



Low-Voltage Single-Supply, SPDT Analog Switch in SC-70

FEATURES

- 6-Pin SC-70 Package
- 60- Ω Max. (26 Typ.) On-Resistance
- 2- Ω Typ. R_{ON} Flatness
- Fast Switching: $t_{ON} = 30$ ns (Max.)
 $t_{OFF} = 25$ ns (Max.)
- 2.25-V to 5.5-V Single Supply Operation
- Break-Before-Make Switching
- TTL/CMOS-Logic Compatible

BENEFITS

- Reduced Power Consumption
- Simple Logic Interface
- High Accuracy
- Reduce Board Space

APPLICATIONS

- Battery-Operated Equipment
- Audio and Video Signal Routing
- Cellular Phones
- Low-Voltage Data-Acquisition Systems
- Sample-and-Hold Circuits
- Communications Systems

DESCRIPTION

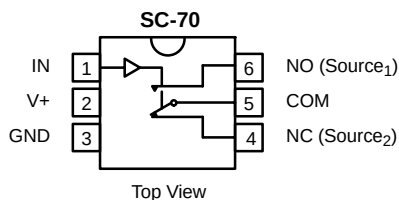
The DG4599 is a cost effective upgrade to other types of 4599 low-voltage, single-pole/double-throw analog switches available in the industry today.

Combining low power, high speed, low on-resistance and small physical size, the DG4599 is ideal for portable and battery powered applications.

The DG4599 is built on Vishay Siliconix's low voltage CMOS process. An epitaxial layer prevents latchup. Break-before-make is guaranteed for DG4599.

Each switch conducts equally well in both directions when on, and blocks up to the power supply level when off.

FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



Device Marking: 4J

TRUTH TABLE

Logic	NC	NO
0	ON	OFF
1	OFF	ON

Logic "0" ≤ 0.8 V
Logic "1" ≥ 2.4 V

ORDERING INFORMATION

Temp Range	Package	Part Number
-40 to 85°C	SC70-6	DG4599DL



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 (Pulsed at 1 ms, 10% duty cycle)	± 200 mA
Storage Temperature (D Suffix)	-65 to 125°C

Power Dissipation (Packages)^b

6-Pin SO70 ^c	250 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 6.5 mW/°C above 75°C

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
Drain-Source On-Resistance	rDS(on)	V+ = 4.5 V, VD = 3 V, IS = 10 mA	Room Full		7 10	60 65	Ω
rDS(on) Flatness ^d	rDS(on) Flatness	V+ = 2.5 V	Room		2		
Switch Off Leakage Current	IS(off)	V+ = 5.5 V VS = 1 V/4.5 V, VD = 4.5 V/1 V	Room Full	-1.0 -4.0		1.0 4.0	nA
	ID(off)		Room Full	-1.0 -4.0		1.0 4.0	
Channel-On Leakage Current	ID(on)	V+ = 5.5 V, VS = VD = 1 V/4.5 V	Room Full	-1.0 -3.0		1.0 4.5	
Digital Control							
Input High Voltage	VINH		Full	2.4			V
Input Low Voltage	VINL		Full			0.8	
Input Capacitance	Cin		Full		3		pF
Input Current	IINL or IINH	VIN = 0 or V+	Full	-1		1	μA
Dynamic Characteristics							
Turn-On Time ^d	tON	VD or VS = 3 V, RL = 300 Ω, CL = 35 pF Figure 1 and 2	Room Full		9	30 40	ns
Turn-Off Time ^d	tOFF		Room Full		5	25 30	
Break-Before-Make Time ^d	t _d		Room	1	4		
Charge Injection ^d	QINJ	CL = 1 nF, VS = 0 V VGEN = 0 V, RGEN = 0 Ω, Figure 3	Room		5	10	pC
Off-Isolation ^d	OIRR	RL = 50 Ω, CL = 5 pF, f = 1 MHz	Room		-73		dB
Crosstalk ^d	XTALK		Room		-70		
Source-Off Capacitance ^d	CS(off)	VIN = 0 or V+, f = 1 MHz	Room		7		pF
Channel-On Capacitance ^d	CD(on)		Room		20		
Drain-to-Source Capacitance ^d	CDS(off)		Room		20		
Power Supply							
Power Supply Range	V+			4.5		5.5	V
Power Supply Current	I+	VIN = 0 or V+			0.01	1.0	μA
Power Consumption	PC					5.5	μW



