

Single 4:1 Low r_{ON} Multiplexers

FEATURES

- Low Voltage Operation (1.8 to 5.5 V)
- Low On-Resistance - $r_{DS(on)}$: 4 Ω
- Off-Isolation and Crosstalk: -55 dB @ 10 MHz
- Fast Switch - 25 ns t_{ON}
- Low Charge Injection - Q_{INJ} : 4.7 pC
- Low Power Consumption - 4 μ W

BENEFITS

- High Accuracy
- High Bandwidth
- TTL and Low Voltage Logic Compatibility
- Low Power Consumption
- Reduced PCB Space

APPLICATIONS

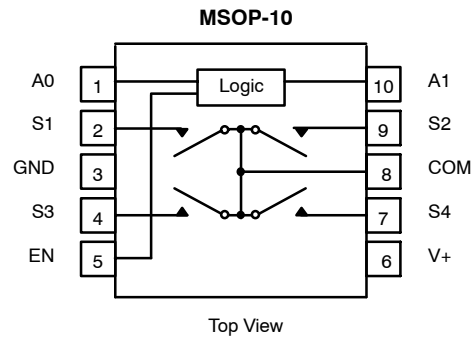
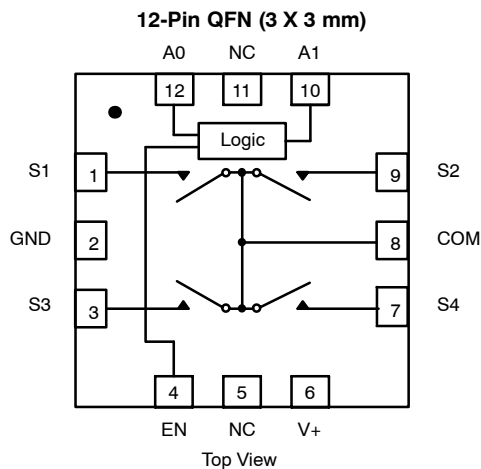
- Mixed Signal Routing
- Portable and Battery Operated Systems
- Low Voltage Data Acquisition
- Modems
- PCMCIA Cards

DESCRIPTION

The DG2034 is a low voltage, low r_{ON} , high bandwidth single 4 to 1 analog multiplexer designed for high performance switching of analog and video signals. Combining low power; fast switching; low on-resistance, flatness and matching; and small physical size, the DG2034 is ideal for portable and battery applications.

Built on Vishay Siliconix's low voltage CMOS process, the DG2034 has an epitaxial layer which prevents latchup. Break-before-make is guaranteed.

FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



TRUTH TABLE

A1	A0	EN	ON Switch
X	X	0	None
0	0	1	S1
0	1	1	S2
1	0	1	S3
1	1	1	S4

ORDERING INFORMATION

Temp Range	Package	Part Number
-40 to 85°C	MSOP-10	DG2034DQ
	12-Pin QFN (3 x 3 mm)	DG2034DN

ABSOLUTE MAXIMUM RATINGS

Reference to GND

V+ -0.3 to +6 V

A_X, E_N, S_X, COM^a -0.3 to (V+ + 0.3 V)Continuous Current (Any terminal) ± 50 mAPeak Current ± 100 mA

(Pulsed at 1ms, 10% duty cycle)

Power Dissipation (Package)^bQFN-12 (3 x 3 mm)^c 850 mW

MSOP-10 320 mW

Storage Temperature (D Suffix) -65 to 150°C

Notes:

