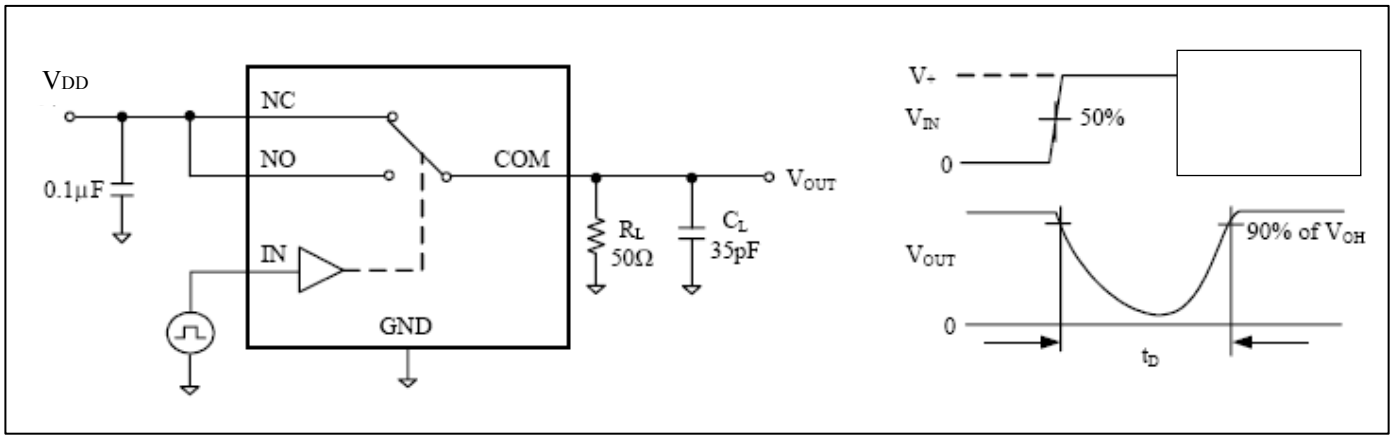


Figure 3. Break Before Make Interval Timing

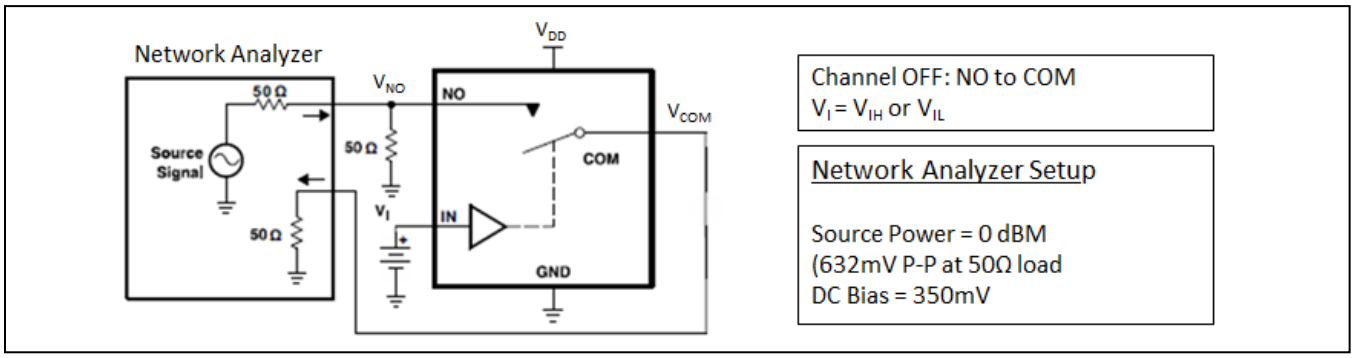


Figure 4. OFF Isolation (O_{ISO})