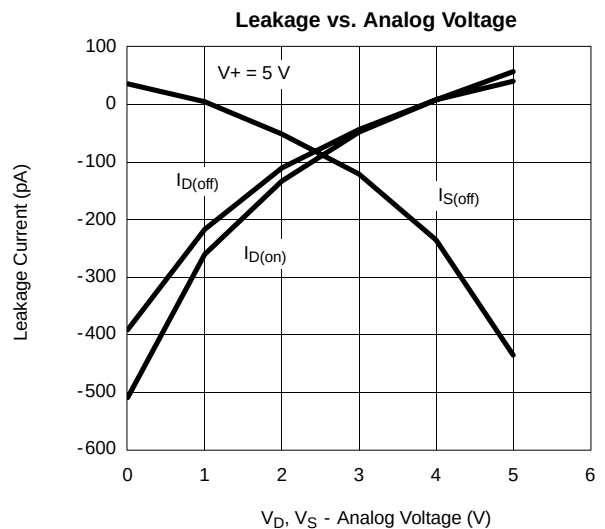
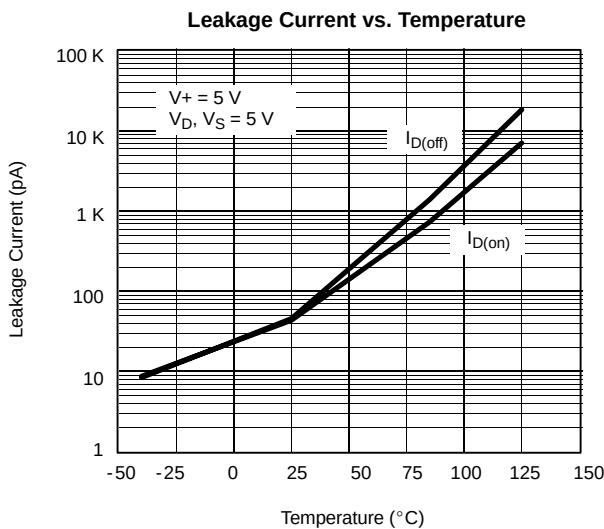
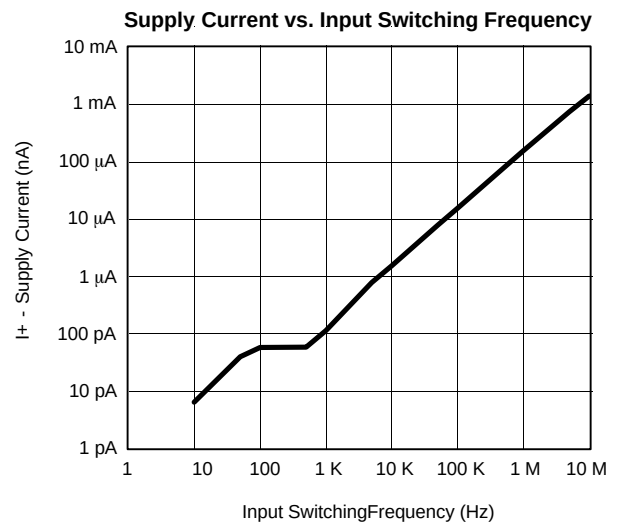
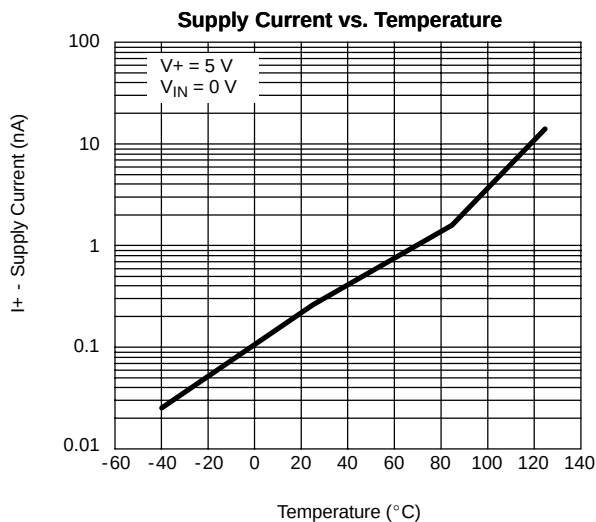
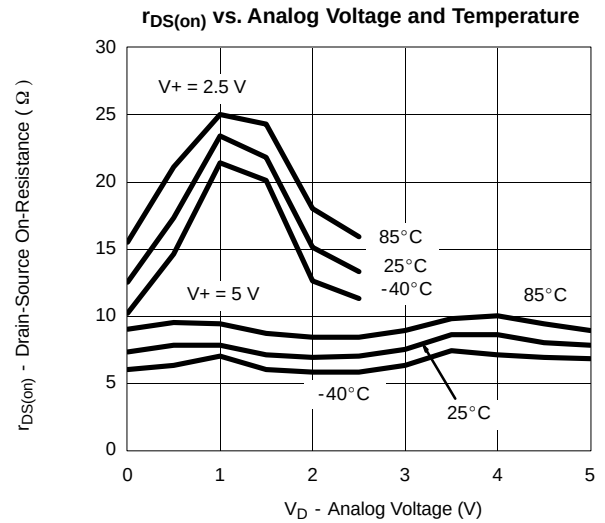
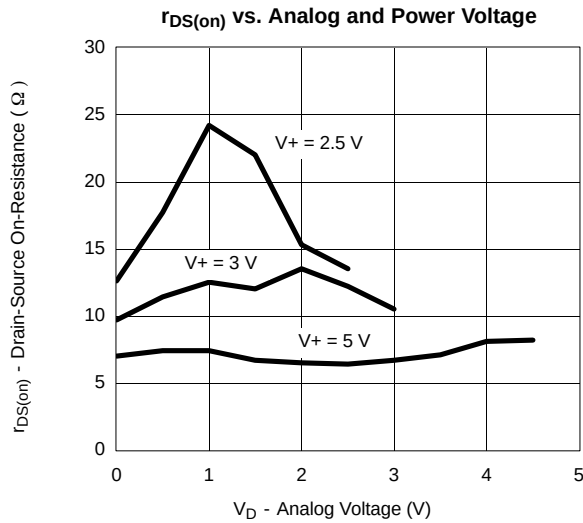
SPECIFICATIONS (V+ = 3 V)							
Parameter	Symbol	Test Conditions Otherwise Unless Specified V+ = 3 V, ±10%, VIN = 0.4 or 2.0 V ^e	Temp ^a	Limits -40 to 85°C			Unit
				Min ^b	Typ ^c	Max ^b	
Analog Switch							
Analog Signal Range ^d	VNO, VNC, VCOM		Full	0		V+	V
Drain-Source On-Resistance ^d	rDS(on)	V+ = 2.7 V, VD = 1.5 V, IS = 10 mA	Room Full		15 19	95 105	Ω
rDS(on) Flatness ^d	rDS(on) Flatness	VS = 0 to V+, IS = 10 mA	Room		7.5		
Digital Control							
Input High Voltage	VINH		Full	2			V
Input Low Voltage	VINL		Full			0.8	
Input Current	IINL or IINH	VIN = 0 or V+	Full	-1		1	μA
Dynamic Characteristics							
Turn-On Time ^d	tON	VD or VS = 2.0 V, RL = 300 Ω, CL = 35 pF Figure 1 and 2	Room Full		12	45 55	ns
Turn-Off Time ^d	tOFF		Room Full		6	35 40	
Break-Before-Make Time ^d	td		Room	1	7		
Charge Injection ^d	QINJ	CL = 1 nF, VGEN = 0 V, VS = 0 V RGEN = 0 Ω, Figure 3	Room		5	10	pC
Power Supply							
Power Supply Range	V+			2.7		3.3	V
Power Supply Current	I+	VIN = 0 or V+			0.01	1.0	μA
Power Consumption	PC					3.3	μW