- Signals on S_X, D_X, EN or A_X exceeding V+ or 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%, V _{AL} = 0.4, V _{AH} = 2.0 V ^e	Temp ^a	Limits -40 to 85°C			Unit
				Min ^c	Typ ^b	Max ^c	
Analog Switch							
Analog Signal Range ^d	V _{ANALOG}		Full	0		V+	V
On-Resistance	r _{ON}	V+ = 2.7 V, V _{COM} = 0.5 V/1.5 V/2.0 V I _S = 10 mA	Room Full		4	7 9	Ω
r _{ON} Match	Δr _{ON}		Room		0.1	0.3	
r _{ON} Flatness ^{d, f}	r _{ON} Flatness		Room		0.3	1.5	
Off Leakage Current ^g	I _{S(off)}	V+ = 3.3 V, V _S = 1 V / 3 V V _{COM} = 3 V / 1 V, V _{EN} = 0 V	Room Full	-1 -10	0.3	1 10	nA
COM Off Leakage Current ^g	I _{COM(off)}		Room Full	-1 -10	0.3	1 10	
Channel-On Leakage Current ^g	I _{COM(on)}	V+ = 3.3 V V _{COM} = V _S = 1 V / 3 V	Room Full	-1 -10	0.3	1 10	
Digital Control							
Input Current ^d	I _A or I _{EN}	V _{A/EN} = 0 or V+, See Truth Table	Full	-1.0		1.0	μA
Input High Voltage ^d	V _{AH} or V _{ENH}		Full	2.0			V
Input Low Voltage ^d	V _{AL} or V _{ENL}		Full			0.4	
Dynamic Characteristics							
Turn-On Time	t _{ON}	V _S = 1.5 V, R _L = 300 Ω	Room Full		25	35 45	ns
Turn-Off Time	t _{OFF}		Room Full		15	25 35	
Break-Before-Make Time ^d	t _D		Room		10.5		
Transition Time	t _{trans}	V _S = 1.5 V/0 V, V _S = 0 V/1.5 V, R _L = 300 Ω	Room Full		30	45 55	
Charge Injection ^d	Q _{INJ}	C _L = 1 nF, V _{gen} = 0 V, R _{gen} = 0 Ω	Room		-4.7		pC
Off-Isolation ^d	OIRR	R _L = 50 Ω, C _L = 5 pF	f = 1 MHz	Room	-73		dB
			f = 10 MHz	Room	-54		
Channel-to-Channel Crosstalk ^d	X _{TALK}	R _L = 50 Ω, C _L = 5 pF	f = 1 MHz	Room	-77		
			f = 10 MHz	Room	-59		
Off Capacitance ^d	C _{S(off)}	V+ = 2.7 V, f = 1 MHz	Room		14		pF
COM Off Capacitance ^d	C _{COM(off)}		Room		46		
COM On Capacitance ^d	C _{COM(on)}		Room		67		
Power Supply							
Power Supply Range	V+			2.7		3.3	V
Power Supply Current ^d	I+	V+ = 3.3 V, V _{A/EN} = 0 or 3.3 V, See Truth Table	Full			1.0	μA

Notes:

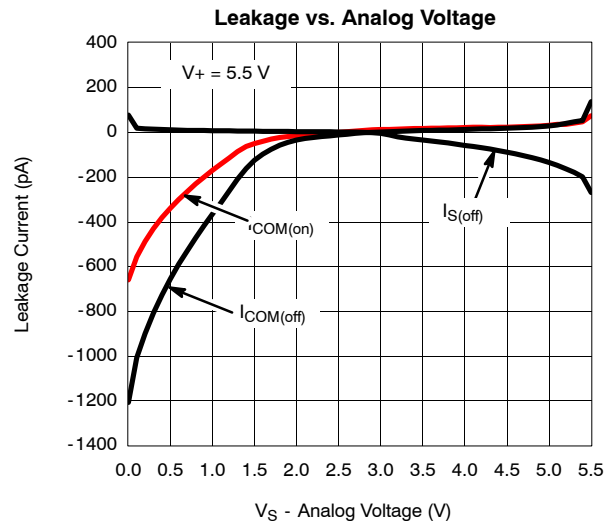
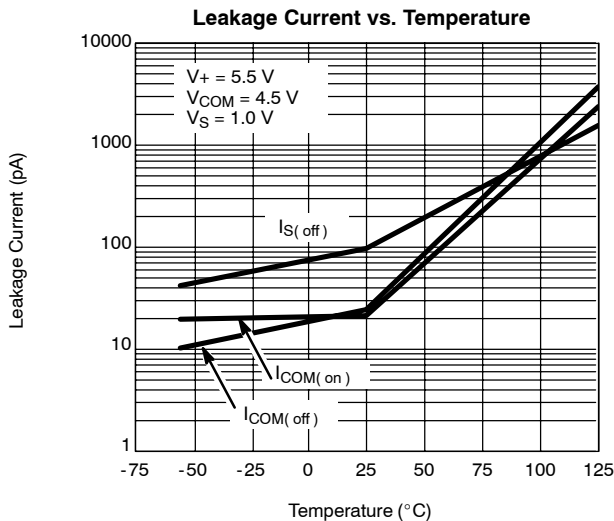
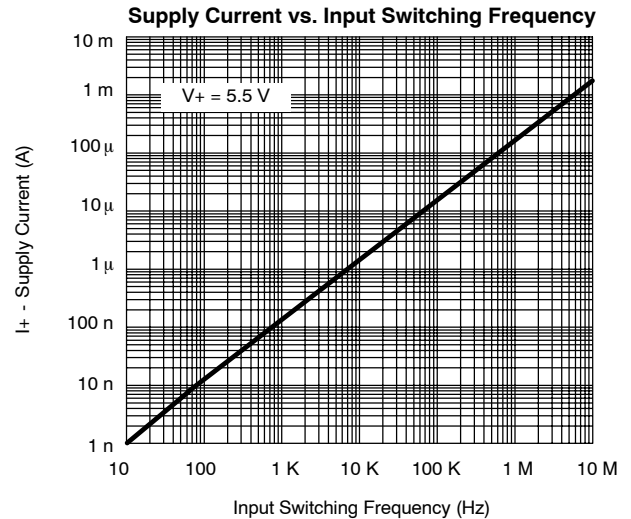
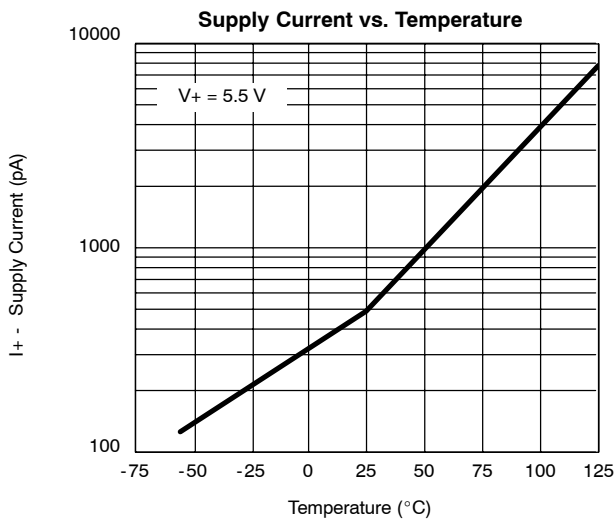
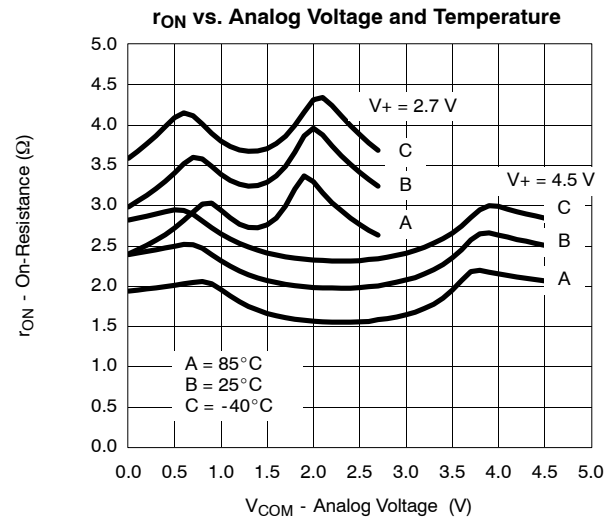
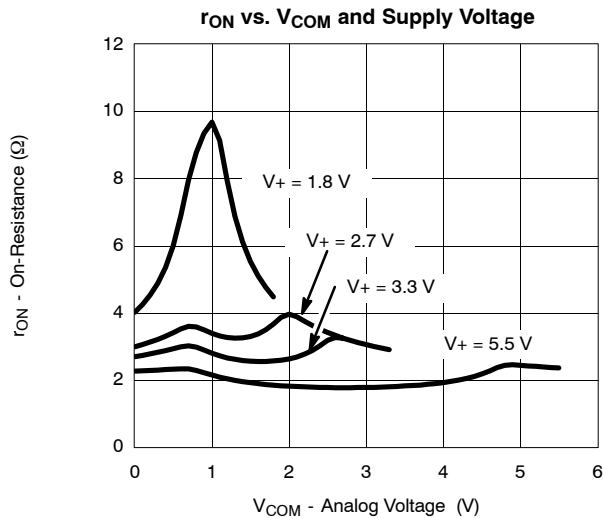
- Room = 25°C, Full = as determined by the operating suffix.
- Typical values are for design aid only, not guaranteed nor subject to production testing.
- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Guarantee by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