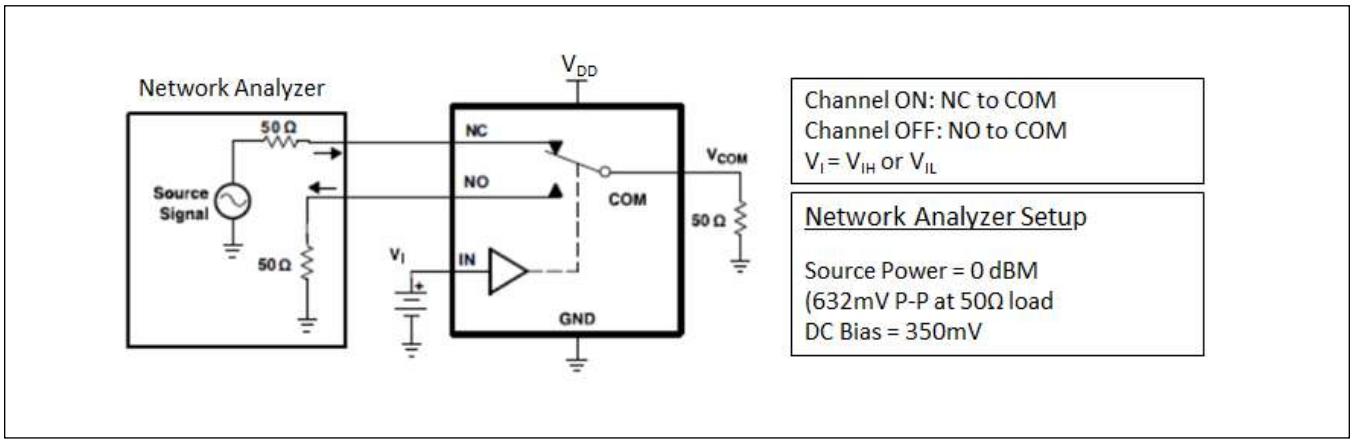


Figure 5. Channel-to-Channel Crosstalk

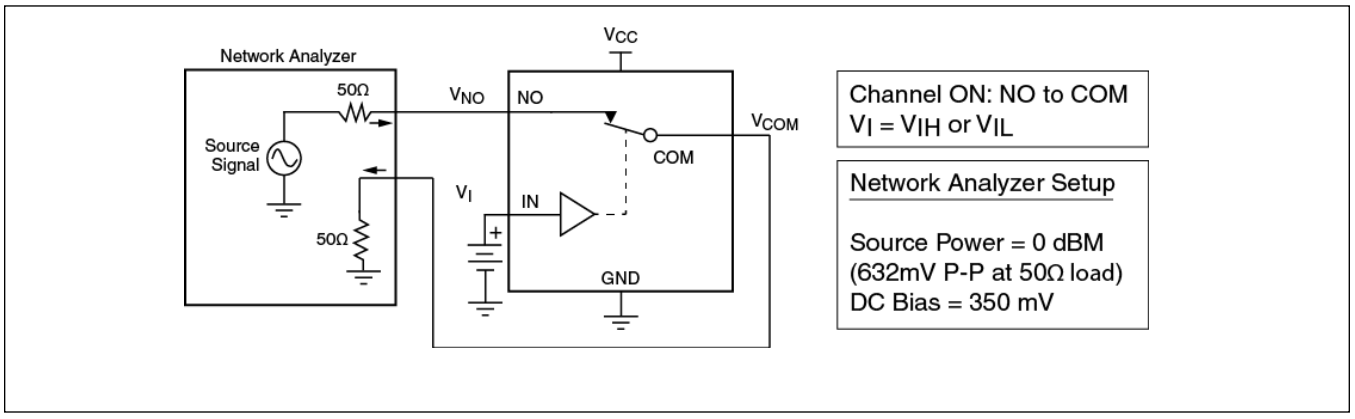


Figure 6. Bandwidth

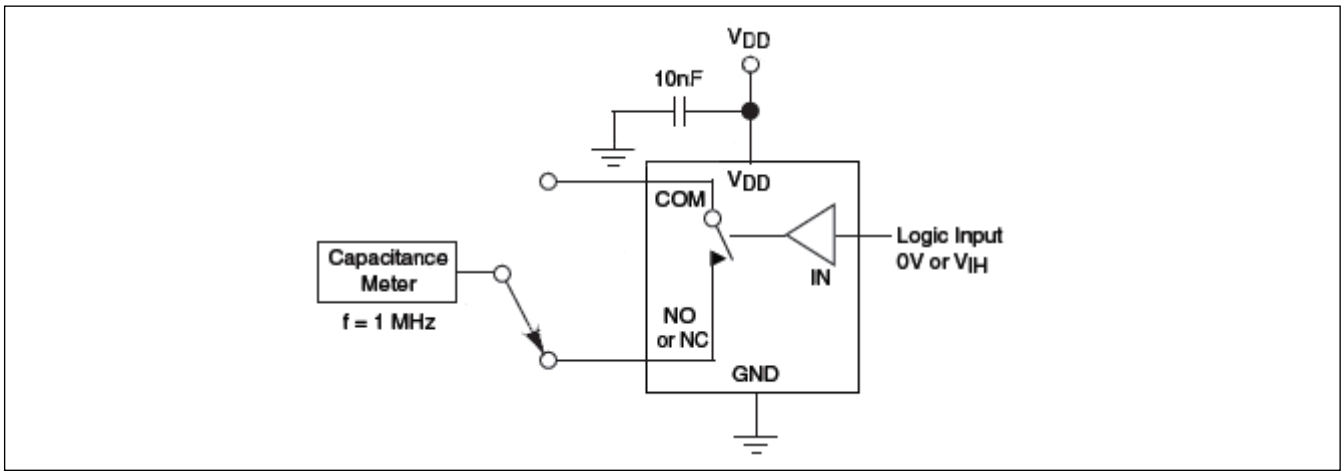


Figure 7. Channel Off Capacitance

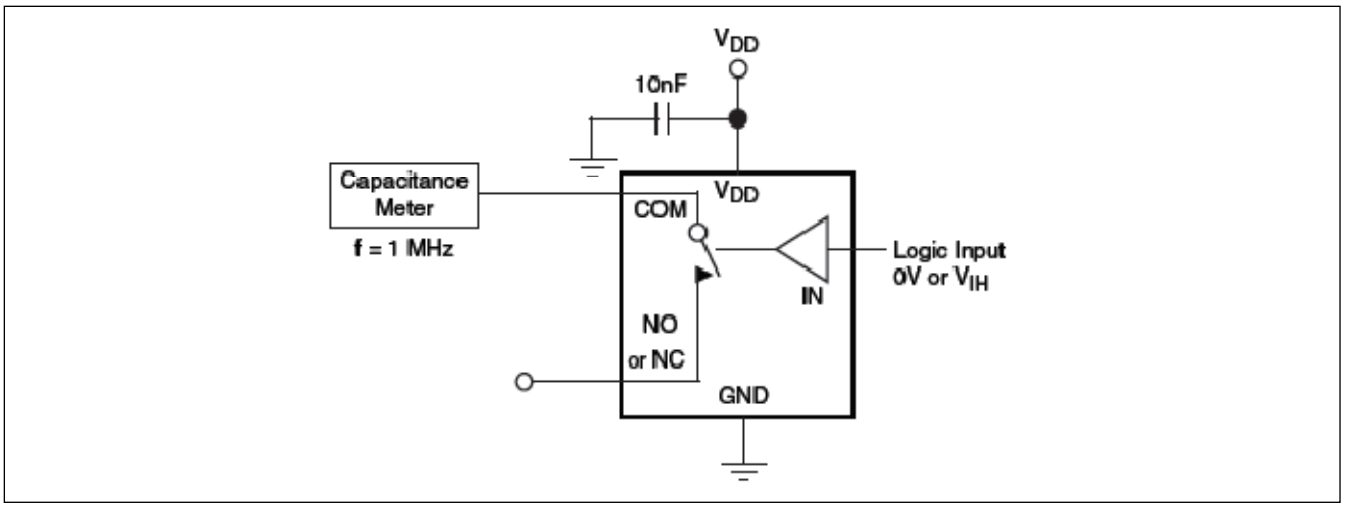


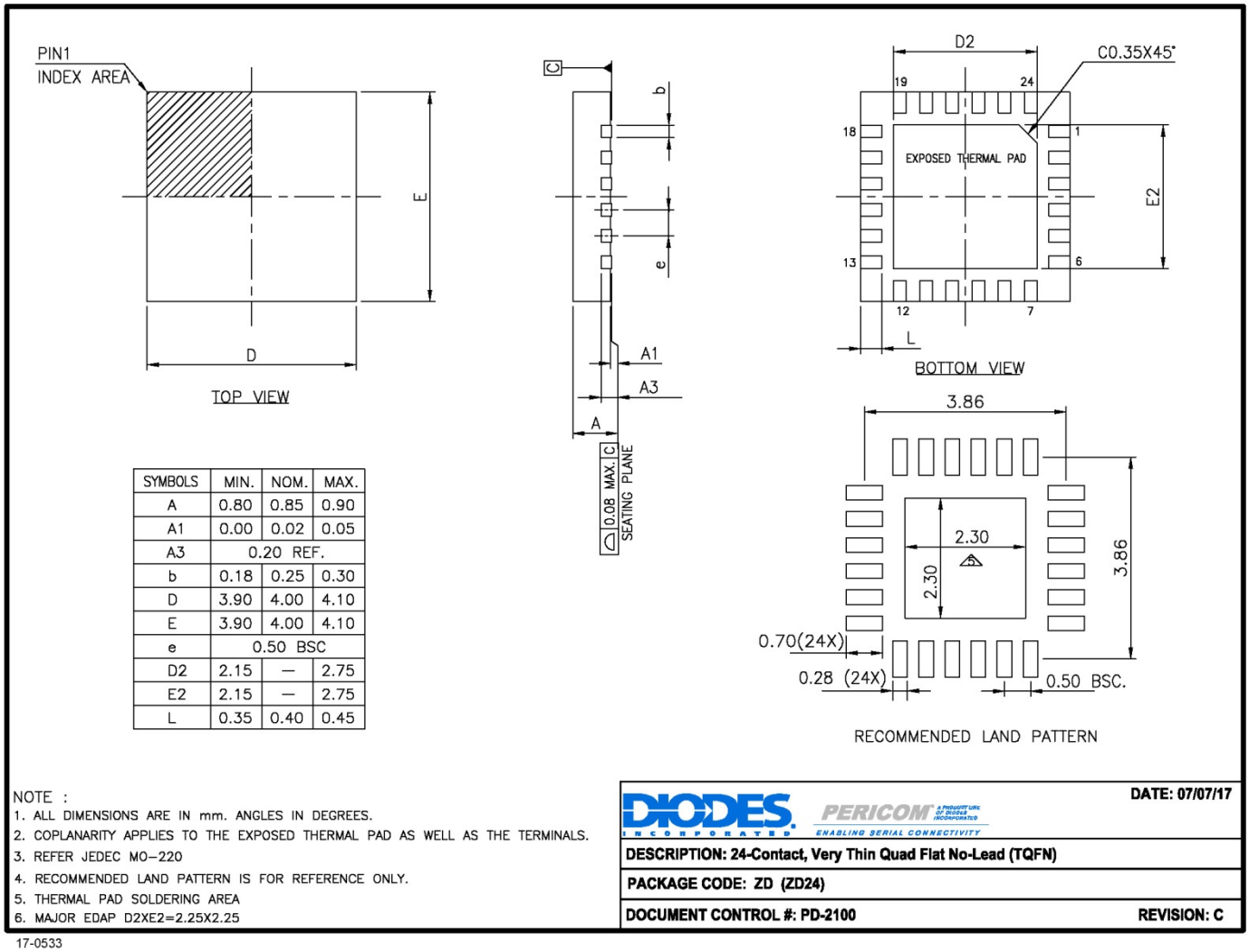
Figure 8. Channel On Capacitance

Part Marking

Top mark not available at this time. To obtain advance information regarding the top mark, please contact your local sales representative.