SPECIFICATIONS (V+ = 2.5 V)							
Parameter	Symbol	Test Conditions Otherwise Unless Specified V+ = 2.5 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
Drain-Source On-Resistance	rDS(on)	V+ = 2.25 V, VD = 1.0 V, IS = 10 mA	Room Full ^d		26 29	110 120	Ω
rDS(on) Flatness ^d	rDS(on) Flatness	V+ = 2.5 V	Room		10		
Digital Control							
Input High Voltage	VINH		Full	2			V
Input Low Voltage	VINL		Full			0.4	
Input Current	IINL or IINH	VIN = 0 or V+	Full	-1		1	μA
Dynamic Characteristics							
Turn-On Time	tON	VD or VS = 1.5 V, RL = 300 Ω, CL = 35 pF Figures 1 and 2	Room Full ^d		16	50 60	ns
Turn-Off Time	tOFF		Room Full ^d		7	35 45	
Break-Before-Make Time	td		Room	1	12		
Power Supply							
Power Supply Range	V+			2.25		2.75	V
Power Supply Current ^d	I+	VIN = 0 or V+			0.01	1.0	μA
Power Consumption	PC						2.75

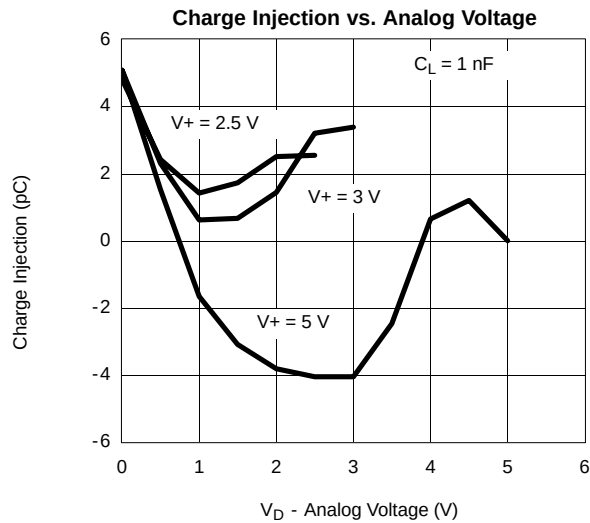
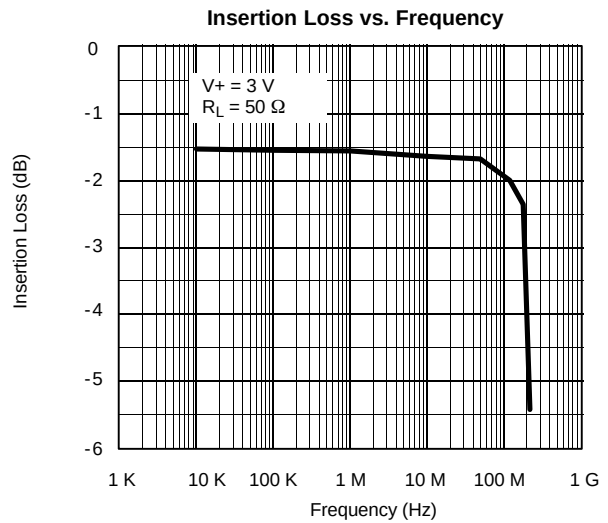
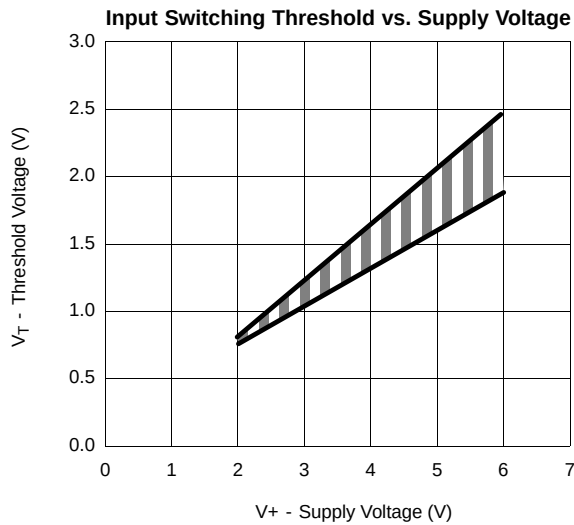
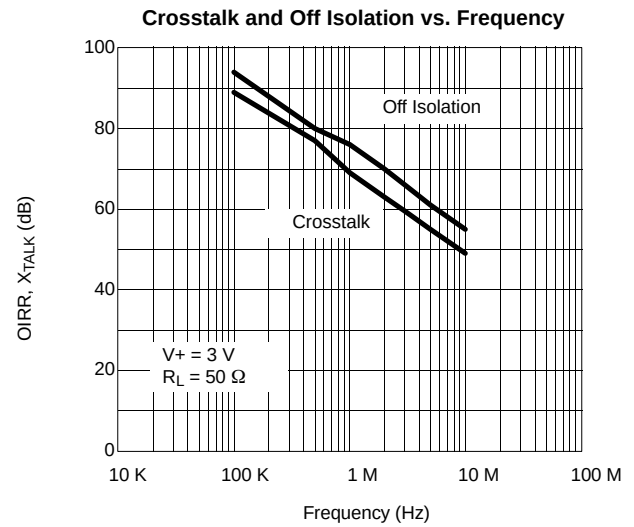
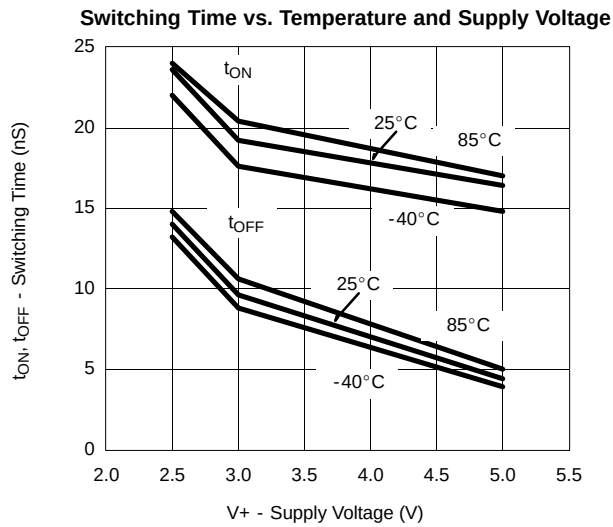
Notes:

- Room = 25°C, Full = as determined by the operating suffix.
- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Typical values are for design aid only, not guaranteed nor subject to production testing.
- 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.

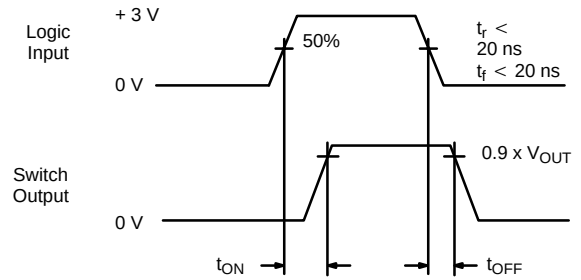
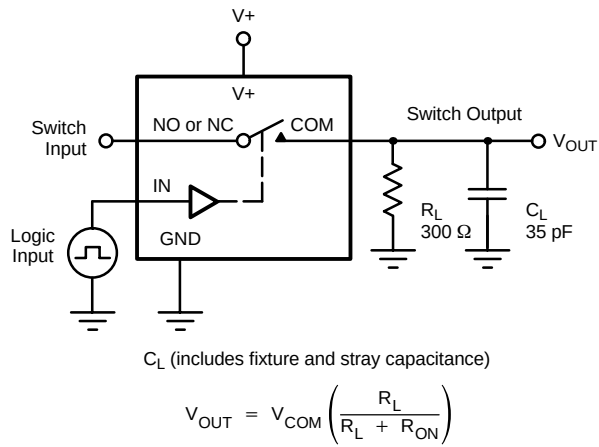
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)