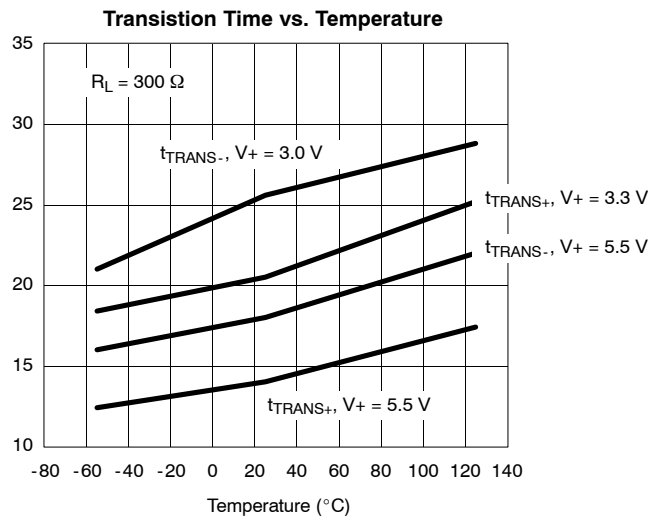
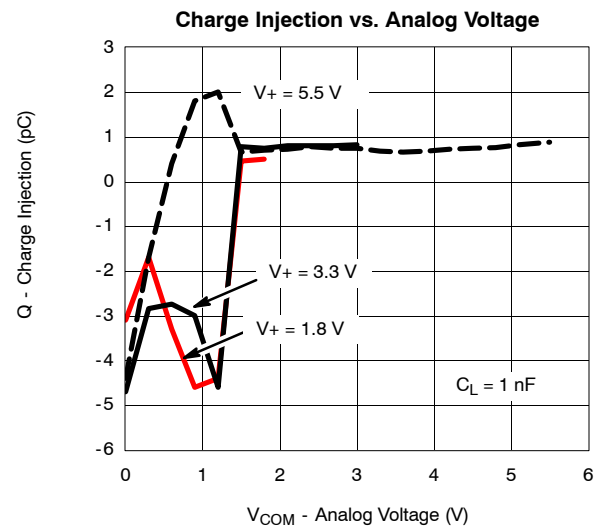
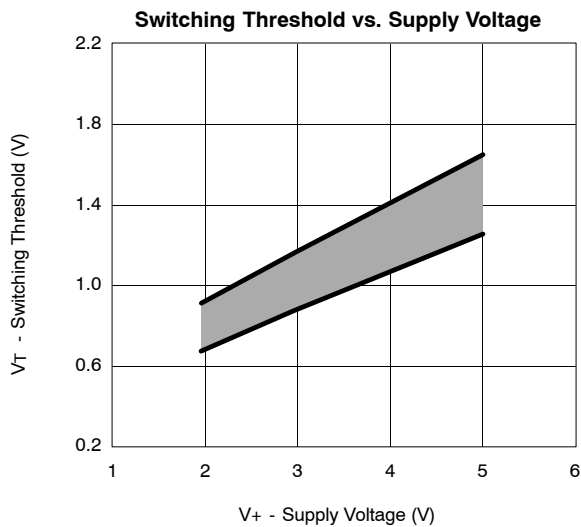
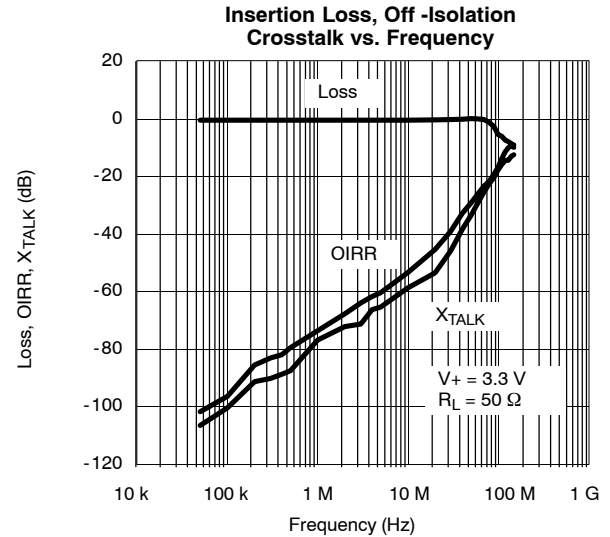
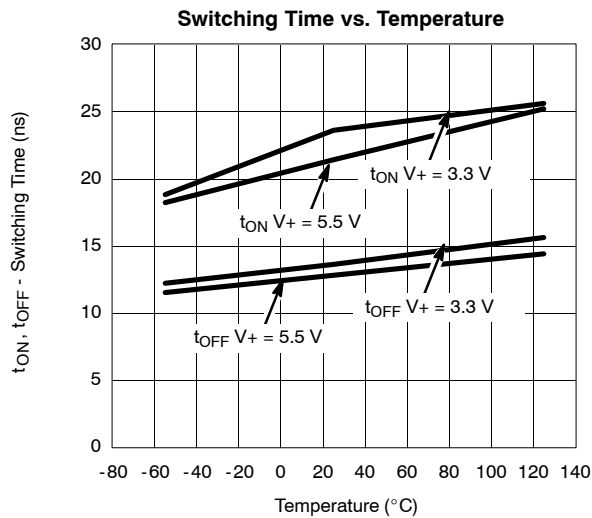
SPECIFICATIONS (V+ = 5 V)							
Parameter	Symbol	Test Conditions Otherwise Unless Specified V+ = 5 V, ±10%, VAL = 0.8 or VAH = 2.4 V ^e	Temp ^a	Limits -40 to 85°C			Unit
				Min ^c	Typ ^b	Max ^c	
Analog Switch							
Analog Signal Range ^d	VANALOG		Full	0		V+	V
On-Resistance	rON	V+ = 4.5 V, VCOM = 1.5 V/2.5 V/3.5 V IS = 10 mA	Room Full		3	5.5 7	Ω
rON Match	ΔrON		Room		0.16	0.5	
rON Flatness ^{d, f}	rON Flatness		Room		0.6	1.5	
Off Leakage Current	IS(off)	V+ = 5.5 V, VS = 1 V / 4.5 V VCOM = 4.5 V / 1 V, VEN = 0 V	Room Full	-1 -10	0.5	1 10	nA
COM Off Leakage Current	ICOM(off)		Room Full	-1 -10	0.5	1 10	
Channel-On Leakage Current	ICOM(on)	V+ = 5.5 V, VCOM = VS = 1 V / 4.5 V	Room Full	-1 -10	0.5	1 10	
Digital Control							
