



High-Bandwidth, Low Voltage, Dual SPDT Analog Switches

FEATURES

- Single Supply (1.8 V to 5.5 V)
- Low On-Resistance - r_{ON} : 2.4 Ω
- Crosstalk and Off Isolation: -81 dB @ 1 MHz
- MSOP-10 Package

BENEFITS

- Reduced Power Consumption
- High Accuracy
- Reduce Board Space
- Low-Voltage Logic Compatible
- High Bandwidth

APPLICATIONS

- Cellular Phones
- Speaker Headset Switching
- Audio and Video Signal Routing
- PCMCIA Cards
- Low-Voltage Data Acquisition
- ATE

DESCRIPTION

The DG2016/DG2026 are monolithic CMOS dual single-pole/double-throw (SPDT) analog switches. They are specifically designed for low-voltage, high bandwidth applications.

The DG2016/DG2026's on-resistance (3 Ω @ 2.7 V), matching and flatness are guaranteed over the entire analog voltage range. Wide dynamic performance is achieved with better than -80 dB for both cross-talk and off-isolation at 1 MHz.

Both SPDT's operate with independent control logic, conduct equally well in both directions and block signals up to the

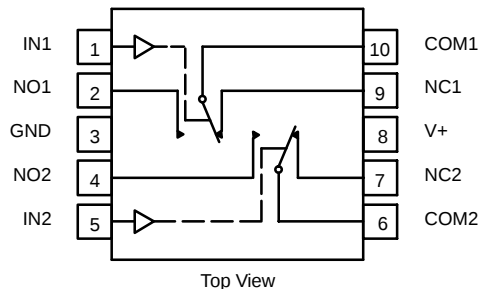
power supply level when off. Break-before-make is guaranteed.

With fast switching speeds, low on-resistance, high bandwidth, and low charge injection, the DG2016/DG2026 are ideally suited for audio and video switching with high linearity.

Built on Vishay Siliconix's low voltage CMOS technology, the DG2016/DG2026 contain an epitaxial layer which prevents latch-up.

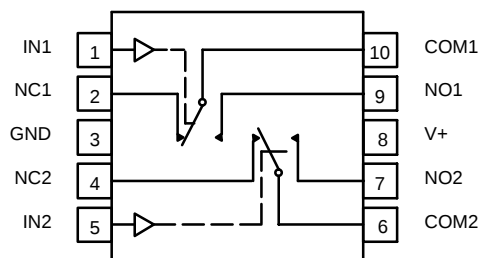
FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION

DG2016DQ—MSOP-10



Top View

DG2026DQ—MSOP-10



Top View

TRUTH TABLE

Logic	NC1 and NC2	NO1 and NO2
0	ON	OFF
1	OFF	ON

ORDERING INFORMATION

Temp Range	Package	Part Number
-40 to 85°C	MSOP-10	DG2016DQ
		DG2026DQ

ABSOLUTE MAXIMUM RATINGS

Reference to GND

V+		-0.3 to +6 V
IN, COM, NC, NO ^a		-0.3 to (V+ + 0.3 V)
Continuous Current (Any terminal)		± 50 mA
Peak Current		± 200 mA
(Pulsed at 1 ms, 10% duty cycle)		
Storage Temperature (D Suffix)		-65 to 150°C

Power Dissipation (Packages)^b

MSOP-10 ^c		320 mW
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Notes:

- Signals on NC, NO, or COM or IN exceeding V+ will be clamped by internal diodes. Limit forward diode current to maximum current ratings.
- All leads welded or soldered to PC Board.
- Derate 4.0 mW/°C above 70°C