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

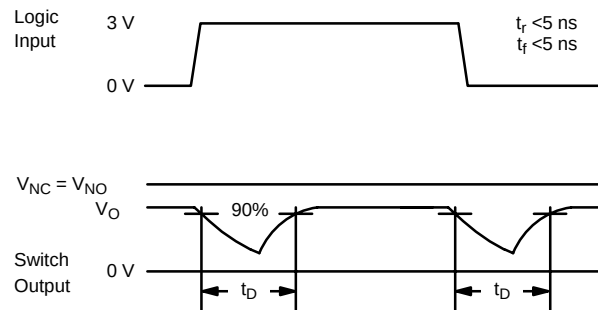
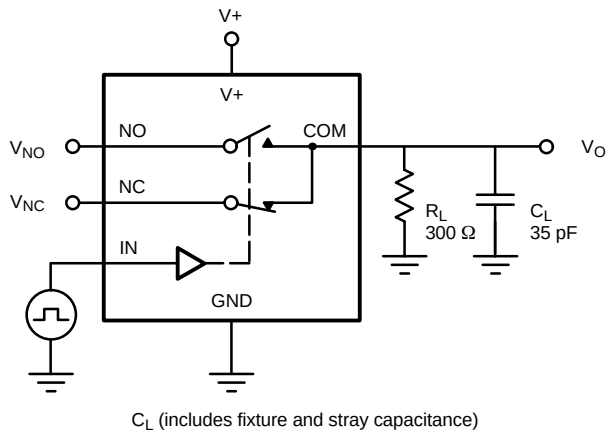
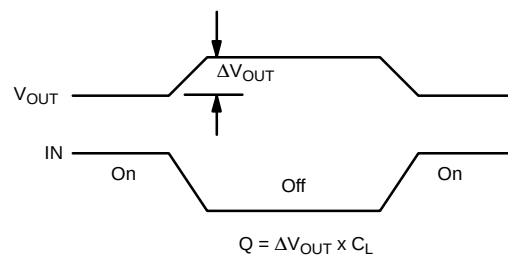
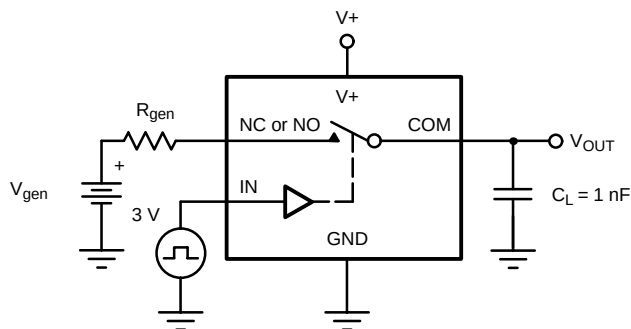


FIGURE 2. Break-Before-Make Interval



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

FIGURE 3. Charge Injection



TEST CIRCUITS

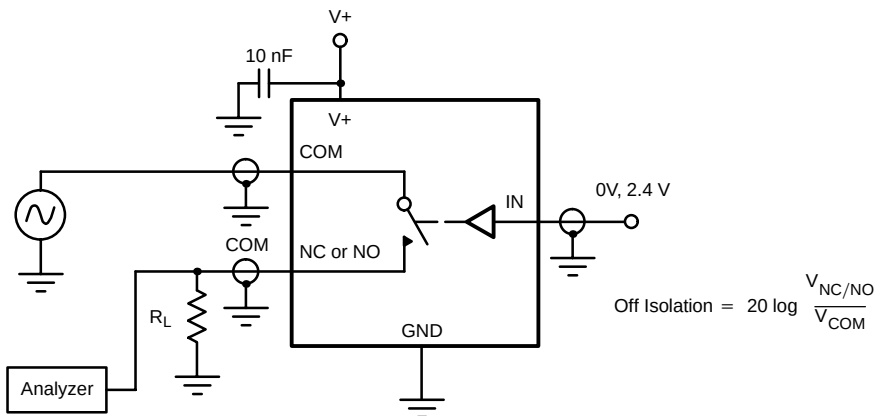


FIGURE 4. Off-Isolation

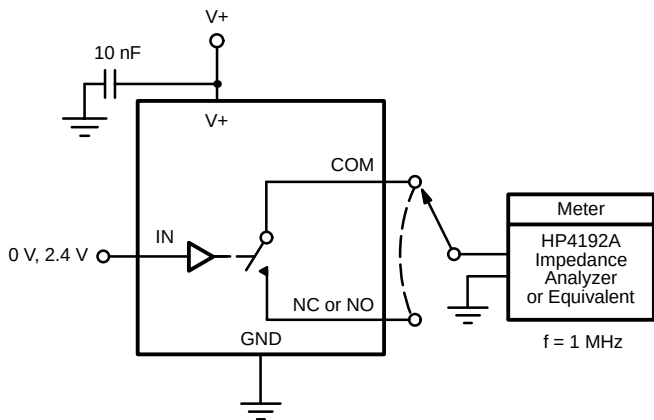


FIGURE 5. Channel Off/On Capacitance