Input Current ^d	IAH or IENH	VA or VEN = 0 or V+, See Truth Table	Full	-1.0		1.0	μA
Input High Voltage ^d	VAH or VENH		Full	2.4			V
Input Low Voltage ^d	VAL or VENL		Full			0.8	
Dynamic Characteristics							
Turn-On Time	tON	VS = 3.0 V, RL = 300 Ω	Room Full		18	30 40	ns
Turn-Off Time	tOFF		Room Full		12	20 30	
Break-Before-Make Time ^d	tD		Room		10.5		
Transition Time	ttrans	VS = 3 V/0 V, VS = 0 V/3 V, RL = 300 Ω	Room Full		25	40 50	
Off-Isolation ^d	OIRR	RL = 50 Ω, CL = 5 pF	f = 1 MHz	Room		-73	dB
			f = 10 MHz	Room		-53.5	
Channel-to-Channel Crosstalk ^d	XTALK	RL = 50 Ω, CL = 5 pF	f = 1 MHz	Room		-77	
			f = 10 MHz	Room		-60.2	
Charge Injection ^d	QINJ	CL = 1 nF, Vgen = 0 V, Rgen = 0 Ω	Room		-4.4		pC
Off Capacitance ^d	CS(off)	V+ = 5.0 V, f = 1 MHz	Room		13		pF
COM Off Capacitance ^d	CCOM(off)		Room		43		
COM On Capacitance ^d	CCOM(on)		Room		64		
Power Supply							
Power Supply Range	V+			4.5		5.5	V
Power Supply Current	I+	V+ = 5.5 V, VA/EN = 0 or 5.5 V, See Truth Table	Full			1.0	μA