SPECIFICATIONS (V+ = 3 V)							
Parameter	Symbol	Test Conditions Otherwise Unless Specified V+ = 3 V, ±10%, VIN = 0.4 or 2.0 V ^e	Temp ^a	Limits -40 to 85°C			Unit
				Min ^b	Typ ^c	Max ^b	
Analog Switch							
Analog Signal Range ^d	VNO, VNC, VCOM		Full	0		V+	V
On-Resistance	rON	V+ = 2.7 V, VCOM = 0.2 V/1.5 V INO, INC = 10 mA	Room Full		3.0	4.8 5.3	Ω
rON Flatness	rON Flatness	V+ = 2.7 V VCOM = 0 to V+, INO, INC = 10 mA	Room			1.6	
rON Match Between Channels	ΔrON		Room			0.2	
Switch Off Leakage Current ^f	INO(off), INC(off)	V+ = 3.3 V, VNO, VNC = 0.3 V/3 V VCOM = 3 V/0.3 V	Room Full	-1 -10		1 10	nA
	ICOM(off)		Room Full	-1 -10		1 10	
Channel-On Leakage Current ^f	ICOM(on)	V+ = 3.3 V, VNO, VNC = VCOM = 0.3 V/3 V	Room Full	-1 -10		1 10	
Digital Control							
Input High Voltage ^d	VINH		Full	1.6			V
Input Low Voltage	VINL		Full			0.4	
Input Capacitance	Cin		Full		5		pF
Input Current	INL or INH	VIN = 0 or V+	Full	1		1	μA
Dynamic Characteristics							
Turn-On Time	tON	VNO or VNC = 2.0 V, RL = 50 Ω, CL = 35 pF	Room Full		28	53 59	ns
Turn-Off Time	tOFF		Room Full		13	38 38	
Break-Before-Make Time	td	VNO or VNC = 2.0 V, RL = 50 Ω, CL = 35 pF	Full	1			
Charge Injection ^d	QINJ	CL = 1 nF, VGEN = 0 V, RGEN = 0 Ω	Room		38		pC
Off-Isolation ^d	OIRR	RL = 50 Ω, CL = 5 pF, f = 1 MHz	Room		-78		dB
Crosstalk ^d	XTALK		Room		-82		
NO, NC Off Capacitance ^d	CNO(off)	VIN = 0 or V+, f = 1 MHz	Room		15		pF
	CNC(off)		Room		15		
Channel-On Capacitance ^d	CNO(on)		Room		49		
	CNC(on)		Room		45		
Power Supply							
Power Supply Current	I+	VIN = 0 or V+	Full		0.01	1.0	μA

Notes:

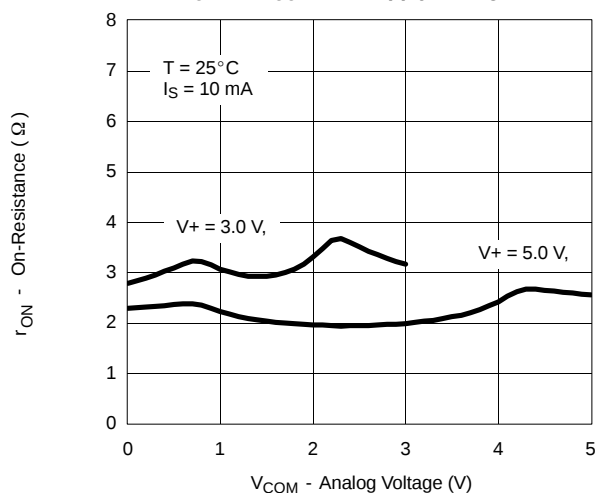
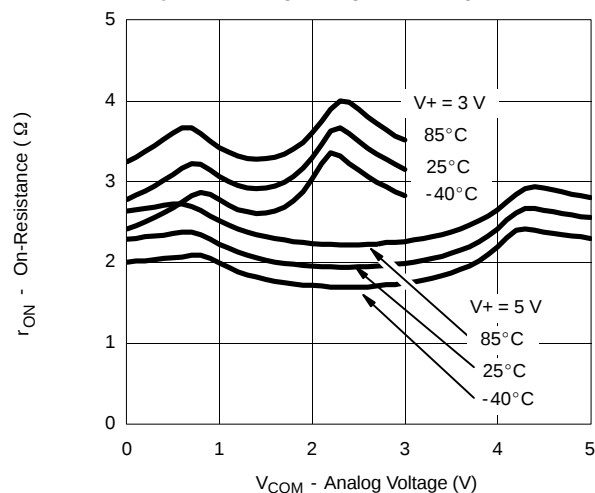
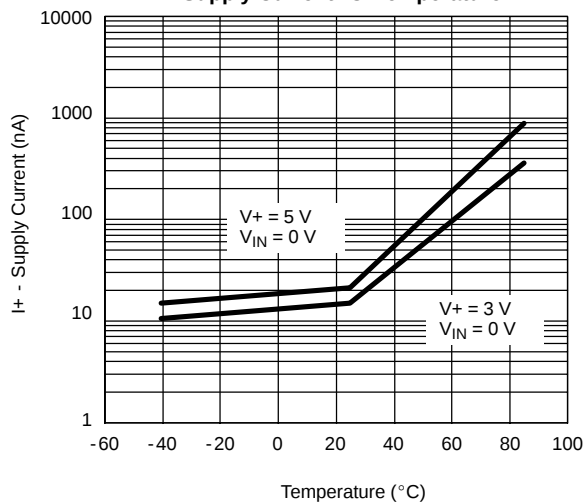
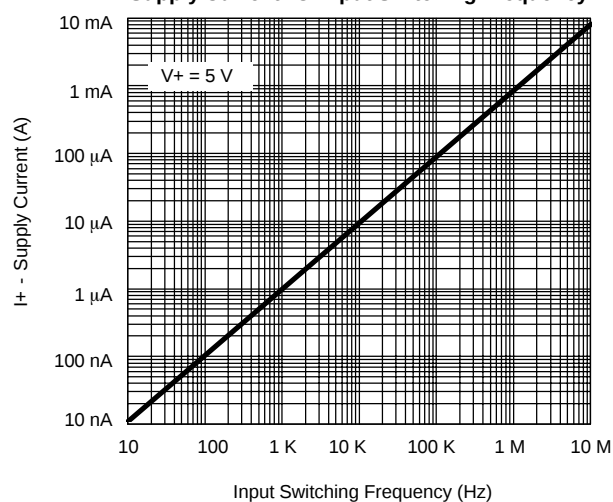
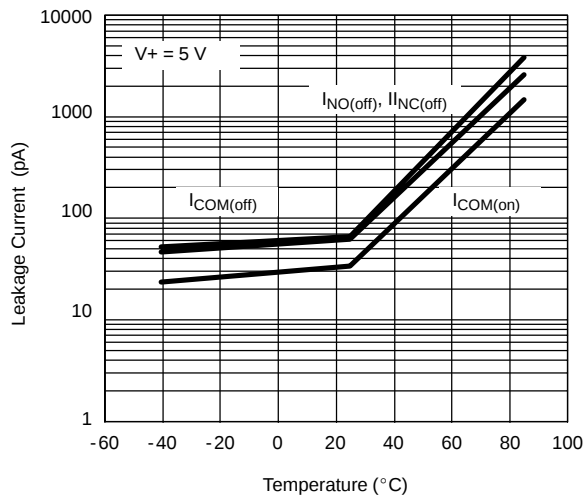
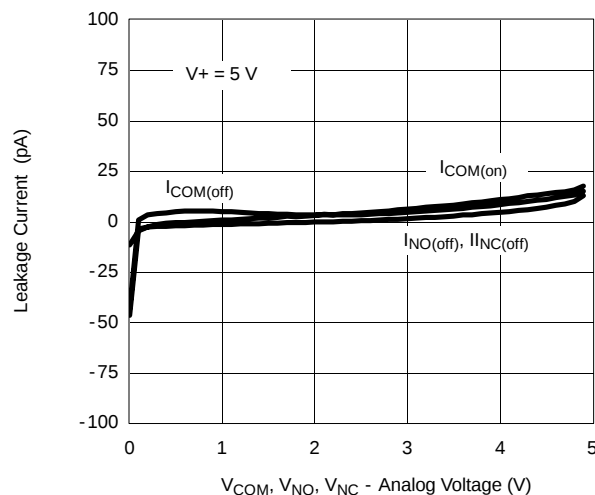
- Room = 25°C, Full = as determined by the operating suffix.
- Typical values are for design aid only, not guaranteed nor subject to production testing.
- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Guarantee by design, nor subjected to production test.
- V_{IN} = input voltage to perform proper function.
- Guaranteed by 5-V leakage testing, not production tested.