Packaging Mechanical

24-TQFN (ZD)



SYMBOLS	MIN.	NOM.	MAX.
A	0.80	0.85	0.90
A1	0.00	0.02	0.05
A3		0.20 REF.	
b	0.18	0.25	0.30
D	3.90	4.00	4.10
E	3.90	4.00	4.10
e		0.50 BSC	
D2	2.15	—	2.75
E2	2.15	—	2.75
L	0.35	0.40	0.45

NOTE :
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
2. COPLANARITY APPLIES TO THE EXPOSED THERMAL PAD AS WELL AS THE TERMINALS.
3. REFER JEDEC MO-220
4. RECOMMENDED LAND PATTERN IS FOR REFERENCE ONLY.
5. THERMAL PAD SOLDERING AREA
6. MAJOR EDAP D2XE2=2.25X2.25

DATE: 07/07/17

DESCRIPTION: 24-Contact, Very Thin Quad Flat No-Lead (TQFN)

PACKAGE CODE: ZD (ZD24)

DOCUMENT CONTROL #: PD-2100 REVISION: C

17-0533

For latest package info.

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

Ordering Information

Part Number	Packaging Code	Package Description
PI3A27518ZDEX	ZD	24-Contact, Very Thin Quad Flat No-Lead (TQFN)

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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