Notes:

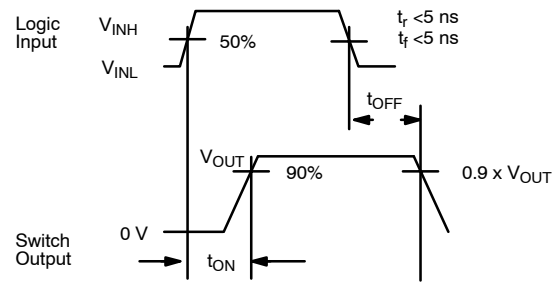
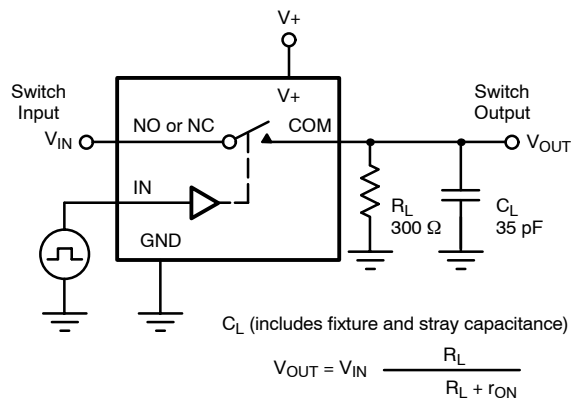
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- Difference of min and max values.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)


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TEST CIRCUITS



Note: Logic input waveform is inverted for switches that have the opposite logic sense control