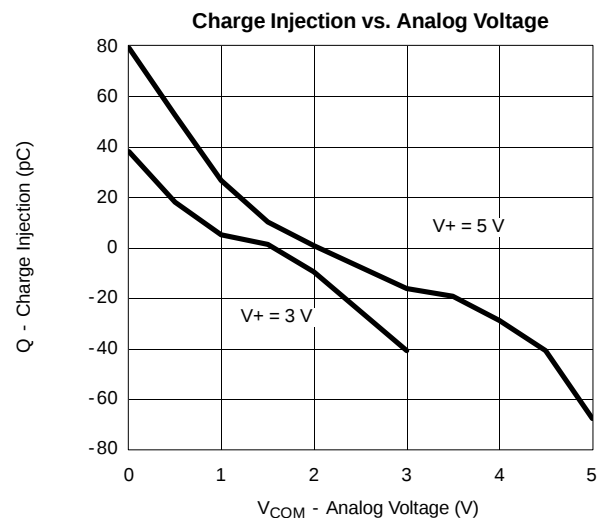
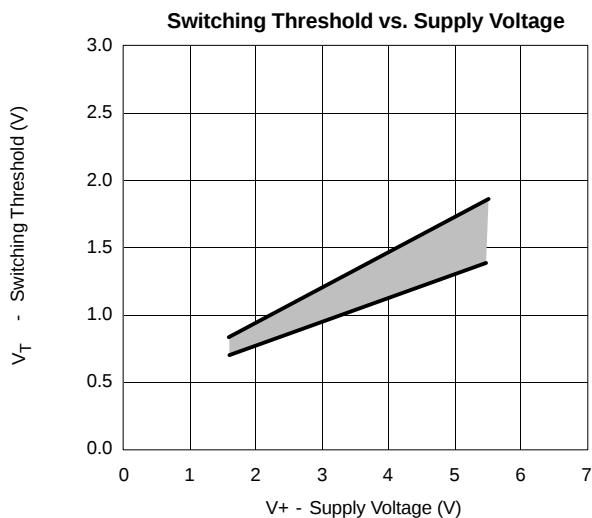
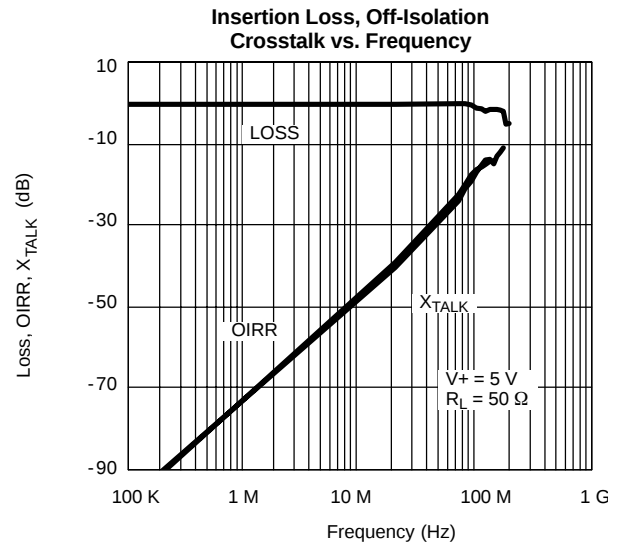
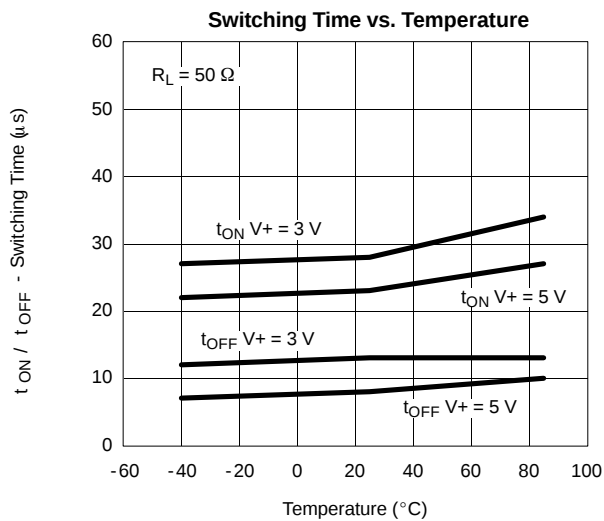
SPECIFICATIONS (V+ = 5 V)							
Parameter	Symbol	Test Conditions Otherwise Unless Specified V+ = 5 V, ±10%, VIN = 0.8 or 2.4 V ^e	Temp ^a	Limits -40 to 85°C			Unit
				Min ^b	Typ ^c	Max ^b	
Analog Switch							
Analog Signal Range ^d	VNO, VNC, VCOM		Full	0		V+	V
On-Resistance	rON	V+ = 4.5 V, VCOM = 3 V, INO, INC = 10 mA	Room Full		2.4	4.0 4.3	Ω
rON Flatness	rON Flatness	V+ = 4.5 V, VCOM = 0 to V+, INO, INC = 10 mA	Room			1.2	
rON Match Between Channels	ΔrON		Room			0.2	
Switch Off Leakage Current	INO(off), INC(off)	V+ = 5.5 V VNO, VNC = 1 V/4.5 V, VCOM = 4.5 V/1 V	Room Full	-1 -10		1 10	nA
	ICOM(off)		Room Full	-1 -10		1 10	
Channel-On Leakage Current	ICOM(on)	V+ = 5.5 V, VNO, VNC = VCOM = 1 V/4.5 V	Room Full	-1 -10		1 10	
Digital Control							
Input High Voltage ^d	VINH		Full	2.0			V
Input Low Voltage	VINL		Full			0.8	
Input Capacitance	Cin		Full		5		pF
Input Current	IINL or IINH	VIN = 0 or V+	Full	1		1	μA
Dynamic Characteristics							
Turn-On Time	tON	VNO or VNC = 3 V, RL = 50 Ω, CL = 35 pF	Room Full		23	48 52	ns
Turn-Off Time	tOFF		Room Full		8	33 35	
Break-Before-Make Time	td	VNO or VNC = 3 V, RL = 50 Ω, CL = 35 pF	Full	1			
Charge Injection ^d	QINJ	CL = 1 nF, VGEN = 0 V, RGEN = 0 Ω	Room		79		pC
Off-Isolation ^d	OIRR	RL = 50 Ω, CL = 5 pF, f = 1 MHz	Room		-81		dB
Crosstalk ^d	XTALK		Room		-82		
Source-Off Capacitance ^d	CNO(off)	VIN = 0 or V+, f = 1 MHz	Room		14		pF
	CNC(off)		Room		14		
Channel-On Capacitance ^d	CNO(on)		Room		48		
	CNC(on)		Room		44		
Power Supply							
Power Supply Range	V+			1.8		5.5	V
Power Supply Current	I+	VIN = 0 or V+	Full		0.01	1.0	μA