Figure 2. Switching Time

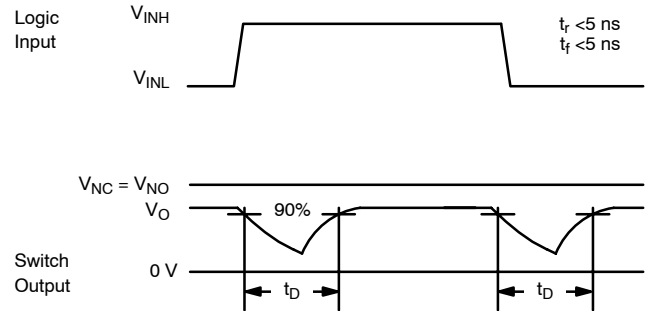
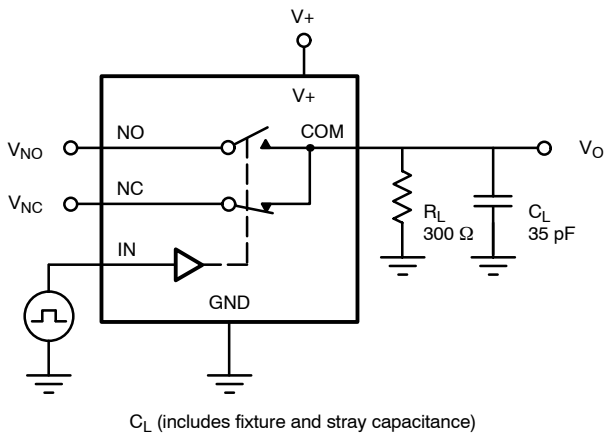


Figure 3. Break-Before-Make

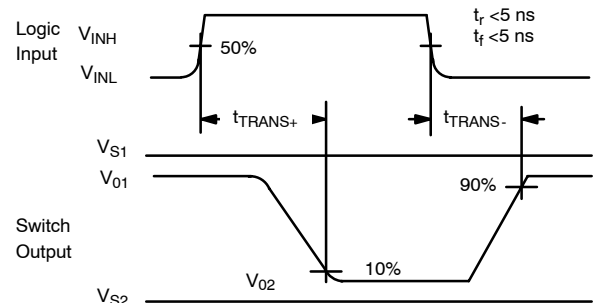
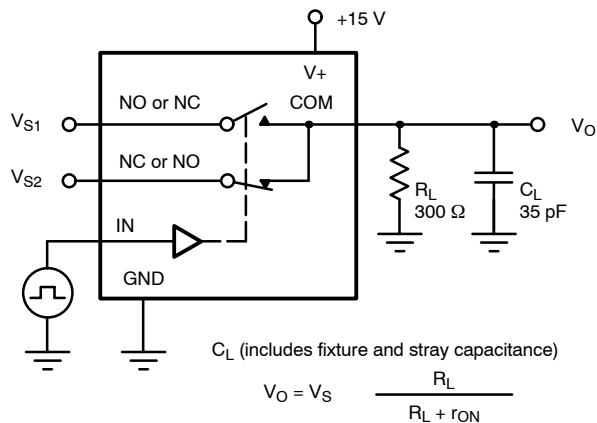