Notes:

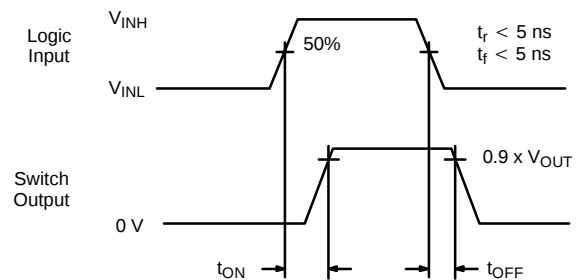
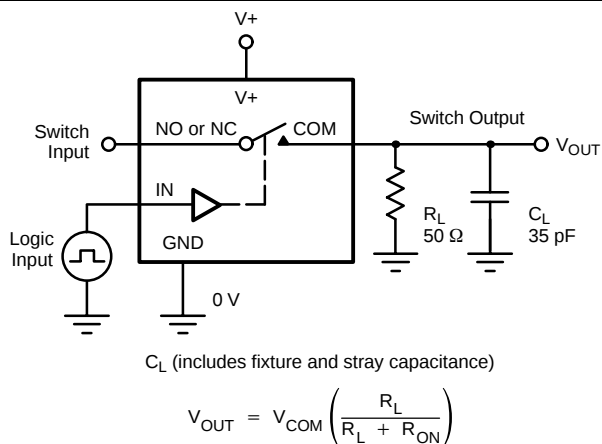
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TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED) **r_{ON} vs. V_{COM} and Supply Voltage** **r_{ON} vs. Analog Voltage and Temperature****Supply Current vs. Temperature****Supply Current vs. Input Switching Frequency****Leakage Current vs. Temperature****Leakage vs. Analog Voltage**

TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



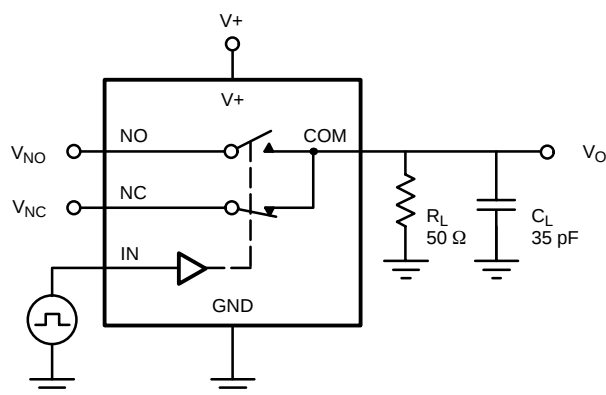
TEST CIRCUITS



Logic "1" = Switch On
Logic input waveforms inverted for switches that have the opposite logic sense.

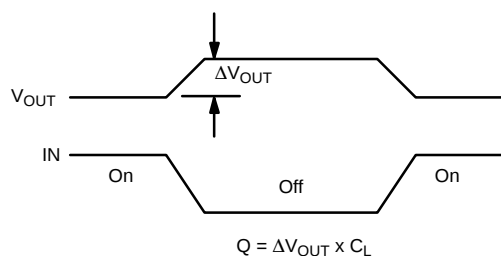
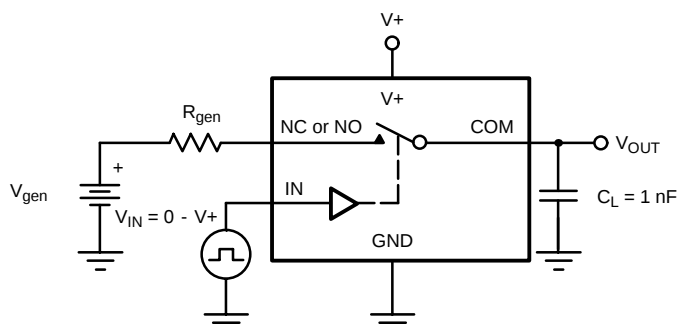
FIGURE 1. Switching Time

TEST CIRCUITS



C_L (includes fixture and stray capacitance)

FIGURE 5. Break-Before-Make Interval



IN depends on switch configuration: input polarity determined by sense of switch.

FIGURE 2. Charge Injection

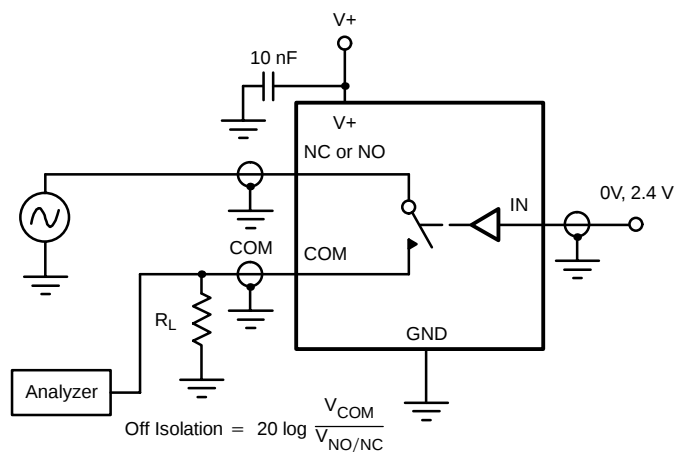


FIGURE 3. Off-Isolation

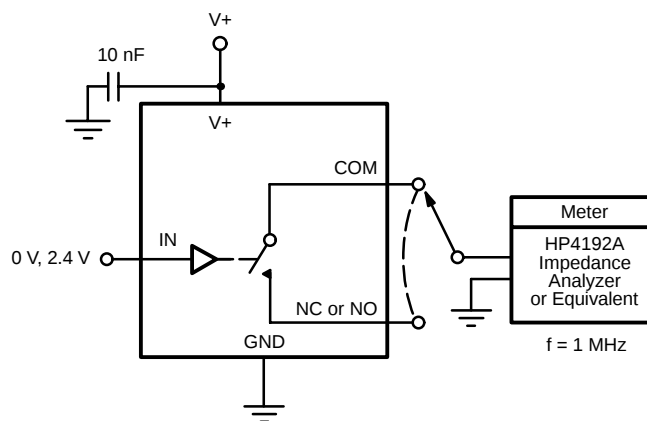


FIGURE 4. Channel Off/On Capacitance