Figure 4. Transition Time

TEST CIRCUITS

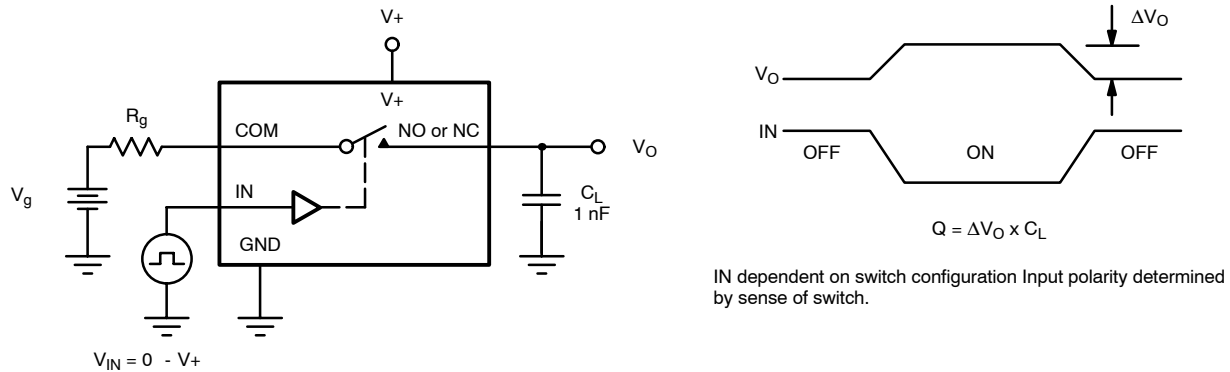


Figure 5. Charge Injection

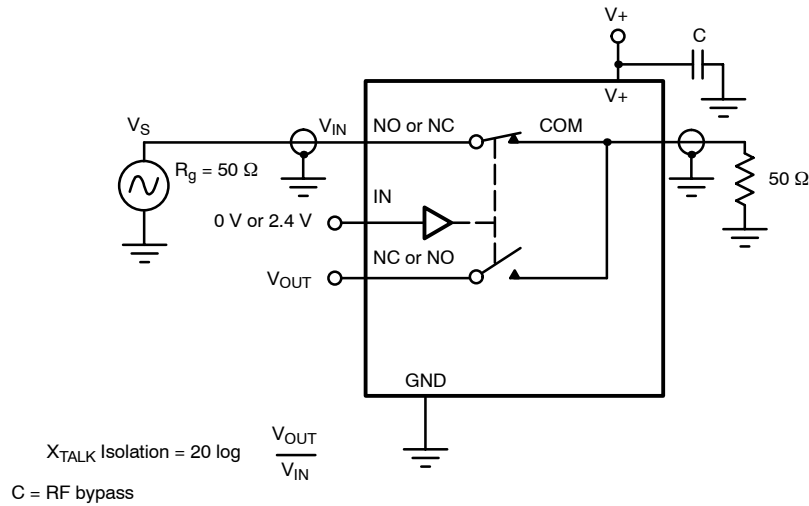


Figure 6. Crosstalk

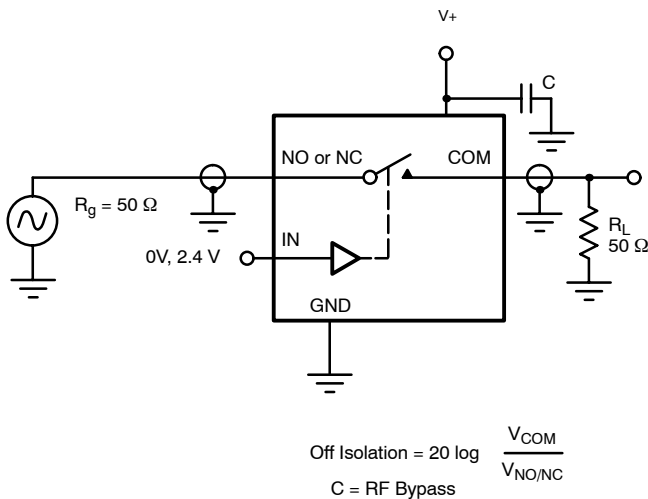


Figure 7. Off Isolation

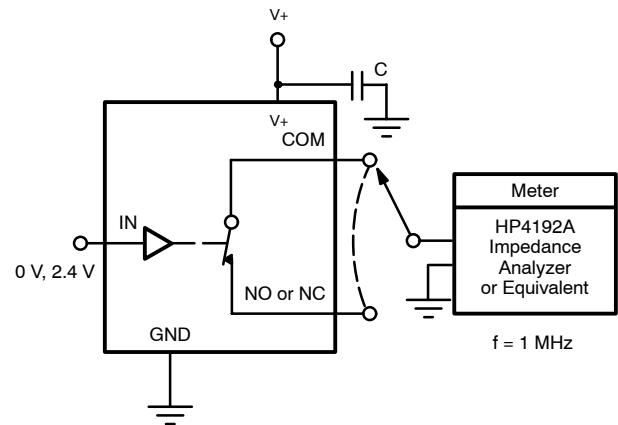


Figure 8. Source/Drain Capacitances